1971

Water Resources Data for Minnesota

Part 1. Surface Water Records

Part 2. Water Quality Records

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Prepared in cooperation with the Minnesota Department of Natural Resources, Division of Waters, Soils and Minerals; the Minnesota Department of Highways; and with other State, municipal, and Federal agencies

CALENDAR FOR WATER YEAR 1971

OCTOBER 1970

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

NOVEMBER 1970

S	M	T	W	T	F	S
1	2	3	4	5	6	7
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29	30					

DECEMBER 1970

S	M	T	W	T	F	S
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27	28	29	30	31		

JANUARY 1971

S	M	T	W	T	F	S
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3	4	5	6	7	8	9
10	11	12	13	14	15	16
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31						

FEBRUARY 1971

S	M	T	W	T	F	S
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28						

MARCH 1971

S	M	T	W	T	F	S
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28	29	30	31			

APRIL 1971

S	M	T	W	T	F	S
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MAY 1971

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16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

JUNE 1971

S	M	T	W	T	F	S
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27	28	29	30			

JULY 1971

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

AUGUST 1971

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

SEPTEMBER 1971

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

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Prepared in cooperation with

Minnesota Department of Natural Resources
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Pelican River Watershed District
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City of Austin
City of Rochester
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1973

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WATER RESOURCES DATA FOR MINNESOTA, 1971

Part 1. Surface-Water Records
Part 2. Water-Quality Records

INTRODUCTION

Water resources data for the 1971 water year for Minnesota including records of streamflow or reservoir storage at gaging stations, partial-record stations, and miscellaneous sites, and records of water-quality data on the chemical and physical characteristics of surface- and ground-water, are given in this report. Records for a few pertinent gaging and water-quality stations and selected data on chemical quality of ground water in bordering States are also included. The records were collected and computed by the Water Resources Division of the U. S. Geological Survey under the direction of Charles R. Collier, district chief. Hydrologic data in this report are collected by the U. S. Geological Survey and cooperating State and Federal agencies in Minnesota. The data are part of the National Water Data System.

Through September 30, 1960, the records of discharge and stage of streams and contents and stage of lakes or reservoirs were published in an annual series of U. S. Geological Survey water-supply papers entitled, "Surface Water Supply of the United States."

Beginning with the 1961 water year, streamflow records and related data have been released by the Geological Survey in annual reports on a State-boundary basis. Distribution of these reports is limited; they are designed primarily for rapid release of data shortly after the end of the water year to meet local needs. The streamflow records for 1961-65 are also published in a Geological Survey water-supply paper series entitled, "Surface Water Supply of the United States 1961-65." There will be a similar series of water-supply papers for the water years 1966-70.

The Geological Survey has published records of chemical quality, suspended sediment, and water temperatures since 1941 in an annual series of water-supply papers entitled, "Quality of Surface Waters of the United States." Beginning with the 1964 water year, water-quality records also have been released on a State-boundary basis in conjunction with streamflow records or in a separate volume.

COOPERATION

The U. S. Geological Survey and organizations of the State of Minnesota have had cooperative agreements for the systematic collection of streamflow records since 1909, and for water-quality records since 1952. Organizations that supplied data are acknowledged in station

descriptions. Organizations that assisted in collecting data through cooperative agreement with the Survey are:

Minnesota Department of Conservation, Division of Waters, Soils and Minerals, Eugene R. Gere, director.

Minnesota Department of Highway, N. T. Waldor, commissioner.

Assistance in the form of funds or services was given by the Corps of Engineers, U. S. Army, in collecting records for 31 gaging stations published in this report.

Several gaging stations in the Hudson Bay and St. Lawrence River basins were maintained by funds appropriated to the United States Department of State.

On waters adjacent to the international boundary, certain gaging stations are maintained by the United States (or Canada) under agreement with Canada (or the United States), and the records are obtained and compiled in a manner equally acceptable in both countries. These stations are designated herein as "International gaging stations."

Some records for the Red River of the North, which border the State on the west, were obtained at the request of other Federal agencies as a part of the program of the U. S. Department of the Interior for development of the Missouri River basin.

DEFINITION OF TERMS

Definition of terms related to streamflow, water-quality, and other hydrologic data, as used in this report, are defined as follows:

Acre-foot (AC-FT, acre-ft) is the quantity of water required to cover 1 acre to a depth of 1 foot and is equivalent to 43,560 cubic feet or 325,851 gallons.

Biochemical oxygen demand (BOD) is the amount of oxygen required by bacteria while stabilizing decomposable organic matter under aerobic conditions.

Chemical oxygen demand (COD) indicates the quantity of oxidizable compounds present in a water and will vary with water compositions, temperature, period of contact, and other factors.

Coliform organisms are a group of bacteria used as an indicator of the sanitary quality of the water. The number of coliform colonies per 100 milliliters is determined by the immediate or delayed incubation membrane filter method.

Contents is the volume of water in a reservoir or lake. Unless otherwise indicated, volume is computed on the basis of a level pool and does not include bank storage.

Control designates a feature downstream from the gage that determines the stage-discharge relation at the gage. This feature may be a natural constriction of the channel, an artificial structure, or a uniform cross section over a long reach of the channel.

Cfs-day is the volume of water represented by a flow of 1 cubic foot per second for 24 hours. It is equivalent to 86,400 cubic feet, 1.9835 acre-feet, or 646,317 gallons, and represents a runoff of 0.0372 inch from 1 square mile.

Cubic feet per second per square mile (CFSM) is the average number of cubic feet of water flowing per second from each square mile of area drained, assuming that the runoff is distributed uniformly in time and area.

Cubic foot per second (cfs) is the rate of discharge representing a volume of 1 cubic foot passing a given point during 1 second and is equivalent to 7.48 gallons per second or 448.8 gallons per minute.

Discharge is the volume of water (or more broadly, total fluids), that passes a given point within a given period of time.

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

Instantaneous discharge is the discharge at a particular instant of time. If this discharge is reported instead of the daily mean, the heading of the discharge column in the tables is "Discharge (cfs)."

Drainage area of a stream at a specified location is that area measured in a horizontal plane, enclosed by a topographic divide from which direct surface runoff from precipitation normally drains by gravity into the stream above the specified point. Figures of drainage area given herein include all closed basins, or noncontributing areas, within the area unless otherwise noted.

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

Gaging station is a particular site on a stream, canal, lake, or reservoir where systematic observations of gage height or discharge are obtained. When used in connection with a discharge record, the term is applied only to those gaging stations where a continuous record of discharge is obtained.

Hardness of water is a physical-chemical characteristic attributable to the presence of alkaline earths (principally calcium and magnesium) and is expressed as equivalent calcium carbonate ($CaCO_3$).

Methylene blue active substance (MBAS) is a measure of apparent detergents. This determination depends on the formation of a blue color when methylene blue dye reacts with snythetic detergent compounds.

Micrograms per liter (µg/l, UG/L) is a unit expressing the concentration of chemical constituents in solution as the weight (micrograms) of solute per unit volume (liter) of water. One thousand micrograms per liter is equivalent to one milligram per liter.

Milligrams per liter (mg/l, MG/L) is a unit for expressing the concentration of chemical constituents in solution. Milligrams per liter represents the weight of solute per unit volume of water. Milligrams or micrograms per liter may be converted to milliequivalents (one thousandth of a gram-equivalent weight of a constituent) per liter by multiplying by the factors in table 1, page 5. Concentration of suspended sediment also is expressed in mg/l, and is based on the weight of sediment per liter of water-sediment mixture. Sediment concentrations may be converted to parts per million by using the factors in table 2, page 5.

Partial-record station is a particular site where limited streamflow or water-quality data are collected systematically over a period of years for use in hydrologic analyses.

Particle size is the diameter, in millimeters (mm), of suspended sediment or bed material determined by either sieve or sedimentation methods. Sedimentation methods (pipet, bottom-withdrawal tube, visual-accumulation tube) determine fall diameter of particles in either distilled water (chemically dispersed) or in native water (the river water at the time and point of sampling) (Guy, 1969).

Particle-size classification used in this report agrees with recommentations made by the American Geophysical Union Subcommittee on Sediment Terminology. The classification is as follows:

Classification	Size (mm)	Method of analysis
Clay.....	0.00024 - 0.004	Sedimentation.
Silt.....	.004 - .062	Sedimentation.
Sand.....	.062 - 2.0	Sedimentation or sieve.
Gravel.....	2.0 - 64.0	Sieve.

The particle-size distribution given in this report are not necessarily representative of all particles in transport in the stream. Most of the organic material is removed and the sample is subjected to mechanical and chemical dispersion before analysis in distilled water. Chemical dispersion is not used for native-water analysis (Guy, 1969).

Table 1.--Factors for conversion of chemical constituents in milligrams or micrograms per liter to milliequivalents per liter

Ion	Multiply by	Ion	Multiply by
Aluminum (Al^{+3})*...	0.11119	Iodide (I^{-1}).....	0.00788
Ammonia as NH_4^{+1}...	.05544	Iron (Fe^{+3})*.....	.05372
Barium (Ba^{+2}).....	.01456	Lead (Pb^{+2})*.....	.00965
Bicarbonate (HCO_3^{-1})	.01639	Lithium (Li^{+1})*...	.14411
Bromide (Br^{-1}).....	.01251	Magnesium (Mg^{+2})..	.08226
Calcium (Ca^{+2}).....	.04990	Manganese (Mn^{+2})*.	.03640
Carbonate (CO_3^{-2})...	.03333	Nickel (Ni^{+2})*....	.03406
Chloride (Cl^{-1})....	.02821	Nitrate (NO_3^{-1})...	.01613
Chromium (Cr^{+6})*...	.11539	Nitrite (NO_2^{-1})...	.02174
Cobalt (Co^{+2})*.....	.03394	Phosphate (PO_4^{-3}).	.03159
Copper (Cu^{+2})*.....	.03148	Potassium (K^{+1})...	.02557
Cyanide (CN^{-1}).....	.03844	Sodium (Na^{+1}).....	.04350
Fluoride (F^{-1}).....	.05264	Strontium (Sr^{+2})*.	.02283
Hydrogen (H^{+1}).....	.99209	Sulfate (SO_4^{-2})...	.02082
Hydroxide (OH^{-1})...	.05880	Zinc (Zn^{+2})*.....	.03060

*Constituent reported in micrograms per liter; multiply by factor and divide results by 1,000.

Table 2.--Factors for conversion of sediment concentration in milligrams per liter to parts per million*
(All values calculated to three significant figures)

Range of concentration in 1000 mg/l	Divide by	Range of concentration in 1000 mg/l	Divide by	Range of concentration in 1000 mg/l	Divide by	Range of concentration in 1000 mg/l	Divide by
0 - 8	1.00	201-217	1.13	411-424	1.26	619-634	1.39
8.05- 24	1.01	218-232	1.14	427-440	1.27	636-650	1.40
24.2 - 40	1.02	234-248	1.15	443-457	1.28	652-666	1.41
40.5 - 56	1.03	250-264	1.16	460-473	1.29	668.682	1.42
56.5 - 72	1.04	266-280	1.17	476-489	1.30	684-698	1.43
72.5 - 88	1.05	282-297	1.18	492-506	1.31	700-715	1.44
88.5 -104	1.06	299-313	1.19	508-522	1.32	717-730	1.45
105 -120	1.07	315-329	1.20	524-538	1.33	732-747	1.46
121 -136	1.08	331-345	1.21	540-554	1.34	749-762	1.47
137 -152	1.09	347-361	1.22	556-570	1.35	765-780	1.48
153 -169	1.10	363-378	1.23	572-585	1.36	782-796	1.49
170 -185	1.11	380-393	1.24	587-602	1.37	798-810	1.50
186 -200	1.12	395-409	1.25	604-617	1.38		

*Based on water density of 1.000 g/ml and a specific gravity of sediment of 2.65.

Plankton is the floating (or weakly swimming) animal or plant life in a body of water consisting chiefly of minute plants (as diatoms and blue-green algae) and of minute animals (as protozoan, entomostracans, and various larvae).

Runoff in inches (IN.) shows the depth to which the drainage area would be covered if all the runoff for a given time period were uniformly distributed on it.

Sediment is solid material that originates mostly from disintegrated rocks and is transported by, suspended in, or deposited from water; it includes chemical and biochemical precipitates and decomposed organic material such as humus. The quantity, characteristics, and cause of the occurrence of sediment in streams are influenced by environmental factors. Some major factors are degree of slope, length of slope, soil characteristics, land usage, and quantity and intensity of precipitation.

Suspended sediment is the sediment that at any given time is maintained in suspension by the upward components of turbulent currents or that exists in suspension as a colloid.

Suspended-sediment discharge is the rate at which dry weight of sediment passes a section of a stream or is the quantity of sediment, as measured by dry weight, or by volume, that is discharged in a given time. It is computed by multiplying discharge times mg/l times 0.0027.

Total sediment discharge or total sediment load is the sum of the suspended-sediment discharge and the bedload discharge. It is the total quantity of sediment, as measured by dry weight or volume, that is discharged during a given time (Colby and Hembree, 1955).

Suspended-sediment concentration is the velocity-weighted concentration of suspended sediment in the sampled zone (from the water surface to a point approximately 0.3 ft above the bed) expressed as milligrams of dry sediment per liter of water-sediment mixture (mg/l).

Mean concentration is the time-weighted concentration of suspended sediment passing a stream section during a 24-hour day.

Sodium adsorption ratio (SAR) is the expression of relative activity of sodium ions in exchange reactions with soil and is an index of sodium or alkali hazard to the soil. This ratio should be known especially for water used for irrigating farmland.

Solute is any substance derived from the atmosphere, vegetation, soil, or rocks that is dissolved in water.

Specific conductance is a measure of the ability of a water to conduct an electrical current and is expressed in micromhos per centimeter at 25°C. Because the specific conductance is related to the number and specific chemical types of ions in solution, it can be used for approximating the dissolved-solids content in the water. Commonly, the amount of dissolved solids (in milligrams per liter) is about 65 percent of the specific conductance (in micromhos). This relation is not constant from stream to stream or from well to well, and it may even vary in the same source with changes in the composition of the water.

Stage-discharge relation is the relation between gage height and the volume of water per unit of time, flowing in a channel.

Thermograph is a thermometer that continuously and automatically records, on a chart, the water temperature of a stream. "Temperature recorder" is the term used to indicate the presence of a thermograph or a digital mechanism that automatically records water temperatures on paper tape.

Time-weighted average is computed by multiplying the number of days in the sampling period by the concentrations of individual constituents for the corresponding period and dividing the sum of the products by the total number of days. A time-weighted average represents the composition of water that would be contained in a vessel or reservoir that had received equal quantities of water from the stream each day for the water year.

Tons per acre-foot indicates the dry weight of dissolved solids in 1 acre-foot of water. It is computed by multiplying the concentration in milligrams per liter by 0.00136.

Tons per day is the quantity of a substance in solution or suspension that passes a stream section during a 24-hour day.

Weighted average is used in this report to indicate discharge-weighted average. It is computed by multiplying the discharge for a sampling period by the concentrations of individual constituents for the corresponding period and dividing the sum of the products by the sum of the discharges. A discharge-weighted average approximates the composition of water that would be found in a reservoir containing all the water passing a given location during the water year after thorough mixing in the reservoir.

WRD is used as an abbreviation for "Water-Resources Data" in the summary REVISIONS paragraph to refer to previously published State annual basic-data reports.

WSP is used as an abbreviation for "Water-Supply Paper" in references to previously published reports.

SPECIAL NETWORKS AND PROGRAMS

Hydrologic bench-mark station is one that provides hydrologic data for a basin in which the hydrologic regimen will likely be governed solely by natural conditions. Data collected at a bench-mark station may be used to separate effects of natural from manmade changes in other basins which have been developed and in which the physiography, climate, and geology are similar to those in the undeveloped bench-mark basin.

Radiochemical program is a network of regularly sampled water quality stations where additional samples are collected twice a year (at high and low flow) to be analyzed for radioisotopes. The streams that are sampled represent major drainage basins in the conterminous United States.

DOWNSTREAM ORDER AND STATION NUMBER

Stations are listed in a downstream direction along the main stream, and stations on tributaries are listed between stations on the main stream in the order in which those tributaries enter the main stream. Stations on tributaries entering above all mainstream stations are listed before the first mainstream station. Stations on tributaries to tributaries are listed in a similar manner. In the lists of gaging stations and water-quality stations in the front of this report the rank of tributaries is indicated by indention, each indention representing one rank.

As an added means of identification, each gaging station, partial-record station, and water-quality station have been assigned a station number. These are in the same downstream order used in this report. In assigning station numbers, no distinction is made between partial-record stations and continuous-record gaging stations; therefore, the station number for a partial-record station indicates downstream order position in a list made up of both types of stations. Water-quality stations located at or near gaging stations or partial-record stations have the same number as the gaging or partial-record station. Gaps are left in the numbers to allow for new stations that may be established; hence, the numbers are not consecutive. The complete 8-digit number for each station, such as 05061500, includes the part number "05" and a 6-digit number. This number appears just to the left of the station name. In this report, the records are listed in downstream order by parts. The part number refers to an area whose boundaries coincide with certain natural drainage lines. All records for a drainage basin encompassing more than one State could be arranged in downstream order by assembling pages from the various State reports by station number to include all records in the basin.

WELL NUMBERS

The well numbering system of the U.S. Geological Survey is based on the grid system of latitude and longitude. The first 6 digits denote the degrees, minutes, and seconds of latitude followed by a letter denoting north or south. Seven digits following the letter denote degrees, minutes, and seconds of longitude. The last digit is a sequential number for wells within a 1-second grid. The system provides the geographic location of the well and a unique number for each well.

SURFACE WATER RECORDS

Collection and computation of data

The base data collected at gaging stations consist of records of stage and measurements of discharge of streams or canals, and stage, surface area, and contents of lakes or reservoirs. In addition, observations of factors affecting the stage-discharge relation or the stage-capacity relation, weather records, and other information are used to supplement base data in determining the daily flow or volume of water in storage. Records of stage are obtained from direct readings on a nonrecording gage or from a water-stage recorder that gives either a continuous graph of the fluctuations or a tape punched at 15-, 30-or 60-minute intervals. Measurements of discharge are made with a current meter, using the general methods adopted by the Geological Survey on the basis of experience in stream gaging since 1888. These methods are described in standard textbooks, in Water-Supply Paper 888, and in U.S. Geological Survey Techniques of Water Resources Investigations, book 3, chapter A6. Surface areas of lakes or reservoirs are determined from instrument surveys using standard methods. The configuration of the reservoir bottom is determined by sounding at many points.

For stream-gaging stations, rating tables giving the discharge for any stage are prepared from stage-discharge relation curves. If extensions to the rating curves are necessary to express discharge greater than measured, they are made on the basis of indirect measurements of peak discharge (such as slope-area or contracted-opening measurements, computation of flow over dams or weirs), velocity-area studies, and logarithmic plotting. The daily mean discharge is computed from gage heights and rating tables, then the monthly and yearly mean discharge are computed from the daily figures. If the stage-discharge relation is subject to change because of frequent or continual change in the physical features that form the control, the daily mean discharge is computed by the shifting-control method, in which correction factors based on individual discharge measurements and notes by engineers and observers are used in applying the gage heights to the rating tables. If the stage-discharge relation for a station is temporarily changed by the presence of aquatic growth or debris on the control, the daily mean discharge is computed by what is basically the shifting-control method.

At some stream-gaging stations the stage-discharge relation is affected by backwater from reservoirs, tributary streams, or other sources. This necessitates the use of the slope method in which the slope or fall in a reach of the stream is a factor in computing discharge. The slope or fall is obtained by means of an auxiliary gage set at some distance from the base gage. At some stations the stage-discharge relation is affected by changing stage; at these stations the rate of change in stage is used as a factor in computing discharge.

At some stream-gaging stations the stage-discharge relation is affected by ice in the winter, and it becomes impossible to compute the discharge in the usual manner. Discharge for periods of ice effect is computed on the basis of the gage-height record and occasional winter discharge measurements, consideration being given to the available information on temperature and precipitation, notes by gage observers and hydrologists, and comparable records of discharge for other stations in the same or nearby basins.

For a lake or reservoir station, capacity tables giving the contents for any stage are prepared from stage-area relation curves defined by surveys. The application of the stage to the capacity table gives the contents, from which the daily, monthly, or yearly change in contents is computed.

If the stage-capacity curve is subject to changes because of deposition of sediment in the reservoir, periodic resurveys of the reservoir are necessary to define new stage-capacity curves. During the period between reservoir surveys the computed contents may be increasingly in error due to the gradual accumulation of sediment.

For some gaging stations there are periods when no gage-height record is obtained or the recorded gage height is so faulty that it cannot be used to compute daily discharge or contents. This happens when the recorder stops or otherwise fails to operate properly, intakes are plugged, the float is frozen in the well, or for various other reasons. For such periods the daily discharges are estimated on the basis of recorded range in stage, adjoining good record, discharge measurements, weather records, and comparison with other station records from the same or nearby basins. Likewise daily contents may be estimated on the basis of operator's log, adjoining good record, inflow-outflow studies, and other information.

The data in this report generally comprise a description of the station and tabulations of daily and monthly figures. For gaging stations on streams or canals a table showing the daily discharge and monthly and yearly discharge is given. For gaging stations on lakes and reservoirs a monthly summary table of stage and contents or a table showing the daily contents is given. Tables of daily mean gage heights are included for some streamflow stations and for some reservoir stations. Records are published for

the water year, which begins on October 1 and ends on September 30. A calendar for the current water year is shown on the reverse side of the front cover to facilitate finding the day of the week for any date.

The description of the gaging stations gives the location, drainage area, period of record, type and history of gages, average discharge, extremes of discharge or contents, and general remarks. The location of the gaging station and the drainage area are obtained from the most accurate maps available. River mileage, given under "LOCATION" for some stations, is that determined and used by the Corps of Engineers or other agencies. Periods for which there are published records for the present station or for stations generally equivalent to the present one are given under "PERIOD OF RECORD." The type of gage currently in use, the datum of the present gage above mean sea level, and a condensed history of the types, locations, and datum of previous gages used during the period of record are given under "GAGE." In references to datum of gage, the phrase "mean sea level" denotes "Sea Level Datum of 1929" as used by the Topographic Division of the Geological Survey unless otherwise qualified. The average discharge for the number of years indicated is given under "AVERAGE DISCHARGE"; it is not given for stations having fewer than 5 complete years of record or for stations where changes in water development during the period of record cause the figure to have a little significance. In addition, the median of yearly mean discharges is given for stream-gaging stations having 10 or more complete years of record if the median differs from the average by more than 10 percent. The maximum discharge (or contents) and the maximum gage height, the minimum discharge if there is little or no regulation (or minimum contents) and the minimum gage height if it is significant are given under "EXTREMES." The minimum daily discharge is given if there is extensive regulation (also the minimum discharge and gage height if they are abnormally low). In the first paragraph headed "Current year," the data given are for the complete current water year unless otherwise specified. In the second paragraph under "EXTREMES" headed "Period of record:" the data given are for the period of record given in PERIOD OF RECORD paragraph. Reliable information concerning major floods that occurred outside the period of record is given in the third or last paragraph under "EXTREMES." Unless otherwise qualified, the maximum discharge (or contents) corresponds to the crest stage obtained by use of a water-stage recorder (graphic or digital), a crest-stage gage, or a nonrecording gage read at the time of the crest. If the maximum gage height did not occur at the same time as the maximum discharge (or contents), it is given separately. Information pertaining to the accuracy of the discharge records, to conditions that affect the natural flow at the gaging station, and availability of Water Quality records, is given under "REMARKS"; for reservoir stations information on the dam forming the reservoir, the capacity, outlet works and spillway, and purpose and use of the reservoir, is also under "REMARKS."

Previously published records of some stations have been found to be in error on the basis of data or information later obtained. Revisions

of such records are usually published along with the current records in one of the annual or compilation reports. In order to make it easier to find such revised records, a paragraph headed "REVISIONS (WATER YEARS)" has been added to the description of all stations for which revised records have been published. Listed therein are all the reports in which revisions have been published, each followed by the water years for which figures are revised in that report. In listing the water years only one number is given; for instance, 1965 stands for the water year October 1, 1964, to September 30, 1965. If no daily, monthly, or annual figures of discharge were revised, that fact is brought out by notations after the year dates as follows: "(M)" means that only the instantaneous maximum discharge was revised; "(m)" that only the instantaneous minimum was revised; and "(P)" that only peak discharges were revised. If the drainage area has been revised, the report in which the revised figure was first published is given. It should be noted that for all stations for which cubic feet per second per square mile and runoff in inches are published, a revision of the drainage area necessitates corresponding revision of all figures based on the drainage area. Revised figures of cubic feet per second per square mile and runoff in inches resulting from a revision of the drainage area only are usually not published in the annual series of reports.

Skeleton rating tables are published for stream-gaging stations where they serve a useful purpose and the dates of applicability can be easily identified.

Skeleton capacity tables are published for all reservoirs for which records of contents are published on a daily basis.

The daily table for stream-gaging stations gives the mean discharge for each day and is followed by monthly and yearly summaries. In the monthly summary below the daily table, the line headed "TOTAL" gives the sum of the daily figures. The line headed "MEAN" gives the average flow in cubic feet per second during the month. The lines headed "MAX" and "MIN" give the maximum and minimum daily discharges, respectively, for the month. Discharge for the month also may be expressed in cubic feet per second per square mile (line headed "CFSM"), or in inches (line headed "IN"), or in acre-feet (line headed "AC-FT"). Figures for cubic feet per second per square mile and runoff in inches are omitted if there is extensive regulation or diversion, if the drainage area includes large noncontributing areas, or if the average annual rainfall over the drainage basin is usually less than 20 inches.

In the yearly summary below the monthly summary, the figures following "MAX" are the maximum daily discharges for the calendar and water years; likewise, those following "MIN" are the minimum daily discharges

Footnotes to the table of daily discharges are introduced by the word "NOTE." Footnotes are used to indicate periods for which the

discharge is computed or estimated by special methods because of no gage-height record, backwater from various sources, or other unusual conditions. Periods of no gage-height record are indicated if the period is continuous for a month or more or includes the maximum discharge for the year. Periods of backwater from an unusual source, of indefinite stage-discharge relation, or of any other unusual condition at the gage site are indicated only if they are a month or more in length and the accuracy of the records is affected. Days on which the stage-discharge relation is affected by ice are not indicated. The methods used in computing discharge for various unusual conditions have been explained in preceding paragraphs.

Peak discharges and their times of occurrence and corresponding gage heights for many stations are listed below the yearly summary. All independent peaks above the selected base are given. The base discharge, which is given in parentheses, is selected so that an average of about three peaks a year can be presented. Peak discharges are not published for any canals, ditches, drains, or for any stream for which the peaks are subjected to substantial control by man. Time of day is expressed in 24-hour local standard time; for example, 12:30 a.m. is 0030, 1:30 p.m. is 1330.

For most gaging stations on lakes and reservoirs the data presented comprise a description of the station and a monthly summary table of stage and contents. For some reservoirs a table showing daily contents or stage is given. A skeleton table of capacity at given stages is published for all reservoirs for which records are published on a daily basis, but is not published for reservoirs for which only monthly data are given.

Data collected at partial-record stations and miscellaneous sites are given in three tables at the end of the surface-water records in this report. The first is a table of discharge measurements at low-flow partial-record stations, the second is a table of annual maximum stage and discharge at crest-stage stations, and the third is a table of discharge measurements at miscellaneous sites.

Accuracy of Data

The accuracy of discharge data depends primarily on (1) the stability of the stage-discharge relation, or if the control is unstable, the frequency of discharge measurements, and (2) the accuracy of observations of stage, measurements of discharge, and interpretation of records.

The station description under "REMARKS" states the degree of accuracy of the records. "Excellent" means that about 95 percent of the daily discharges is within 5 percent; "good" within 10 percent; and "fair" within 15 percent. "Poor" means that daily discharges have less than "fair" accuracy.

Figures of daily mean discharge in this report are shown to the nearest hundredth of a cubic foot per second for discharges of less than 1 cfs; to tenths between 1.0 and 10 cfs; to whole numbers between 10 and 1,000 cfs; and to 3 significant figures above 1,000 cfs. The number of significant figures used is based solely on the magnitude of the figure. The same rounding rules apply to discharge figures listed for partial-record stations and miscellaneous sites.

Discharge at many stations, as indicated by the monthly mean, may not reflect natural runoff due to the effects of diversion, consumption, regulation by storage, increase or decrease in evaporation due to artificial causes or to other factors. For such stations, figures of cubic feet per second per square mile and of runoff in inches are not published unless satisfactory adjustments can be made for diversions, for changes in contents of reservoirs, or for other changes incident to use and control. Evaporation from a reservoir is not included in the adjustments for changes in reservoir contents, unless it is so stated. Even at those stations where adjustments are made, large errors in computed runoff may occur if adjustments or losses are large in comparison with the observed discharge.

Publications

In each water-supply paper entitled, "Surface Water Supply of the United States" there is a list of numbers of preceding water-supply papers containing streamflow information for the area covered by that report. In addition, there is a list of numbers of water-supply papers containing detailed information on major floods in the area. Records for stations in Minnesota for the period October 1960 to September 1965 are in Water-Supply Papers 1911, 1913, 1914, 1915, and 1917.

Two series of summary reports entitled, "Compilation of Records of Surface Waters of the United States" have been published; the first series covers the entire period of record through September 1950 and the second series covers the period October 1950 to September 1960. These reports contain summaries of monthly and annual discharge and monthend storage for all previously published records, as well as some records not contained in the annual series of water-supply papers. All records were reexamined and revised where warranted. Estimates of discharge were made to fill short gaps whenever practical. The yearly summary table for each gaging station lists the numbers of the water-supply papers in which daily records were published for that station. Records for stations in Minnesota are compiled in Water-Supply Papers 1307, 1308, and 1310 through September 1950, and in 1727, 1728, and 1730 for October 1950 to September 1960.

Special reports on major floods or droughts or of other hydrologic studies for the area have been issued in publications other than water-supply papers. Information relative to these reports may be obtained from the district office.

Other data available

More detailed information, than that published for most of the gaging stations, such as discharge measurements, gage-height record, and rating tables, is on file in the district office. Many gaging-station records in Minnesota have been analyzed through 1968 to give several statistical summaries: (1) the number of days in each year that the daily discharge was between selected limits (duration tables); (2) the lowest mean discharge for selected numbers of consecutive days in each year; and (3) the highest mean discharge for selected numbers of consecutive days in each year.

WATER QUALITY RECORDS

Collection and examination of data

Water samples for analyses usually are collected at or near gaging stations. The discharge records at these stations are used in conjunction with the computations of the chemical constituents and sediment loads in this report.

Descriptive statements are given for water-quality stations located at or near streamflow stations. Given are location, drainage area, periods of record for the various water-quality data, extremes of pertinent data, and general remarks, in a format similar to that used for streamflow gaging stations. For ground-water stations, no descriptive statements are given; however, the well number, depth of well, date of sampling, and other pertinent data are given in the table containing the chemical analyses of the ground water.

Data on the quality of surface water were collected from designated sampling sites (map on page 214) at predetermined intervals such as once daily, weekly, monthly or less frequently. Whereas at some sites it was necessary to continuously record data on a punched paper tape at 15-, 30-, or 60-minute intervals. Data on quality of ground water were collected at 65 wells throughout the State.

Water-quality information is presented for chemical quality, biological, microbiological, water temperature, and fluvial sediment. Chemical quality includes concentrations of individual dissolved constituents and certain properties or characteristics such as hardness, sodium adsorption ratio, specific conductance, and pH. The biological information includes qualitative and quantitative analyses of plankton, bottom organisms, and particulate inorganic and amorphous matter present. Microbiological information includes quantitative identification of certain bacteriological indicator organisms. Water-temperature data represent once-daily observations except for stations where a continuous temperature recorder furnished information from which daily minimums and maximums are

obtained. Fluvial-sediment information is given for suspended-sediment discharges and concentrations and for particle-size distribution of suspended sediment and bed material.

Prior to the 1968 water year, data for chemical constituents and concentration of suspended sediment were reported in parts per million (ppm) and water temperatures were reported in degrees Fahrenheit (°F). In October 1967 the U.S. Geological Survey began to use the metric system; data for chemical constituents and concentrations of suspended sediment are now reported in milligrams per liter (mg/l) and water temperatures are given in degrees Celsius (centigrade, °C). In waters with a density of 1.000 g/ml (grams per milliliter), parts per million and milligrams per liter can be considered equal. In waters with a density greater than 1.000 g/ml, values in parts per million should be multiplied by the density to convert to milligrams per liter. To convert temperatures in degrees Fahrenheit to degrees Celsius, see table 3 below.

In October 1968, the Geological Survey began reporting many of the chemical constituents as well as the minor elements in micrograms per liter instead of milligrams per liter. (See "Definition of Terms," p. 4.)

Table 3.--Degrees Fahrenheit (°F) to degrees Celsius (°C)* (Temperature reported to nearest 0.5°C)

°F	°C	°F	°C	°F	°C	°F	°C	°F	°C
32	0.0	50	10.0	68	20.0	86	30.0	104	40.0
33	.5	51	10.5	69	20.5	87	30.5	105	40.5
34	1.0	52	11.0	70	21.0	88	31.0	106	41.0
35	1.5	53	11.5	71	21.5	89	31.5	107	41.5
36	2.0	54	12.0	72	22.0	90	32.0	108	42.0
37	3.0	55	13.0	73	23.0	91	33.0	109	43.0
38	3.5	56	13.5	74	23.5	92	33.5	110	43.5
39	4.0	57	14.0	75	24.0	93	34.0	111	44.0
40	4.5	58	14.5	76	24.5	94	34.5	112	44.5
41	5.0	59	15.0	77	25.0	95	35.0	113	45.0
42	5.5	60	15.5	78	25.5	96	35.5	114	45.5
43	6.0	61	16.0	79	26.0	97	36.0	115	46.0
44	6.5	62	16.5	80	26.5	98	36.5	116	46.5
45	7.0	63	17.0	81	27.0	99	37.0	117	47.0
46	8.0	64	18.0	82	28.0	100	38.0	118	48.0
47	8.5	65	18.5	83	28.5	101	38.5	119	48.5
48	9.0	66	19.0	84	29.0	102	39.0	120	49.0
49	9.5	67	19.5	85	29.5	103	39.5	121	49.5

*°C = 5/9 (°F - 32) or °F = 9/5 (°C) + 32.

Solutes

The methods of collecting and analyzing water samples for determining the kinds and concentrations of solutes are described by Skougstad, Brown, and Fishman (1970). One sample can define adequately the water quality at a given time if the mixture of solutes throughout the stream cross section is homogeneous. However, the concentration of solutes at different locations in the cross section may vary widely with different rates of water discharge, depending on the source of material and the turbulence and mixing of the stream. Some streams must be sampled at several verticals across the channel to determine accurately the solute load.

Ground-water quality does not change significantly during short periods of time; infrequent sampling and analysis of ground water adequately define ground-water quality at a given site. Water samples from wells are analyzed individually.

Temperature

Water temperatures are measured at most of the water-quality stations. For daily stations, the water temperatures are taken about the same time each day when sample is collected. Large streams have a small diurnal temperature change while small, shallow streams may have a daily range of several degrees and may follow closely the changes in air temperature. Some streams may be affected by waste-heat discharges.

At stations where continuously recording thermographs are present, the records consist of maximum and minimum temperatures for each day and the monthly averages.

Sediment

Suspended-sediment concentrations are determined from samples collected by using depth-integrating samplers. Samples usually are obtained at several verticals in the cross section, or a single sample may be obtained at a fixed point and a coefficient applied to determine the mean concentration in the cross sections.

During periods of rapidly changing flow or rapidly changing concentration, samples may have been collected more frequently (twice daily or, in some instances, hourly). The published sediment discharges for days of rapidly changing flow or concentration were computed by the sub-divided day method (time-discharge weighted average). Therefore, for those days when the published sediment discharge value differs from the value computed as the product of discharge times mean concentration times 0.0027, the reader can assume that the sediment discharge for that day was computed by the sub-divided day method. For periods when no samples are collected, daily loads of suspended sediment are estimated on the basis of water discharge, sediment concentrations observed immediately before and after the periods, and suspended-sediment loads for other periods of similar discharge.

At other stations, suspended-sediment samples are collected periodically at many verticals in the stream cross section. Although data collected periodically may represent conditions only at the time of observation, such data are useful in establishing seasonal relations between quality and streamflow in predicting long-term sediment-discharge characteristics of the stream.

In addition to the records of the quantities of suspended sediment, records of periodic measurements of the particle-size distribution of the suspended sediment and bed material are included.

Publications

The annual series of water-supply papers that contain information on quality of surface waters in Minnesota are listed below.

Water year	Parts 1-14	Parts 1-4	Parts 3-4	Parts 5-6	Water year	Parts 1-14	Parts 1-4	Parts 3-4	Parts 5-6
1941	942	---	---	---	1954	---	1350	---	1351
1942	950	---	---	---	1955	---	1400	---	1401
1943	970	---	---	---	1956	---	1450	---	1451
1944	1022	---	---	---	1957	---	1520	---	1521
1945	1030	---	---	---	1958	---	1571	---	1572
1946	1050	---	---	---	1959	---	---	1642	1643
1947	1102	---	---	---	1960	---	---	1742	1743
1948	---	1132	---	1132	1961	---	---	1882	1883
1949	---	1162	---	1162	1962	---	---	1942	1943
1950	---	1186	---	1187	1963	---	---	1948	1949
1951	---	1197	---	1198	1964	---	---	1955	1956
1952	---	1250	---	1251	1965	---	---	1962	1963
1953	---	1290	---	1291	1966	---	---	1992	1993
					1967	---	---	2012	2013

HYDROLOGIC CONDITIONS

Annual runoff during the 1971 water year was generally near normal. The water year began with greater than normal streamflow throughout the State during October and November. The October and November precipitation amounts over four-fifths of the State were new records for these months. During the winter period and continuing through the spring and summer, streamflow returned to near normal conditions.

No significant floods occurred during the year. Heavy snow cover did accumulate during the winter months; however, ideal melting conditions during late March and early April prevented any severe flooding.

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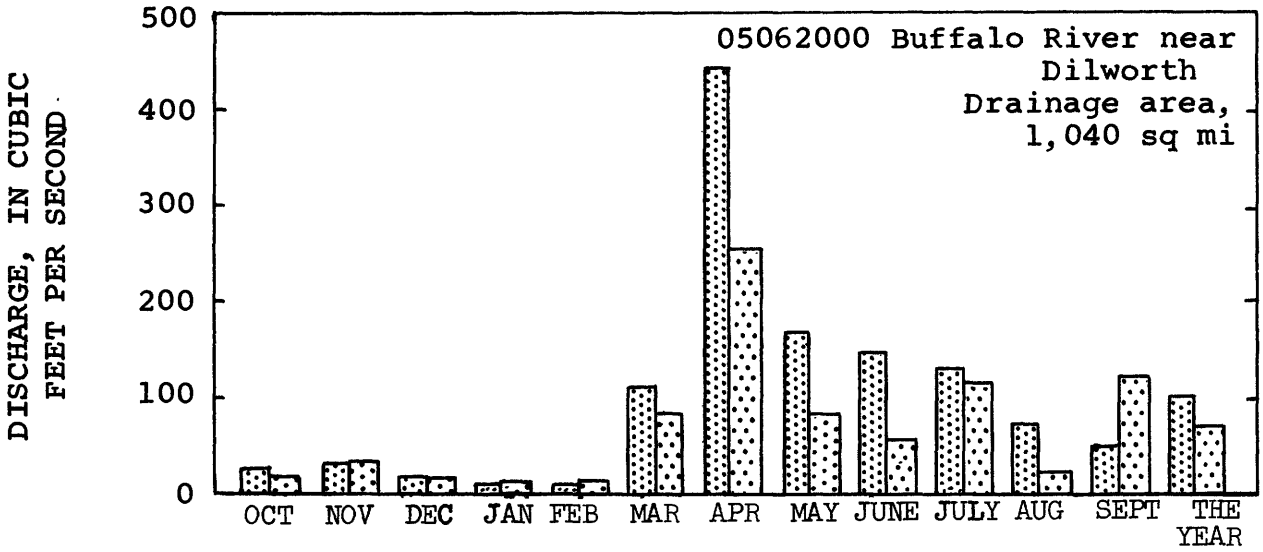
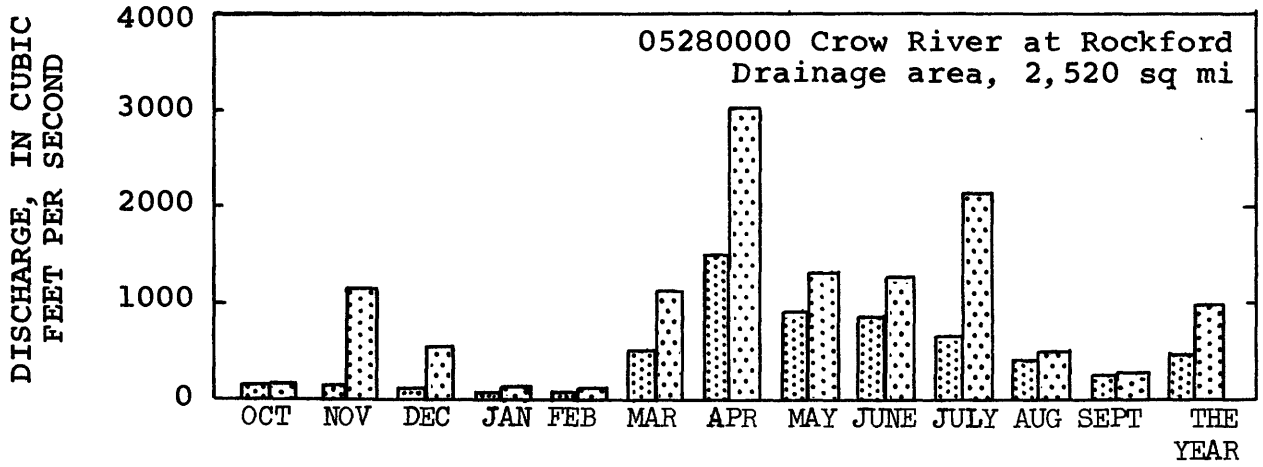
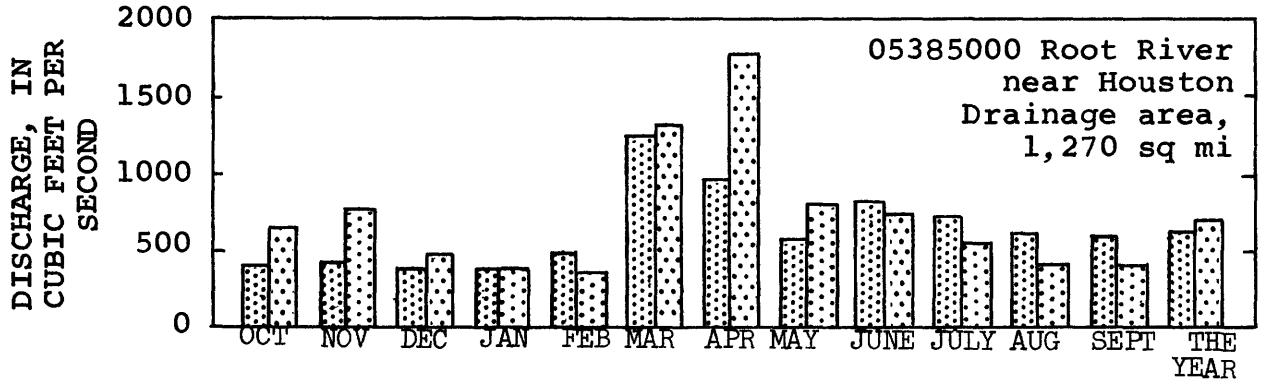
_____, 1961, The single stage sampler for suspended sediment: Rept. 13.

_____, 1963, Determinations of fluvial sediment discharge: Rept. 14.







Mean of monthly and yearly mean discharges for water years 1931-60.

Monthly and yearly mean discharges during 1971 water year.

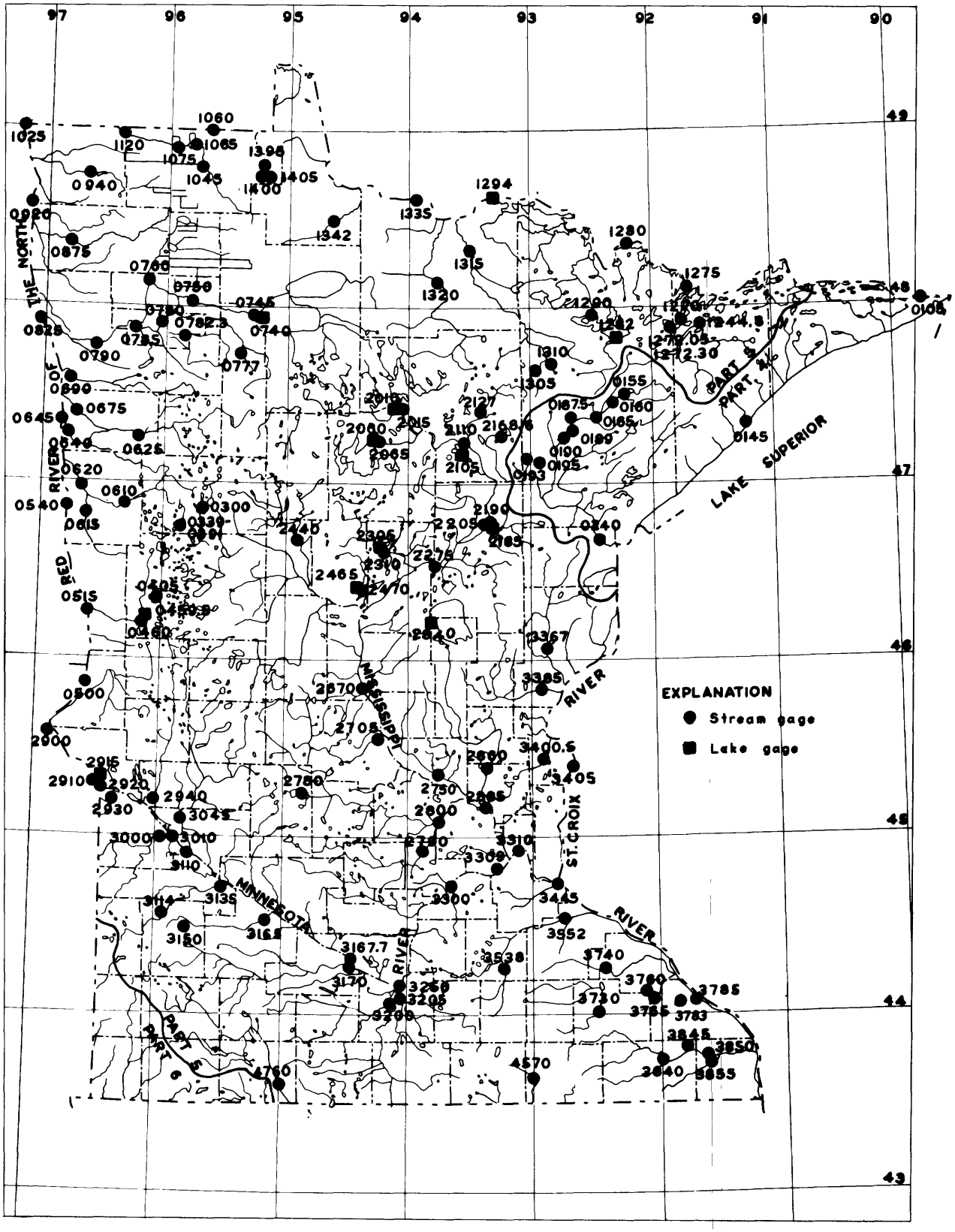


Figure 2.-- Map showing location of lake and stream gaging stations.

PART 1. SURFACE WATER RECORDS

04010500 Pigeon River at Middle Falls, near Grand Portage, Minn.

(International gaging station)

LOCATION.--Lat 48°00'44", long 89°36'58", in NE¼ sec.24, T.64 N., R.6 E., Cook County, on right bank 400 ft upstream from Middle Falls, 2.5 miles upstream from Grand Portage Port of Entry, 3.5 miles upstream from mouth, and 4.7 miles northeast of village of Grand Portage.

DRAINAGE AREA.--600 sq mi.

PERIOD OF RECORD.--June to October 1921, April to November 1922, March 1923 to current year. Published as "at International Bridge" April 1924 to September 1940 and as "below International Bridge" October 1940 to September 1965. Monthly discharge only for some periods, published in WSP 1307.

GAGE.--Water-stage recorder. Datum of gage is 789.58 ft above mean sea level, datum of 1929. Prior to Sept. 30, 1940, nonrecording gage at International Bridge, 5.8 miles upstream at datum 100.24 ft higher.

AVERAGE DISCHARGE.--48 years (1923-71), 497 cfs (11.25 inches per year).

EXTREMES.--Current year: Maximum discharge, 5,040 cfs Apr. 20 (gage height, 7.92 ft); maximum gage height, 8.33 ft Apr. 17 (backwater from ice); minimum discharge, 80 cfs Sept. 28 (gage height, 0.57 ft).
Period of record: Maximum discharge, 11,000 cfs May 5, 1934 (gage height, 7.6 ft, site and datum then in use), from rating curve extended above 7,000 cfs; minimum, 27 cfs Nov. 4, 1945 (gage height, -0.08 ft).

REMARKS.--Records good except those for winter periods, which are fair. Records of water temperatures for the current year are published in Part 2 of this report.

COOPERATION.--This station is one of the international gaging stations maintained by the United States under agreement with Canada.

REVISIONS (WATER YEARS).--WSP 744: 1927-28. WSP 804: 1934(M). WSP 974: Drainage area. WSP 1337: 1924(M), 1925, 1926-28(M), 1931(M), 1938(M), 1941(M), 1945-46(M), 1947, 1948(M), 1950(M).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	296	2,970	910	380	360	370	285	2,360	1,580	598	212	107
2	281	2,800	890	375	340	335	290	2,480	1,460	580	200	105
3	278	2,420	870	365	310	300	295	2,410	1,370	543	191	101
4	279	2,080	840	360	285	275	305	2,340	1,290	518	184	98
5	273	1,840	820	355	270	250	340	2,330	1,230	497	173	96
6	253	1,660	810	350	260	225	390	2,320	1,190	471	166	96
7	249	1,520	800	342	320	205	460	2,270	1,110	466	160	95
8	820	1,400	790	335	370	195	570	2,270	1,030	443	156	102
9	2,140	1,410	770	330	390	190	700	2,220	947	411	151	102
10	1,930	1,930	760	325	360	185	860	2,090	882	398	154	114
11	1,510	2,020	755	320	325	185	1,100	1,980	893	367	148	134
12	1,230	1,890	740	320	305	180	1,400	1,900	891	351	148	172
13	1,050	1,690	730	315	290	182	1,750	1,770	865	398	144	154
14	909	1,510	710	310	280	185	2,050	1,650	827	423	136	136
15	800	1,400	700	310	270	190	2,230	1,540	802	405	127	125
16	720	1,340	695	310	260	205	2,450	1,450	753	376	118	125
17	660	1,250	690	305	255	250	3,030	1,380	793	353	114	117
18	607	1,130	680	305	250	320	3,500	1,410	1,140	329	109	112
19	563	1,100	650	300	250	360	4,050	1,410	1,080	309	108	110
20	530	1,080	615	310	245	335	4,460	1,890	969	290	107	106
21	506	970	580	320	240	315	4,850	1,880	922	278	106	102
22	487	900	550	330	240	300	4,620	1,610	843	266	105	98
23	475	720	520	335	240	290	4,180	1,490	776	264	100	95
24	499	800	500	330	240	285	3,710	3,230	727	250	100	92
25	559	900	480	355	240	280	3,350	4,000	677	236	101	88
26	724	1,070	450	365	250	280	3,100	4,030	628	234	97	85
27	2,210	1,050	435	370	320	278	2,860	3,450	594	238	93	81
28	4,470	1,030	425	375	400	275	2,640	2,770	574	247	90	101
29	4,410	1,000	410	380	------	275	2,510	2,270	572	238	91	106
30	3,590	940	400	380	------	280	2,390	1,960	589	237	100	123
31	3,230	------	390	375	------	283	------	1,740	------	225	102	------
TOTAL	36,538	43,820	20,365	10,537	8,165	8,063	64,725	67,900	28,004	11,239	4,091	3,278
MEAN	1,179	1,461	657	340	292	260	2,158	2,190	933	363	132	109
MAX	4,470	2,970	910	380	400	370	4,850	4,030	1,580	598	212	172
MIN	249	720	390	300	240	180	285	1,380	572	225	90	81
CFSM	1.97	2.44	1.10	.57	.49	.43	3.60	3.65	1.56	.61	.22	.18
IN.	2.27	2.72	1.26	.65	.51	.50	4.01	4.21	1.74	.70	.25	.20

CAL YR 1970 TOTAL 310,005 MEAN 849 MAX 5,620 MIN 123 CFSM 1.42 IN 19.22
WTR YR 1971 TOTAL 306,725 MEAN 840 MAX 4,850 MIN 81 CFSM 1.40 IN 19.02

PEAK DISCHARGE (BASE, 3,000 CFS)

DATE	TIME	G.HT.	DISCHARGE	DATE	TIME	G.HT.	DISCHARGE
10-28	1800	7.90	5,010	5-26	0100	7.21	4,150
4-20	2000	7.92	5,040				

04014500 Baptism River near Beaver Bay, Minn.

LOCATION.--Lat 47°20'15", long 91°12'00", in SE¼NE¼ sec.15, T.56 N., R.7 W., Lake County, on right bank 30 ft upstream from bridge on U.S. Highway 61, 0.2 mile upstream from mouth, 4 miles northeast of Silver Bay, and 7 miles northeast of village of Beaver Bay.

DRAINAGE AREA.--140 sq mi.

PERIOD OF RECORD.--October 1927 to current year. Monthly discharge only for some periods, published in WSP 1307.

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

AVERAGE DISCHARGE.--44 years, 163 cfs (15.81 inches per year).

EXTREMES.--Current year: Maximum discharge, 3,230 cfs Oct. 27 (gage height, 4.48 ft); minimum, 16 cfs Oct. 4, 5 (gage height, 0.68 ft).
Period of record: Maximum discharge recorded, 9,350 cfs Aug. 9, 1939 (gage height, 8.11 ft), from rating curve extended above 4,000 cfs; maximum gage height, 11.06 ft Apr. 12, 1965 (from floodmark, backwater from ice); minimum daily discharge, 0.4 cfs Jan. 5, 6, 1940.

REMARKS.--Records good except those for winter periods, which are fair. Records of water temperatures for the current year are published in Part 2 of this report.

REVISIONS (WATER YEARS).--WSP 894: 1939. WSP 1337: 1933-34(M), 1935.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	17	1,460	418	116	29	38	45	463	233	189	84	36
2	16	870	454	110	28	36	46	445	210	184	67	39
3	16	661	360	103	27	35	47	392	199	160	54	32
4	16	595	307	101	27	34	48	384	182	138	44	31
5	16	454	251	97	26	33	50	384	184	125	37	41
6	19	352	199	92	26	32	57	360	180	106	30	36
7	24	288	175	86	26	31	75	328	162	97	26	30
8	219	255	160	81	25	31	125	314	144	94	23	27
9	436	409	155	79	25	30	220	294	127	79	22	25
10	557	642	150	76	24	30	450	262	127	64	22	39
11	445	652	148	72	24	29	756	242	215	50	22	72
12	336	633	145	68	24	29	1,080	224	246	82	22	89
13	255	463	142	65	23	29	1,110	208	219	189	26	79
14	208	320	140	62	23	38	1,090	199	215	175	23	66
15	180	275	140	59	23	50	1,280	187	192	136	21	52
16	154	251	138	56	23	52	1,730	177	168	116	20	41
17	133	237	136	54	24	51	2,040	182	851	114	19	35
18	114	233	135	52	24	50	2,160	228	2,100	103	28	38
19	101	233	142	51	24	48	1,960	360	1,000	88	100	29
20	89	224	148	50	25	47	2,210	699	756	72	130	26
21	79	205	150	49	25	46	2,610	585	642	59	102	25
22	73	195	152	48	25	45	2,270	418	427	50	75	24
23	89	185	150	46	26	44	2,140	360	294	41	54	24
24	138	170	148	45	26	43	1,690	1,170	233	33	46	23
25	175	160	145	43	27	43	1,250	927	205	29	62	22
26	215	155	143	41	27	43	898	690	182	26	70	22
27	2,060	150	140	38	38	45	718	509	162	22	62	23
28	1,980	145	136	36	40	48	652	352	143	155	50	28
29	1,590	142	132	34	------	47	576	275	148	151	40	29
30	1,120	155	125	32	------	46	481	255	164	127	34	47
31	1,640	------	120	30	------	45	------	262	------	104	30	------
TOTAL	12,510	11,169	5,584	1,972	734	1,248	29,864	12,135	10,310	3,158	1,445	1,130
MEAN	404	372	180	63.6	26.2	40.3	995	391	344	102	46.6	37.7
MAX	2,060	1,460	454	116	40	52	2,610	1,170	2,100	189	130	89
MIN	16	142	120	30	23	29	45	177	127	22	19	22
CFSM	2.89	2.66	1.29	.45	.19	.29	7.11	2.79	2.46	.73	.33	.27
IN.	3.32	2.97	1.48	.52	.20	.33	7.94	3.22	2.74	.84	.38	.30

CAL YR 1970 TOTAL 68,924.0 MEAN 189 MAX 2,290 MIN 5.4 CFSM 1.35 IN 18.31
WTR YR 1971 TOTAL 91,259.0 MEAN 250 MAX 2,610 MIN 16 CFSM 1.79 IN 24.25

PEAK DISCHARGE (BASE, 1,300 CFS)

DATE	TIME	G. H.	DISCHARGE	DATE	TIME	G. H.	DISCHARGE
10-27	0800	4.48	3,230	6-18	0430	4.05	2,350
4-20	2130	4.29	2,840				

04015500 Second Creek near Aurora, Minn.

LOCATION.--Lat 47°31'25", long 92°11'35", in SW¼ sec.12, T.58 N., R.15 W., St. Louis County, on left bank 0.1 mile downstream from First Creek, 0.4 mile upstream from mouth, and 2.1 miles east of Aurora.
DRAINAGE AREA.--26.3 sq mi.
PERIOD OF RECORD.--March 1955 to current year.
GAGE.--Water-stage recorder. Datum of gage is 1,410.36 ft above mean sea level. datum of 1929 (levels by Erie Mining Company).
AVERAGE DISCHARGE.--16 years, 22.0 cfs (11.36 inches per year).
EXTREMES.--Current year: Maximum discharge, 235 cfs Apr. 13 (gage height, 5.53 ft); minimum daily, 8.0 cfs Feb. 2, 3.

Period of record: Maximum discharge, 254 cfs (revised) Apr. 22, 1961 (gage height, 5.64 ft); maximum gage height, 5.75 ft Mar. 28, 1957 (backwater from ice); minimum daily discharge, 1.5 cfs Jan. 26 to Feb. 4, 1963; minimum gage height, 3.10 ft Feb. 2, 3, 4, 1963.

REVISIONS.--Figures of maximum discharge for the water years 1957 and 1961 have been revised to 247 cfs Apr. 21, 1957 (gage height, 5.60 ft), and 254 cfs Apr. 22, 1961 (gage height, 5.64 ft), superseding figures published in WSP 1507, 1677, 1727, 1911, and WRD Minn. 1961.

REMARKS.--Records good except those for period of no gage-height record and those for winter periods, which are fair.
REVISIONS (WATER YEARS).--Revised figures of discharge, in cubic feet per second, for high water periods in water years 1957 and 1961, superseding figures published in WSP 1507, 1911, and WRD Minn. 1961, are given below:

Apr. 20, 1957	199	Apr. 21, 1961	225
Apr. 21, 1957	233	Apr. 22, 1961	233
Apr. 22, 1957	201		

Month	Cfs-days	Maximum	Minimum	Mean	CFSM	Inches
April 1957	2,260	233	20	75.3	2.86	3.20
Water year 1957	7,363.8	233	6.1	20.2	0.768	10.41
Calendar year 1957	7,295	233	5.6	20.0	0.760	10.32
April 1961	1,643	233	16	54.8	2.08	2.32
Water year 1961	6,204.4	233	2.2	17.0	0.646	8.76
Calendar year 1961	6,659.7	233	2.3	18.2	0.692	9.41

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	14	42	19	19	8.7	19	31	50	31	28	23	31
2	13	42	20	18	8.0	18	32	47	29	26	23	29
3	12	39	21	18	8.0	17	30	41	27	25	22	27
4	12	38	22	17	9.0	18	29	39	26	24	20	32
5	11	36	22	16	10	19	29	39	25	23	17	33
6	11	33	22	16	11	20	30	38	24	22	15	31
7	14	30	21	15	12	20	31	34	23	24	14	33
8	26	28	21	15	13	19	34	34	22	26	13	32
9	40	41	20	15	14	19	80	34	21	26	13	36
10	45	54	20	15	15	18	165	30	22	25	21	44
11	46	54	20	15	16	18	193	30	26	24	20	39
12	52	54	19	15	16	17	196	31	26	28	23	34
13	45	48	19	15	18	16	194	32	25	29	21	30
14	35	40	19	15	18	18	140	31	23	31	21	27
15	27	30	19	15	17	25	127	31	21	31	19	27
16	26	25	20	15	16	26	130	28	20	31	17	25
17	25	25	20	14	15	27	132	27	30	27	15	24
18	24	26	20	14	14	27	123	27	43	24	29	23
19	21	27	21	14	13	26	114	31	56	24	64	22
20	18	28	21	13	13	25	107	44	62	24	50	23
21	16	27	21	13	12	24	93	46	64	23	44	21
22	16	26	21	13	12	24	77	41	63	21	41	25
23	21	24	21	13	12	24	68	44	58	22	37	27
24	37	23	21	13	11	23	60	66	53	20	34	27
25	54	21	21	13	13	23	53	67	47	21	33	24
26	53	20	21	13	18	24	46	62	42	24	32	22
27	48	19	20	12	22	24	42	56	37	26	31	21
28	46	19	20	12	20	25	42	48	33	30	30	46
29	47	18	20	11	------	25	39	41	31	27	27	48
30	48	18	19	11	------	26	45	36	30	25	28	67
31	45	------	19	10	------	28	------	34	------	24	28	------
TOTAL	948	955	630	443	384.7	682	2,512	1,239	1,040	785	825	930
MEAN	30.6	31.8	20.3	14.3	13.7	22.0	83.7	40.0	34.7	25.3	26.6	31.0
MAX	54	54	22	19	22	28	196	67	64	31	64	67
MIN	11	18	19	10	8.0	16	29	27	20	20	13	21
CFSM	1.16	1.21	.77	.54	.52	.84	3.18	1.52	1.32	.96	1.01	1.18
IN.	1.34	1.35	.89	.63	.54	.96	3.55	1.75	1.47	1.11	1.17	1.32

CAL YR 1970 TOTAL 10,382.7 MEAN 28.4 MAX 85 MIN 8.5 CFSM 1.08 IN 14.69
WTR YR 1971 TOTAL 11,373.7 MEAN 31.2 MAX 196 MIN 8.0 CFSM 1.19 IN 16.09

PEAK DISCHARGE (BASE, 60 CFS)

DATE	TIME	G. H.	DISCHARGE	DATE	TIME	G. H.	DISCHARGE
4-13	0830	5.53	235	8-19	0130	4.57	88
5-24	1230	4.39	70	9-30	1630	4.56	85
6-21	Unknown	----	about 66				

NOTE.--No gage-height record June 4 to July 11.

04016000 Partridge River near Aurora, Minn.

LOCATION.--Lat 47°31'02", long 92°11'24", in SE¼SW¼ sec.12, T.58 N., R.15 W., St. Louis County, on right bank at upstream side of highway bridge, 1,000 ft downstream from Second Creek, 2.5 miles east of Aurora, and 2.8 miles upstream from mouth.

DRAINAGE AREA.--156 sq mi.

PERIOD OF RECORD.--August 1942 to current year.

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

AVERAGE DISCHARGE (adjusted for storage and diversion).--29 years, 126 cfs (10.97 inches per year).

EXTREMES.--Current year: Maximum discharge, 1,420 cfs Apr. 20 (gage height, 6.08 ft); minimum daily, 21 cfs Feb. 2.
Period of record: Maximum discharge, 3,230 cfs May 10, 1950 (gage height, 7.86 ft); minimum, 2.2 cfs Jan. 30, 31, 1961; minimum gage height, 0.88 ft Mar. 2, 1963.

REMARKS.--Records good except those for winter periods, which are fair. Flow regulated at times by storage in off-channel Partridge Reservoir, formerly known as Whitewater Lake. Reservoir formed from lake by levees around marsh areas and natural outlet. Available capacity, 20,000 acre-ft between elevations 1,410 ft (natural lake level) and 1,440 ft. Storage began Apr. 9, 1955. Storage in reservoir obtained from Colby Lake during periods of high flow; release from storage returned to Colby Lake to maintain lake elevation during diversion for iron-ore processing. Diversion began Feb. 7, 1956. Some seepage losses from reservoir bypass station.

REVISIONS (WATER YEARS).--WSP 974: 1942. WSP 1307: 1943(M).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	30	82	72	49	23	42	57	391	316	127	41	59
2	28	98	74	48	21	42	56	371	267	113	41	53
3	26	109	76	46	22	42	57	361	226	99	40	51
4	24	122	76	44	23	42	57	348	194	88	37	58
5	23	131	75	42	24	42	58	328	176	78	35	56
6	23	138	73	41	25	41	62	302	162	71	32	52
7	23	137	70	41	25	41	71	266	147	68	30	52
8	46	136	67	40	26	41	87	231	139	66	28	50
9	72	145	64	40	27	40	138	209	130	67	28	55
10	80	175	61	38	28	40	218	192	116	66	39	65
11	81	198	59	38	28	39	299	174	128	62	35	59
12	95	201	57	38	29	38	355	162	122	63	38	54
13	88	201	55	38	30	37	377	153	116	66	35	50
14	75	203	54	38	32	42	371	141	112	67	35	47
15	54	203	54	36	31	45	360	124	104	69	34	46
16	47	203	54	35	30	46	411	112	93	68	32	44
17	46	201	55	34	29	46	495	105	128	63	31	44
18	43	197	56	34	29	46	660	97	149	61	47	43
19	35	182	58	33	28	46	1,160	103	196	59	90	42
20	33	168	56	33	27	47	1,390	126	305	56	75	42
21	31	154	54	32	27	47	1,380	153	311	53	75	41
22	32	129	55	32	27	46	1,300	177	346	49	73	43
23	36	117	57	32	27	47	1,180	214	372	47	172	44
24	46	107	56	32	28	48	1,040	275	363	44	114	44
25	64	102	54	31	31	48	888	301	325	43	82	38
26	63	96	54	31	34	48	764	410	271	42	78	36
27	65	89	52	29	41	48	655	523	218	45	66	35
28	63	83	51	29	44	51	571	553	176	52	60	58
29	63	77	49	28	------	50	480	520	153	46	55	61
30	64	71	49	28	------	52	427	457	144	43	56	87
31	71	------	49	25	------	54	------	377	------	42	55	------
TOTAL	1,570	4,255	1,846	1,115	796	1,384	15,424	8,256	6,005	1,983	1,689	1,509
MEAN	50.6	142	59.5	36.0	28.4	44.6	514	266	200	64.0	54.5	50.3
MAX	95	203	76	49	44	54	1,390	553	372	127	172	87
MIN	23	71	49	25	21	37	56	97	93	42	28	35
(✓)	+92.8	+38.0	+14.7	+1.73	-1.93	-0.15	+107	+33.5	+30.4	+6.10	+0.08	-0.47
MEAN ≠	143	180	74.2	37.7	26.5	44.4	621	300	230	70.1	54.6	49.8
CFSM ≠	0.92	1.15	0.48	0.24	0.17	0.28	3.98	1.92	1.47	0.45	0.35	0.32
IN. ≠	1.06	1.29	0.55	0.28	0.18	0.33	4.44	2.22	1.65	0.52	0.40	0.36

CAL YR 1970:	MEAN	97.7	MEAN ≠	125	MAX	993	MIN	16	CFSM ≠	0.80	IN. ≠	10.87
WTR YR 1971:	MEAN	126	MEAN ≠	154	MAX	1,390	MIN	21	CFSM ≠	0.99	IN. ≠	13.32

✓ Change in contents in Partridge Reservoir and diversion to iron-ore processing plant, equivalent in cubic feet per second; furnished by Erie Mining Co.
≠ Adjusted for change in contents and diversion.

04016500 St. Louis River near Aurora, Minn.

LOCATION.--Lat 47°29'30", long 92°14'20", in SW¼ sec.22, T.58 N., R.15 W., St. Louis County, on left bank at upstream side of highway bridge, 0.8 mile downstream from Partridge River and 1.5 miles south of Aurora.

DRAINAGE AREA.--312 sq mi.

PERIOD OF RECORD.--August 1942 to current year.

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

AVERAGE DISCHARGE (adjusted for storage and diversion).--29 years, 244 cfs (10.62 inches per year).

EXTREMES.--Current year: Maximum discharge, 2,370 cfs Apr. 21 (gage height, 5.31 ft); minimum, 25 cfs Oct. 6 (gage height, 0.73 ft).
Period of record: Maximum discharge, 5,380 cfs May 14, 1950 (gage height, 8.37 ft); minimum, 4.0 cfs Oct. 2, 3, 1948 (gage height, 0.30 ft).

REMARKS.--Records good except those for winter periods, which are fair. Flow regulated at times by storage in off-channel Partridge Reservoir, formerly known as Whitewater Lake. Reservoir formed from lake by levees around marsh areas and natural outlet. Available capacity 20,000 acre-ft between elevations 1,410 ft (natural lake level) and 1,440 ft. Storage began Apr. 9, 1955. Storage in reservoir obtained from Colby Lake during periods of high flow; release from storage returned to Colby Lake to maintain lake elevation during diversion for iron-ore processing. Diversion began Feb. 7, 1956. Some seepage losses from reservoir enter above station.

REVISIONS (WATER YEARS).--WSP 1337: 1950.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	37	337	153	93	45	61	88	1,190	642	407	83	88
2	35	374	156	90	42	59	88	1,110	574	368	78	79
3	33	396	159	87	41	60	90	1,040	507	330	75	76
4	30	418	160	84	42	61	90	968	451	301	70	85
5	27	427	160	81	44	62	92	904	433	269	64	85
6	25	428	157	78	46	62	96	832	407	239	58	78
7	27	421	151	77	46	61	105	753	383	217	53	76
8	74	409	144	76	47	60	134	675	357	200	49	75
9	112	479	138	74	49	60	220	618	330	190	46	80
10	121	551	132	71	50	60	430	560	304	177	70	97
11	117	589	126	70	50	59	590	509	332	163	59	93
12	149	618	122	70	52	59	812	469	313	165	58	84
13	160	613	118	70	54	60	949	432	294	176	57	79
14	149	594	114	70	56	66	1,010	397	272	170	57	75
15	134	565	113	69	55	71	1,010	363	250	167	53	72
16	128	532	111	67	53	74	1,200	333	225	158	51	71
17	128	504	112	66	52	74	1,420	307	324	146	51	70
18	130	469	113	65	50	74	1,570	293	393	142	66	69
19	126	438	114	64	49	74	2,040	311	517	136	121	68
20	129	410	113	63	47	75	2,320	366	765	129	99	68
21	130	384	111	62	46	75	2,330	409	824	124	97	65
22	132	310	110	62	46	74	2,290	436	844	115	97	65
23	141	280	110	62	46	75	2,220	478	833	108	128	69
24	151	256	110	61	45	76	2,120	623	798	100	196	68
25	173	236	108	59	46	76	1,980	714	749	94	102	59
26	176	214	106	58	53	76	1,830	826	685	91	104	57
27	207	197	103	57	60	77	1,660	892	607	91	88	56
28	222	180	100	55	63	80	1,510	898	532	109	82	78
29	250	167	97	53	------	80	1,370	854	485	95	78	89
30	271	157	96	51	------	83	1,280	784	446	90	79	122
31	298	------	95	48	------	85	------	714	------	87	79	------
TOTAL	4,022	11,953	3,812	2,113	1,375	2,149	32,944	20,058	14,876	5,354	2,448	2,296
MEAN	130	398	123	68.2	49.1	69.3	1,098	647	496	173	79.0	76.5
MAX	298	618	160	93	63	85	2,330	1,190	844	407	196	122
MIN	25	157	95	48	41	59	88	293	225	87	46	56
(≠)	+92.8	+38.0	+14.7	+1.73	-1.93	-0.15	+107	+33.5	+30.4	+6.10	+0.08	-0.47
MEAN ≠	223	436	138	69.9	47.2	69.2	1,205	680	526	179	79.1	76.0
CFSM ≠	0.71	1.40	0.44	0.22	0.15	0.22	3.18	2.18	1.69	0.57	0.25	0.24
IN. ≠	0.82	1.56	0.51	0.26	0.16	0.26	4.31	2.51	1.88	0.66	0.29	0.27

CAL YR 1970	MEAN	218	MEAN ≠	247	MAX	1,690	MIN	24	CFSM ≠	0.79	IN. ≠	10.76
WTR YR 1971	MEAN	283	MEAN ≠	310	MAX	2,330	MIN	25	CFSM ≠	0.99	IN. ≠	13.49

(≠) Change in contents in Partridge Reservoir and diversion to iron-ore processing plant, equivalent in cubic feet per second; furnished by Erie Mining Co.
≠ Adjusted for change in contents and diversion.

NOTE: No gage-height record Jan. 3 to Feb. 3.

04018750 St. Louis River at Forbes, Minn.

LOCATION.--Lat 47°21'48", long 92°35'56", in NE¼SE¼ sec.3, T.56 N., R.18 W., St. Louis County, on right bank at downstream side of highway bridge, 0.5 mile downstream from Eveleth Taconite Company dam, 0.6 mile south of Forbes, 1.8 miles upstream from Elbow Creek.

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

GAGE.--Water-stage recorder. Datum of gage is 1,293.11 ft above mean sea level, datum of 1929. Prior to Oct. 28, 1964, nonrecording gage at same site and datum.

AVERAGE DISCHARGE.--7 years, 578 cfs.

EXTREMES.--Current year: Maximum discharge, 5,610 cfs Apr. 16 (gage height, 16.20 ft, result of release of storage behind ice jam at dam 0.5 mile upstream); maximum daily discharge, 4,910 cfs Apr. 22; maximum gage height, 16.27 ft Apr. 15 (backwater from ice); minimum discharge, 39 cfs Oct. 6 (gage height, 5.45 ft); minimum gage height, 5.41 ft July 27.

Period of record: Maximum discharge, 5,610 cfs Apr. 16, 1971 (gage height, 16.20 ft, result of release of storage behind ice jam at dam 0.5 mile upstream); maximum daily discharge, 5,170 cfs Apr. 18, 1969; maximum gage height, 16.27 ft Apr. 15, 1971 (backwater from ice); minimum discharge, 24 cfs Nov. 26, 1966 (gage height, 5.23 ft).

REMARKS.--Records good except those for winter periods, which are fair. There is some regulation at medium and low flows and diversion for iron-ore processing at Eveleth Taconite Company dam 0.5 mile upstream. Diversion began Dec. 5, 1965. Records of chemical analyses for the current year are published in Part 2 of this report.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	80	837	460	277	114	129	191	2,540	1,410	962	60	101
2	81	869	490	269	113	121	194	2,410	1,320	853	80	219
3	77	897	510	263	112	167	200	2,160	1,200	757	152	216
4	75	898	520	259	111	171	205	1,860	1,080	694	206	216
5	71	893	520	258	111	170	210	1,800	1,060	646	200	231
6	60	880	510	257	111	166	210	1,670	1,010	503	186	237
7	42	858	500	254	112	164	230	1,560	910	537	166	219
8	78	823	500	250	112	161	260	1,450	831	486	155	207
9	251	904	490	241	113	158	310	1,320	762	336	221	201
10	413	1,310	480	234	114	156	450	1,200	720	433	176	219
11	405	1,290	470	224	116	157	1,100	1,120	820	402	122	250
12	411	1,270	470	218	118	158	2,100	1,030	842	216	126	240
13	458	1,250	460	206	123	160	2,750	956	628	500	182	228
14	488	1,170	450	198	127	163	3,280	885	713	476	178	213
15	496	1,130	440	188	132	166	3,900	812	650	251	175	198
16	491	1,100	430	181	136	168	4,440	749	482	483	170	106
17	483	1,040	425	174	142	170	4,430	696	782	271	167	149
18	480	976	415	168	145	171	4,290	631	1,120	383	193	190
19	474	916	400	163	146	172	4,520	570	1,070	176	266	187
20	457	863	390	157	146	173	4,710	818	1,510	367	344	181
21	441	806	380	152	145	174	4,890	822	1,830	373	327	175
22	425	703	370	147	145	174	4,910	844	1,800	223	301	169
23	472	601	365	142	145	174	4,730	859	1,720	204	278	161
24	475	520	360	137	145	173	4,400	1,080	1,660	275	272	161
25	466	480	350	133	146	174	4,030	1,190	1,590	263	330	158
26	472	465	340	129	170	175	3,730	1,370	1,490	239	253	155
27	536	440	335	127	180	177	3,620	1,550	1,360	124	240	112
28	633	430	325	124	156	179	3,310	1,620	1,220	244	219	44
29	662	430	315	121	------	182	2,910	1,610	1,070	268	207	117
30	685	440	300	118	------	184	2,700	1,590	1,040	314	204	288
31	746	------	290	116	------	187	------	1,510	------	171	126	------
TOTAL	11,884	25,489	13,060	5,885	3,686	5,174	77,210	40,282	33,700	12,430	6,282	5,548
MEAN	383	850	421	190	132	167	2,574	1,299	1,123	401	203	185
MAX	746	1,310	520	277	180	187	4,910	2,540	1,830	962	344	288
MIN	42	430	290	116	111	121	191	570	482	124	60	44

CAL YR 1970 TOTAL 186,443 MEAN 511 MAX 2,880 MIN 41
WTR YR 1971 TOTAL 240,630 MEAN 659 MAX 4,910 MIN 42

04018900 East Two River near Iron Junction, Minn.

LOCATION.--Lat 47°24'04", long 92°39'52", in NW¼NW¼ sec.29, T.57 N., R.18 W., St. Louis County, on right bank 30 ft downstream from bridge on State Highway 37 and 2.2 miles southwest of Iron Junction.

DRAINAGE AREA.--40.0 sq mi.

PERIOD OF RECORD.--June 1966 to current year. Occasional low-flow measurements, water years 1957-62

GAGE.--Water-stage recorder. Altitude of gage is 1,335 ft (from topographic map).

AVERAGE DISCHARGE.--5 years, 33.9 cfs (11.51 inches per year).

EXTREMES.--Current year: Maximum discharge, 625 cfs Apr. 14 (gage height, 9.61 ft); maximum gage height, 10.16 ft Apr. 12 (backwater from ice); minimum daily discharge, 7.7 cfs Feb. 15; minimum gage height, 2.94 ft Oct. 3, 4.

Period of record: Maximum discharge, 625 cfs Apr. 14, 1971 (gage height, 9.61 ft); maximum gage height, 10.16 ft Apr. 12, 1971; minimum daily discharge, 4.6 cfs Jan. 27-30, 1970.

REMARKS.--Records good except those for winter periods, which are fair.

COOPERATION.--Records collected and computed by U.S. Steel Corporation and reviewed by Geological Survey.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9.4	95	25	13	8.6	11	21	56	42	28	14	13
2	9.1	90	24	12	8.6	11	21	52	36	25	13	13
3	8.8	78	24	12	8.5	12	22	47	32	22	13	13
4	8.3	67	23	12	8.4	12	22	44	32	24	12	16
5	8.8	56	23	11	8.4	13	23	40	31	27	11	16
6	8.8	47	22	11	8.3	13	25	34	31	26	10	18
7	9.1	41	21	11	8.2	14	26	31	30	25	10	17
8	15	36	21	11	8.2	14	40	33	28	22	10	17
9	41	61	21	10	8.1	14	60	33	27	20	10	16
10	78	77	20	10	8.0	15	100	31	22	18	12	17
11	102	97	20	10	8.0	15	135	29	29	16	14	18
12	129	83	19	9.8	7.9	16	180	26	30	16	13	19
13	131	71	19	9.6	7.8	16	270	23	32	22	14	19
14	107	56	18	9.5	7.8	16	540	23	29	20	15	18
15	75	53	18	9.3	7.7	16	390	21	26	20	14	17
16	54	46	18	9.2	7.8	17	373	19	22	19	13	16
17	41	38	17	9.2	7.8	17	379	18	66	19	13	16
18	33	33	17	9.1	8.0	17	350	19	103	18	14	15
19	28	30	17	9.1	8.0	17	319	24	105	18	18	14
20	25	28	16	9.0	8.2	18	289	42	219	16	18	13
21	22	27	16	9.0	8.4	18	253	62	273	15	17	13
22	24	28	16	9.0	8.6	18	202	58	243	14	17	13
23	27	28	15	8.9	8.8	18	162	56	180	16	16	12
24	31	28	15	8.8	9.1	19	129	108	118	16	16	12
25	34	28	15	8.8	9.4	19	102	143	81	15	14	12
26	34	28	14	8.8	9.8	19	85	154	63	15	14	12
27	52	27	14	8.8	10	19	73	147	51	14	14	11
28	76	27	14	8.7	11	20	67	118	44	15	13	18
29	80	26	13	8.6	------	20	60	88	36	15	12	29
30	79	26	13	8.6	------	20	56	63	33	15	12	44
31	86	------	13	8.6	------	21	------	48	------	14	13	------
TOTAL	1,466.3	1,456	561	303.4	237.4	505	4,774	1,690	2,094	585	419	497
MEAN	47.3	48.5	18.1	9.79	8.48	16.3	159	54.5	69.8	18.9	13.5	16.6
MAX	131	97	25	13	11	21	540	154	273	28	18	44
MIN	8.3	26	13	8.6	7.7	11	21	18	22	14	10	11
CFSM	1.18	1.21	.45	.24	.21	.41	3.98	1.36	1.75	.47	.34	.42
IN.	1.36	1.35	.52	.28	.22	.47	4.44	1.57	1.95	.54	.39	.46

CAL YR 1970 TOTAL 11,498.1 MEAN 31.5 MAX 294 MIN 4.6 CFSM .79 IN 10.69
WTR YR 1971 TOTAL 14,588.1 MEAN 40.0 MAX 540 MIN 7.7 CFSM 1.00 IN 13.57

04019000 West Two River near Iron Junction, Minn.

LOCATION.--Lat 47°24'05", long 92°42'10", in SW¼SW¼ sec.24, T.57 N., R.19 W., St. Louis County, on right bank 40 ft upstream from bridge on State Highway 37, 5 miles southwest of Iron Junction, and 9.2 miles upstream from St. Louis River.

DRAINAGE AREA.--68.4 sq mi.

PERIOD OF RECORD.--October 1953 to September 1962, October 1965 to current year.

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

AVERAGE DISCHARGE.--15 years, 47.1 cfs (9.35 inches per year).

EXTREMES.--Current year: Maximum discharge, 876 cfs Apr. 18 (gage height, 8.91 ft); minimum, 9.2 cfs Oct. 7 (gage height, 2.48 ft); minimum gage height, 2.46 ft Sept. 26.
Period of record: Maximum discharge, 916 cfs Apr. 17, 1954 (gage height, 9.85 ft); minimum daily, 3.0 cfs Jan. 22 to Feb. 6, 1957; minimum gage height, 2.34 ft Aug. 15-17, 24-28, 1961, Oct. 31, Nov. 1, 1967.

REMARKS.--Records good except those for winter periods, which are fair. Flow regulated at times by storage in West Two River Reservoir for taconite processing at U.S. Steel Mountain Iron Taconite Plant. The reservoir impounds water from the upper 27.9 sq miles of the drainage area and has an available capacity of 8,500 acre-ft between elevations 1,370 ft (natural inlet) and 1,395 ft (crest of spillway at outlet dam). Storage began July 28, 1966. Some seepage losses from reservoir enter above station.

COOPERATION.--Records for current year collected and computed by U.S. Steel Corporation and reviewed by Geological Survey.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10	98	47	27	15	15	27	105	78	54	20	11
2	10	103	47	26	14	15	28	95	66	48	18	11
3	10	100	46	26	14	15	28	85	57	42	18	10
4	9.6	89	46	25	14	15	29	81	49	45	18	12
5	9.6	79	45	25	14	15	30	78	49	46	17	12
6	9.6	70	44	24	14	15	32	71	43	43	17	12
7	9.6	63	43	24	14	16	36	64	39	42	16	11
8	15	55	42	23	14	16	65	60	36	40	16	10
9	29	83	41	23	15	16	110	55	33	38	16	11
10	38	108	41	22	15	16	155	51	32	35	18	14
11	39	116	40	22	15	17	230	48	45	32	18	13
12	51	117	39	22	15	17	280	44	44	32	18	12
13	52	103	38	21	15	17	350	39	41	39	18	12
14	52	92	37	21	15	18	638	36	38	35	18	12
15	50	90	37	20	16	18	738	33	35	34	18	12
16	46	61	36	20	16	18	732	31	32	33	18	12
17	42	55	36	20	16	19	816	30	78	30	18	12
18	39	51	35	19	16	19	864	29	115	30	18	11
19	36	48	34	19	16	20	816	35	137	29	17	11
20	34	45	33	19	16	20	696	58	260	28	16	10
21	32	45	33	18	16	21	591	71	312	26	17	11
22	32	49	32	18	16	21	507	79	304	25	16	10
23	35	50	31	18	16	22	409	91	258	24	16	10
24	35	50	31	17	16	22	309	149	195	23	16	10
25	34	50	30	17	16	23	243	177	146	22	16	10
26	35	50	30	17	15	23	198	199	107	21	16	9.6
27	53	49	29	16	15	24	164	197	84	22	14	12
28	73	49	29	16	15	24	144	175	71	23	10	24
29	79	49	28	15		25	124	142	62	21	10	24
30	84	48	28	15		26	111	113	58	21	10	38
31	93		27	15		26		93		20	10	
TOTAL	1,176.4	2,115	1,135	630	424	594	9,500	2,614	2,904	1,003	502	389.6
MEAN	37.9	70.5	36.6	20.3	15.1	19.2	317	84.3	96.8	32.4	16.2	13.0
MAX	93	117	47	27	16	26	864	199	304	54	20	38
MIN	9.6	45	27	15	14	15	27	29	32	20	10	9.6
CFSM	.55	1.03	.54	.30	.22	.28	4.63	1.23	1.42	.47	.24	.19
IN.	.64	1.15	.62	.34	.23	.32	5.17	1.42	1.58	.55	.27	.21

CAL YR 1970 TOTAL 17,846.5 MEAN 48.9 MAX 558 MIN 7.9 CFSM .71 IN 9.71
WTR YR 1971 TOTAL 22,987.0 MEAN 63.0 MAX 864 MIN 9.6 CFSM .92 IN 12.50

04019300 West Swan River near Silica, Minn.

LOCATION.--Lat 47°17'36", long 93°02'30", in SW¼NW¼ sec.32, T.56 N., R.21 W., St. Louis County, on right bank 10 ft upstream from pilings of dismantled bridge and railroad bed of Great Northern Railroad, 2 miles northwest of Silica, 9 miles southwest of Hibbing and 20 miles upstream from confluence of East Swan and West Swan.

PERIOD OF RECORD.--April 1963 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,360 ft (from topographic map). Prior to Aug. 2, 1963, reference point at same site and datum.

AVERAGE DISCHARGE.--8 years, 10.8 cfs.

EXTREMES.--Current year: Maximum discharge, 428 cfs Apr. 12 (gage height, 5.09 ft); no flow Oct. 1-7. Period of record: Maximum discharge, 428 cfs Apr. 12, 1971 (gage height, 5.09 ft); maximum gage height, 5.17 ft Mar. 28, 1968 (backwater from ice); no flow Aug. 20 to Sept. 4, 1969, Aug. 18 to Oct. 7, 1970.

REMARKS.--Records good except those for winter periods, which are fair.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0	15	1.9	1.0	.20	.30	.80	7.5	6.0	3.2	.50	.20
2	0	18	2.5	1.0	.20	.30	.80	7.1	4.8	2.5	.40	.20
3	0	14	3.8	.90	.20	.30	.80	5.9	3.6	2.0	.40	.10
4	0	11	3.4	.90	.20	.30	.80	5.9	2.7	2.5	.20	.20
5	0	9.2	3.2	.90	.20	.30	.90	6.4	2.1	2.3	.20	.10
6	0	7.8	3.0	.80	.20	.30	1.2	5.4	1.5	1.7	.20	.30
7	0	6.6	2.9	.80	.20	.30	2.5	4.4	1.4	1.5	.20	.10
8	.10	5.4	2.8	.80	.20	.30	4.0	3.8	1.2	1.3	.20	.20
9	2.3	12	2.6	.70	.20	.30	11	3.2	1.1	1.2	.20	.10
10	6.0	26	2.5	.70	.20	.30	90	2.5	1.4	1.1	.60	.50
11	4.6	22	2.3	.60	.20	.40	185	2.3	9.5	1.3	.30	.90
12	4.6	16	2.2	.60	.20	.40	367	2.1	17	2.5	.20	1.0
13	4.4	12	2.1	.60	.20	.40	333	2.6	12	2.0	.20	1.5
14	3.1	11	1.9	.50	.20	.40	208	14	6.2	1.6	.20	1.0
15	2.4	6.4	1.8	.50	.20	.40	148	7.7	3.5	1.4	.10	.40
16	2.0	5.1	1.8	.50	.20	.40	202	4.9	2.0	1.3	.10	.50
17	1.9	4.4	1.7	.50	.30	.50	224	2.4	103	1.4	.10	.40
18	1.6	3.8	1.7	.40	.30	.50	137	1.8	207	1.5	7.4	.40
19	1.5	3.6	1.5	.40	.30	.60	83	2.8	91	1.4	10	.40
20	1.1	3.5	1.4	.40	.30	.60	59	12	91	1.3	5.2	.40
21	1.1	3.4	1.4	.30	.30	.60	43	34	62	1.2	2.7	.30
22	1.1	3.1	1.4	.30	.30	.60	27	26	28	1.2	1.6	.20
23	1.1	2.7	1.3	.30	.30	.60	17	19	15	1.1	1.0	.20
24	1.5	2.4	1.3	.30	.30	.60	12	53	11	1.1	1.2	.20
25	1.9	2.1	1.3	.30	.30	.60	9.9	77	9.5	1.2	1.1	.20
26	2.6	1.9	1.3	.30	.30	.60	8.4	54	7.3	1.4	.70	.20
27	10	1.8	1.3	.20	.30	.70	7.3	32	5.5	2.0	.50	.20
28	16	1.8	1.2	.20	.30	.70	7.5	17	4.5	2.7	.20	8.8
29	10	1.7	1.2	.20	------	.70	7.7	11	3.6	2.2	.20	9.0
30	8.4	1.7	1.2	.20	------	.80	6.9	8.2	3.5	1.4	.20	13
31	11	------	1.0	.20	------	.80	------	6.9	------	.60	.20	------
TOTAL	100.30	235.4	60.9	16.30	6.80	14.90	2,205.50	442.8	717.9	51.10	36.50	41.20
MEAN	3.24	7.85	1.96	.53	.24	.48	73.5	14.3	23.9	1.65	1.18	1.37
MAX	16	26	3.8	1.0	.30	.80	367	77	207	3.2	10	13
MIN	0	1.7	1.0	.20	.20	.30	.80	1.8	1.1	.60	.10	.10

CAL YR 1970 TOTAL 2,792.70 MEAN 7.65 MAX 280 MIN 0
WTR YR 1971 TOTAL 3,929.60 MEAN 10.8 MAX 367 MIN 0

PEAK DISCHARGE (BASE, 400 CFS)

DATE	TIME	G. H.	DISCHARGE	DATE	TIME	G. H.	DISCHARGE
4-13	1630	20.03	1,720	6-18	1730	13.05	722
5-25	1830	10.54	492				

04019500 East Swan River near Toivola, Minn.

LOCATION.--Lat 47°16'55", long 92°50'05", in NE¼NE¼ sec.2, T.55 N., R.20 W., St. Louis County, on left bank 350 ft downstream from bridge on St. Louis County Road 442, 4.8 miles upstream from confluence with West Swan River, 8 miles northwest of Toivola, and 8.8 miles upstream from St. Louis River.

DRAINAGE AREA.--112 sq mi.

PERIOD OF RECORD.--September 1953 to September 1962, October 1964 to September 1971 (discontinued).

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

AVERAGE DISCHARGE.--16 years, 93.8 cfs (11.37 inches per year).

EXTREMES.--Current year: Maximum discharge, 1,720 cfs Apr. 13 (gage height, 20.03 ft); minimum daily, 17 cfs Mar. 9-14; minimum gage height, 3.69 ft Aug. 9.

Period of record: Maximum discharge, 1,950 cfs Apr. 12, 1969 (gage height, 19.27 ft); maximum gage height, 20.03 ft Apr. 13, 1971; minimum discharge, 11 cfs Aug. 3, 10, 11, 1970; minimum gage height, 3.01 ft Aug. 10, 1970.

Flood in May 1950 reached a stage of about 20.0 ft, from information by local residents.

REMARKS.--Records good except those for winter periods, which are fair.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	37	115	48	27	25	20	22	231	143	96	37	33
2	38	133	50	27	26	19	24	211	125	85	36	32
3	39	128	51	27	26	19	26	187	108	75	35	31
4	38	113	51	27	26	19	29	174	92	72	33	32
5	38	100	50	27	26	18	34	175	89	90	32	33
6	39	94	49	27	27	18	42	152	89	79	30	33
7	40	86	48	27	27	18	55	133	73	71	29	31
8	49	76	47	26	27	18	80	118	65	66	26	33
9	80	96	46	26	27	17	148	108	59	63	25	33
10	121	200	45	26	27	17	350	98	57	58	32	36
11	96	209	44	26	26	17	670	90	127	54	34	47
12	98	177	44	26	26	17	1,180	80	157	55	31	38
13	86	143	43	26	26	17	1,660	74	154	68	30	31
14	74	108	42	26	26	17	1,650	69	107	62	32	29
15	67	128	40	26	25	18	1,490	64	78	58	30	28
16	60	116	39	26	25	18	1,350	59	66	53	29	29
17	55	90	38	26	25	18	1,360	56	286	50	30	30
18	51	77	37	26	24	19	1,370	58	668	51	104	30
19	48	71	36	26	24	19	1,240	62	574	56	103	28
20	46	68	35	26	24	19	1,060	148	556	50	75	27
21	45	57	35	26	23	20	840	293	633	48	57	27
22	44	47	34	25	23	20	666	277	530	48	45	30
23	44	50	33	25	22	21	543	224	369	42	38	31
24	45	50	32	25	22	22	448	369	286	40	35	33
25	45	48	31	25	21	22	370	480	229	36	35	31
26	47	47	30	25	21	23	317	460	180	38	34	32
27	67	44	29	25	20	24	276	366	143	40	30	30
28	122	43	28	25	20	24	257	287	117	50	31	51
29	114	44	27	25	------	24	243	218	104	47	31	168
30	92	46	27	25	------	23	229	179	102	40	29	154
31	94	------	27	25	------	22	------	160	------	35	29	------
TOTAL	1,959	2,804	1,216	803	687	607	18,029	5,660	6,366	1,776	1,207	1,231
MEAN	63.2	93.5	39.2	25.9	24.5	19.6	601	183	212	57.3	38.9	41.0
MAX	122	209	51	27	27	24	1,660	480	668	96	104	168
MIN	37	43	27	25	20	17	22	56	57	35	25	27
CFSM	.56	.83	.35	.23	.22	.18	5.37	1.63	1.89	.51	.35	.37
IN.	.65	.93	.40	.27	.23	.20	5.99	1.88	2.11	.59	.40	.41

CAL YR 1970 TOTAL 34,461 MEAN 94.4 MAX 1,140 MIN 12 CFSM .84 IN 11.45
WTR YR 1971 TOTAL 42,345 MEAN 116 MAX 1,660 MIN 17 CFSM 1.04 IN 14.06

PEAK DISCHARGE (BASE, 400 CFS)

DATE	TIME	G. H.	DISCHARGE	DATE	TIME	G. H.	DISCHARGE
4-13	1630	20.03	1,720	6-18	1730	13.05	722
5-25	1830	10.54	492				

04024000 St. Louis River at Scanlon, Minn.

LOCATION.--Lat 46°42'12", long 92°25'07", in NW¼ sec.30, T.49 N., R.16 W., St. Louis County, on right bank 25 ft downstream from lower bridge on U.S. Highway 61 at Scanlon, 0.6 mile downstream from Minnesota Power & Light Co. powerplant, 3 miles upstream from Thomson Reservoir, and 3.2 miles upstream from Midway River.

DRAINAGE AREA.--3,430 sq mi, approximately.

PERIOD OF RECORD.--January 1908 to current year. Monthly discharge only for some periods published in WSP 1307. Published as "near Thomson" 1908-50.

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

AVERAGE DISCHARGE (UNADJUSTED).--63 years, 2,236 cfs (8.85 inches per year).

EXTREMES.--Current year: Maximum discharge, 26,200 cfs Apr. 18 (gage height, 12.07 ft); minimum, 426 cfs Aug. 17 (gage height, 2.36 ft).
Period of record: Maximum daily discharge, 37,900 cfs May 9, 1950; maximum gage height, 15.8 ft, May 9, 1950, from Minnesota Highway Department (discharge uncertain); minimum discharge, 80 cfs Aug. 29, 1963; minimum daily, 109 cfs Feb. 7, 1924.

REMARKS.--Records good. Diurnal fluctuation caused by powerplant upstream. Flow regulated by Whiteface Reservoir and Boulder, Island, Rice and Fish Lakes (combined capacity, 332,160 acre-ft). Records of chemical analyses for the current year are published in Part 2 of this report.

REVISIONS (WATER YEARS).--WSP 1337: 1911-12.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	824	2,950	2,340	1,600	1,290	1,410	1,550	6,870	5,190	3,550	1,520	1,150
2	797	3,270	2,410	1,580	1,290	1,510	1,530	6,530	4,760	3,240	1,460	1,160
3	774	3,360	2,660	1,560	1,290	1,540	1,350	5,950	4,360	2,930	1,200	1,080
4	767	3,310	2,440	1,550	1,310	1,560	1,530	5,550	3,520	2,400	1,030	1,060
5	722	3,050	2,550	1,510	1,320	1,490	1,550	5,230	3,570	2,060	1,160	1,120
6	749	2,850	2,230	1,500	1,310	1,380	1,530	4,810	3,850	1,690	1,200	1,190
7	805	2,670	2,230	1,510	1,330	1,490	1,420	4,520	3,920	1,530	1,260	1,150
8	1,110	2,420	2,210	1,540	1,390	1,520	1,600	4,090	3,530	1,360	1,280	1,140
9	1,370	2,580	2,450	1,550	1,380	1,510	2,280	3,700	3,080	1,200	1,310	1,110
10	1,840	3,810	2,080	1,540	1,380	1,510	3,230	3,430	2,360	1,340	1,130	1,250
11	1,930	5,350	2,180	1,520	1,380	1,520	7,840	3,110	2,470	1,280	1,220	1,460
12	2,130	5,420	2,280	1,460	1,330	1,520	16,200	2,780	3,280	1,250	1,400	1,740
13	2,050	5,250	2,280	1,470	1,380	1,500	19,100	2,580	3,720	1,490	1,480	1,470
14	1,780	4,640	2,190	1,490	1,400	1,550	22,100	2,240	3,310	1,380	1,400	1,460
15	1,680	3,770	1,900	1,470	1,510	1,580	23,700	2,110	2,680	1,660	1,260	1,370
16	1,710	3,630	2,130	1,480	1,530	1,500	24,200	1,920	2,500	1,490	1,330	1,320
17	1,470	3,510	2,120	1,350	1,530	1,580	25,500	1,680	2,280	1,380	1,460	1,420
18	1,390	3,120	2,170	1,430	1,520	1,550	26,000	1,700	8,680	1,440	6,490	1,280
19	1,320	3,000	2,090	1,480	1,500	1,590	25,000	1,720	11,100	1,650	7,930	1,050
20	1,250	2,810	1,950	1,440	1,400	1,530	23,400	2,630	9,540	1,620	6,140	983
21	1,190	2,620	1,980	1,360	1,440	1,500	21,500	3,790	9,830	1,520	4,240	784
22	1,170	2,360	1,820	1,360	1,530	1,530	19,400	4,380	9,540	1,360	3,210	983
23	1,180	1,460	1,720	1,450	1,410	1,500	16,900	4,130	9,360	1,460	2,370	1,080
24	1,190	1,190	1,680	1,370	1,510	1,520	15,000	4,590	9,090	1,310	2,110	1,070
25	1,260	1,620	1,700	1,410	1,660	1,390	13,100	6,640	8,450	1,100	1,620	1,080
26	1,360	1,960	1,670	1,380	1,610	1,550	11,300	8,680	7,750	1,120	1,530	1,190
27	1,570	2,250	1,540	1,380	1,610	1,520	9,820	8,640	6,690	1,210	1,400	1,160
28	1,910	2,290	1,570	1,360	1,490	1,560	8,800	8,060	5,180	1,250	1,210	1,260
29	2,390	2,260	1,530	1,340	------	1,600	7,920	7,040	4,100	1,340	1,090	1,050
30	2,520	2,230	1,500	1,310	------	1,500	7,260	6,240	3,780	1,700	994	1,150
31	2,670	------	1,560	1,300	------	1,530	------	5,630	------	1,590	950	------
TOTAL	44,868	91,010	63,160	45,050	40,030	47,040	361,610	141,170	161,530	50,880	63,404	35,780
MEAN	1,447	3,034	2,037	1,453	1,430	1,517	12,050	4,554	5,384	1,641	2,045	1,193
MAX	2,670	5,420	2,660	1,600	1,660	1,600	26,000	8,840	11,100	3,550	7,930	1,740
MIN	722	1,190	1,500	1,300	1,290	1,380	1,350	1,680	2,280	1,100	950	784
(∠)	+337	+903	-493	-789	-799	-878	+3,041	+1,136	+150	-219	-274	-412
MEAN ≠	1,784	3,937	1,544	664	631	639	15,091	5,690	5,534	1,422	1,771	781
CFSM ≠	0.52	1.15	0.45	0.19	0.18	0.19	4.40	1.66	1.61	0.41	0.52	0.23
IN. ≠	0.60	1.28	0.52	0.22	0.19	0.21	4.91	1.91	1.80	0.48	0.60	0.25

CAL YR 1970	MEAN	2,346	MAX	15,300	MIN	722	MEAN ≠	2,338	CFSM ≠	0.68	IN. ≠	9.25
WTR YR 1971	MEAN	3,138	MAX	26,000	MIN	722	MEAN ≠	3,280	CFSM ≠	0.96	IN. ≠	12.98

∠ Change in contents, equivalent in cubic feet per second, in Whiteface Reservoir and Boulder, Island, Rice and Fish Lakes; records furnished by Minnesota Power and Light Co.
≠ Adjusted for change in contents.

05030000 Otter Tail River near Detroit Lakes, Minn.

LOCATION.--Lat 46°50'12", long 95°41'57", in NE¼SW¼ sec.23, T.139 N., R.40 W., Becker County, on right bank 10 ft upstream from highway bridge, 5 miles downstream from Height of Land Lake, and 7.5 miles east of city of Detroit Lakes.

DRAINAGE AREA.--270 sq mi.

PERIOD OF RECORD.--March 1937 to September 1971 (discontinued).

GAGE.--Water-stage recorder and concrete control. Datum of gage is 1,409.49 ft above mean sea level, datum of 1929.

AVERAGE DISCHARGE.--34 years, 53.7 cfs (38,910 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 84 cfs Apr. 10 (gage height, 3.76 ft); maximum gage height 5.46 ft Feb. 25 (backwater from ice); minimum discharge, 0.82 cfs Oct. 5, 6, 7 (gage height, 2.61 ft).
Period of record: Maximum discharge, 371 cfs June 26, 1943 (gage height, 4.78 ft, from graph based on partial record); maximum gage height, 6.96 ft Jan. 27, 1950 (backwater from ice); minimum daily discharge, 0.10 cfs Mar. 23, 1940.

REMARKS.--Records good except those for winter periods, which are fair. Flow partly regulated by dams of Minnesota Department of Conservation on several lakes above station.

REVISIONS (WATER YEARS).--WSP 1308: 1944(M).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.7	8.1	21	22	29	35	44	32	46	44	15	12
2	1.5	8.9	19	23	29	35	44	32	44	43	15	11
3	1.3	9.5	19	23	29	35	45	24	43	42	14	11
4	1.2	9.1	19	23	29	35	44	2	43	44	14	44
5	1.1	9.4	19	23	30	36	47	29	41	42	14	41
6	.91	9.9	19	23	30	36	53	34	4[illegible]	42	13	46
7	1.1	10	19	24	30	36	62	38	41	45	13	45
8	1.2	1[illegible]	19	24	30	37	73	41	39	45	13	45
9	1.4	11	19	24	30	37	77	44	37	45	12	45
10	1.8	12	19	24	30	38	79	45	37	44	13	44
11	1.8	13	19	24	31	38	84	44	35	42	12	43
12	2.0	13	19	25	31	38	81	44	38	46	12	41
13	3.2	13	19	25	31	38	78	44	37	47	14	40
14	3.5	13	19	25	31	39	50	43	35	47	14	39
15	3.3	13	19	25	31	50	31	41	35	46	14	38
16	3.1	13	19	25	32	41	25	42	33	4[illegible]	13	37
17	3.1	14	20	25	32	40	29	43	34	32	13	36
18	3.0	14	20	26	32	40	44	43	34	28	13	35
19	2.8	14	20	26	32	40	43	43	35	26	13	35
20	2.7	14	20	26	32	40	47	41	42	24	13	35
21	2.5	15	20	26	32	41	55	40	39	22	15	34
22	2.5	15	21	27	33	41	54	39	37	20	15	34
23	2.5	17	21	27	33	41	60	45	36	19	15	33
24	2.4	18	21	27	33	42	63	48	39	17	15	32
25	3.0	18	21	27	45	42	65	46	38	16	14	32
26	4.0	18	21	27	35	42	67	45	36	15	14	31
27	5.3	18	22	28	35	42	58	44	36	15	13	31
28	5.5	18	22	28	35	43	46	43	35	15	12	31
29	5.7	19	22	28	------	43	37	43	41	15	11	31
30	6.2	19	22	28	------	42	33	46	46	16	12	32
31	7.5	------	22	28	------	45	------	47	------	15	12	------
TOTAL	88.81	406.9	621	786	892	1,228	1,618	1,253	1,155	999	416	1,045
MEAN	2.86	13.6	20.0	25.4	31.9	39.6	53.9	40.4	35.5	32.2	13.4	34.8
MAX	7.5	19	22	28	45	50	84	48	46	47	16	46
MIN	.91	8.1	19	22	29	35	25	20	33	15	11	11
AC-FT	176	807	1,230	1,560	1,770	2,440	3,210	2,490	2,290	1,980	825	2,070

CAL YR 1970 TOTAL 17,550.67 MEAN 48.1 MAX 166 MIN .50 AC-FT 34,810
WTR YR 1971 TOTAL 10,508.71 MEAN 28.8 MAX 84 MIN .91 AC-FT 20,840

05033900 Pelican River at Detroit Lakes, Minn.

LOCATION.--Lat 46°48'37", long 95°49'42", in SW¼ sec.35, T.139 N., R.41 W., Becker County, on left bank 60 ft upstream from culvert, 0.5 mile upstream from Detroit Lake, at Detroit Lakes.

PERIOD OF RECORD.--July 1968 to July 1971 (discontinued).

GAGE.--Nonrecording gage read once daily. Datum of gage is 1334.73 ft above mean sea level, datum of 1929 (levels by Winston Larson, Detroit Lakes city engineer).

EXTREMES.--Maximum discharge during period October 1970 to July 1971, 61 cfs Apr. 8 (gage height, 1.15 ft); minimum daily, 0.6 cfs Dec. 20-21.
Period of record: Maximum discharge, 167 cfs Apr. 10, 1969 (gage height, 5.31 ft, from floodmark); minimum daily, 0.3 cfs Sept. 28-30, 1969.

REMARKS.--Records fair. Records of chemical analyses for the current year are published in Part 2 of this report.

COOPERATION.--Gage-height record furnished by Pelican River Watershed District.

DISCHARGE, IN CUBIC FEET PER SECOND, OCTOBER 1970 TO JULY 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.1	7.7	3.0	.80	1.2	.80	26	26	11	10		
2	1.8	7.2	2.7	.80	1.2	1.0	28	24	10	8.6		
3	2.1	6.8	2.7	.80	1.2	.80	23	23	9.0	7.7		
4	2.4	6.4	2.7	1.0	1.1	1.2	22	22	9.0	11		
5	2.4	5.5	2.7	1.0	1.1	1.0	26	22	9.0	10		
6	2.7	5.5	2.7	1.0	1.1	1.1	34	21	8.2	9.0		
7	4.7	4.7	2.4	1.0	1.1	1.2	51	20	8.2	14		
8	3.3	4.3	2.1	1.0	1.1	1.5	60	19	7.7	13		
9	4.0	3.6	2.1	1.0	1.1	1.6	59	18	7.7	10		
10	2.7	3.6	1.8	.80	1.1	1.8	58	17	7.7	9.0		
11	2.1	3.3	1.8	1.0	1.0	1.9	55	16	5.9	10		
12	2.1	3.3	1.6	1.2	1.0	2.0	46	13	5.1	15		
13	2.7	3.6	1.4	1.0	1.0	2.2	40	13	4.7	12		
14	2.4	3.0	1.4	1.0	1.0	2.3	35	13	4.7	12		
15	2.1	2.7	1.4	1.2	1.0	2.5	32	13	4.7			
16	1.8	2.7	1.0	1.2	1.0	2.6	29	12	4.0			
17	1.6	2.7	1.0	1.0	1.0	2.8	27	12	7.2			
18	1.6	2.7	1.2	1.0	1.0	3.0	28	11	7.7			
19	1.6	3.0	.80	1.0	1.4	3.3	28	10	5.9			
20	1.6	3.0	.60	1.0	1.4	5.6	28	9.5	22			
21	1.6	3.0	.60	1.0	1.2	5.4	28	8.6	17			
22	1.6	2.7	.60	.80	1.4	5.3	26	8.2	15			
23	1.6	2.7	.70	.80	1.6	5.6	25	14	14			
24	1.6	2.7	.70	1.0	1.6	5.3	25	19	19			
25	1.8	2.4	.70	1.0	1.6	4.9	24	18	14			
26	2.7	2.1	.70	1.1	1.4	4.3	22	15	12			
27	4.7	1.6	.70	1.2	1.4	5.1	26	14	11			
28	3.6	1.6	.70	1.2	1.0	5.1	26	13	6.8			
29	4.7	1.8	.70	1.2	------	5.9	27	12	9.0			
30	5.5	2.1	.70	1.2	------	10	26	11	19			
31	6.8	------	.70	1.2	------	26	------	12	------			------
TOTAL	84.0	108.0	44.60	31.50	33.3	123.10	990	479.3	296.2			
MEAN	2.71	3.60	1.44	1.02	1.19	3.97	33.0	15.5	9.87			
MAX	6.8	7.7	3.0	1.2	1.6	26	60	26	22			
MIN	1.6	1.6	.60	.80	1.0	.80	22	8.2	4.0			
AC-FT	167	214	88	62	66	244	1,960	951	588			

CAL YR 1970 TOTAL 3,290.20 MEAN 9.01 MAX 55 MIN .60 AC-FT 6,530

1334.73
5.31
1340.04

05034100 Pelican River at Detroit Lake Outlet near Detroit Lakes, Minn.

LOCATION.--Lat 46 47'22", long 95 52'00", on line between secs. 4 and 9, T.138 N., R.41 W., Becker County, on left wingwall of remains of old dam at outlet of Detroit Lake, 60 ft upstream from bridge on County Highway 22 and 2.5 miles southwest of Detroit Lakes.

PERIOD OF RECORD.--July 1968 to July 1971 (discontinued).

GAGE.--Nonrecording gage read once daily. Datum of gage is 1,330.01 ft above mean sea level, datum of 1929.

EXTREMES.--Maximum daily discharge during period October 1970 to July 1971, 41 cfs July 7 (gage height, 4.38 ft); no flow Oct. 1-26.

Period of record: Maximum discharge, 111 cfs Apr. 17, 1969 (gage height, 4.55 ft); minimum daily, -4.6 cfs Oct. 9, 1969; no flow at times in 1968, 1969 and 1971.

REMARKS.--Records fair.

COOPERATION.--Gage readings furnished by Pelican River Watershed District.

DISCHARGE, IN CUBIC FEET PER SECOND, OCTOBER 1970 TO JULY 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0	1.2	1.6	9.5	11	31	13	31	8.1	27		
2	0	1.0	3.0	9.5	11	29	14	30	8.1	27		
3	0	1.0	3.0	9.5	11	27	14	30	8.5	27		
4	0	.70	4.5	9.2	11	26	14	29	9.2	31		
5	0	.70	4.8	9.2	11	26	15	29	8.8	28		
6	0	.40	5.1	8.8	11	26	15	30	6.8	29		
7	0	.40	4.5	8.8	11	26	17	30	7.2	41		
8	0	.40	4.5	8.8	11	25	18	29	7.2	38		
9	0	.40	4.5	8.8	11	25	20	29	7.5	32		
10	0	.30	4.5	8.8	11	24	21	27	7.8	32		
11	0	.40	4.5	8.8	11	23	23	26	7.8	32		
12	0	.50	5.6	9.2	11	23	24	24	7.5	32		
13	0	.70	5.9	9.5	11	21	25	22	7.5	27		
14	0	.60	5.9	9.5	11	22	27	21	7.2	26		
15	0	.50	5.9	9.8	13	22	28	19	6.8	26		
16	0	.50	6.2	9.8	21	22	29	18	6.8	26		
17	0	.60	6.2	9.8	31	21	29	18	8.8	25		
18	0	.60	6.2	9.5	32	21	31	17	8.1	24		
19	0	.60	6.8	9.5	34	21	33	16	7.2	25		
20	0	.70	6.8	9.2	35	21	35	15	12	26		
21	0	.90	7.2	9.2	38	21	36	15	12	26		
22	0	1.0	7.5	9.2	37	21	33	15	13	25		
23	0	1.2	8.5	9.2	37	21	33	16	18	24		
24	0	1.3	8.8	9.2	34	21	31	18	20	24		
25	0	1.3	9.9	9.2	33	18	31	16	20	23		
26	0	1.3	9.5	11	31	16	30	14	21	21		
27	.10	1.3	9.8	11	32	15	32	12	21	20		
28	.20	1.5	10	11	31	14	33	10	20	19		
29	.40	1.5	10	11	------	13	32	8.5	23	19		
30	.40	1.5	9.5	11	------	13	32	7.8	27	18		
31	.60	------	9.2	11	------	12	------	8.8	------	18		------
TOTAL	1.70	25.00	198.8	297.5	593	667	768	631.1	353.9	818		
MEAN	.055	.83	6.41	9.60	21.2	21.5	25.6	20.4	11.8	26.4		
MAX	.60	1.5	10	11	38	31	36	31	27	41		
MIN	0	.30	1.6	8.8	11	12	13	7.8	6.8	18		
AC-FT	3.4	50	394	590	1,180	1,320	1,520	1,250	702	1,620		

CAL YR 1970 TOTAL 4,608.90 MEAN 12.6 MAX 73 MIN -1.0 AC-FT 9,140

1330.01
4.55
1334.56

05035100 Long Lake Outlet near Detroit Lakes, Minn.

LOCATION.--Lat 46°48'33", long 95°53'26", in SE¼ sec.32, T.139 N., R.41 W., Becker County, on right downstream wingwall of abandoned Minnesota Conservation Department dam, 200 ft downstream from Long Lake, 2,500 ft upstream from St. Clair Lake and 2.2 miles west of Detroit Lakes.

PERIOD OR RECORD.--July 1968 to July 1971 (discontinued).

GAGE.--Nonrecording gage read once daily. Altitude of gage is 1,350 ft (from topographic map).

EXTREMES.--Maximum daily discharge during period October 1970 to July 1971, 4.4 cfs Mar. 23, 26, 28-30, Apr. 1-10; maximum gage height, 5.08 ft Mar. 15 (backwater from ice); no flow for many days.
Period of record: Maximum discharge, 6.9 cfs Apr. 13, 1969 (gage height, 3.97 ft); maximum gage height, 5.08 ft Mar. 15, 1971 (backwater from ice); no flow for several days in most years.

REMARKS.--Records good. Flow affected by natural storage in Long Lake.

COOPERATION.--Gage-height record furnished by Pelican River Watershed District.

DISCHARGE, IN CUBIC FEET PER SECOND, OCTOBER 1970 TO JULY 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0	.27	.60	.60	.52	.75	4.4	3.5	2.0	2.7		
2	0	.34	.65	.59	.52	.75	4.4	3.3	2.0	2.5		
3	0	.34	.70	.59	.52	.75	4.4	3.3	2.0	2.4		
4	0	.27	.75	.59	.52	.75	4.4	3.1	2.0	2.5		
5	0	.27	.75	.58	.52	.75	4.4	2.9	2.0	2.5		
6	0	.21	.83	.58	.52	.75	4.4	3.1	1.8	2.5		
7	0	.27	.83	.58	.52	.75	4.4	3.3	1.8	2.5		
8	0	.27	.75	.58	.51	.76	4.4	2.9	1.8	2.5		
9	0	.27	.67	.56	.51	.76	4.4	2.9	1.8	2.5		
10	0	.27	.67	.56	.51	.78	4.4	3.3	1.8	2.5		
11	0	.27	.54	.56	.51	1.0	4.1	3.3	1.6	2.7		
12	0	.43	.67	.55	.51	1.6	4.1	2.9	1.6	2.9		
13	.01	.43	.67	.54	.51	2.0	4.1	2.7	1.6	2.9		
14	.01	.43	.83	.54	.51	2.2	4.1	2.5	1.4	2.7		
15	.01	.43	.83	.54	.51	2.6	3.9	2.4	1.4			
16	.01	.43	.83	.52	.51	2.8	3.9	2.2	1.6			
17	.01	.43	.83	.52	.51	3.0	4.1	2.0	1.8			
18	.01	.43	.83	.52	.51	3.2	4.1	2.0	1.8			
19	.01	.43	.83	.52	.51	3.6	4.1	1.8	1.6			
20	.01	.43	.75	.52	.51	3.8	4.1	1.8	2.5			
21	.01	.43	.72	.52	.51	4.0	4.1	2.0	2.4			
22	.01	.43	.70	.52	.51	4.2	4.1	1.8	2.2			
23	.01	.43	.70	.52	.51	4.4	3.9	2.2	2.4			
24	.01	.43	.68	.52	.51	4.2	3.9	2.2	2.9			
25	.03	.45	.67	.52	.60	4.1	3.7	2.0	2.7			
26	.02	.45	.66	.52	.65	4.4	3.7	1.8	2.5			
27	.03	.46	.65	.52	.70	4.2	3.5	1.8	2.5			
28	.03	.47	.65	.52	.75	4.4	3.5	2.0	2.5			
29	.03	.48	.63	.52	------	4.4	3.5	2.0	2.4			
30	.03	.49	.62	.52	------	4.4	3.5	2.2	3.5			
31	.05	------	.60	.52	------	4.2	------	2.2	------			------
TOTAL	.34	11.44	22.09	16.86	15.01	80.25	122.0	77.4	61.9			
MEAN	.011	.38	.71	.54	.54	2.59	4.07	2.50	2.06			
MAX	.05	.49	.83	.60	.75	4.4	4.4	3.5	3.5			
MIN	0	.21	.54	.52	.51	.75	3.5	1.8	1.4			
AC-FT	.7	23	44	33	30	159	242	154	123			

CAL YR 1970 TOTAL 591.57 MEAN 1.62 MAX 6.0 MIN 0 AC-FT 1,170

05035200 West Branch County Ditch No. 14 near Detroit Lakes, Minn.

LOCATION.--Lat 46°48'48", long 95°52'20", in NW¼ sec.33, T.139 N., R.41 W., Becker County, 1,700 ft upstream from East Branch County Ditch No. 14, 1,900 ft upstream from St. Clair Lake and 1.5 miles west of Detroit Lakes.

PERIOD OF RECORD.--July 1968 to July 1971 (discontinued).

GAGE.--Nonrecording gage read once-daily. Datum of gage is 1,333.78 ft above mean sea level, datum of 1929 (Minnesota Highway Department bench mark).

EXTREMES.--Maximum daily discharge during period October 1970 to July 1971, 4.1 cfs on Apr. 6, 7 (backwater from ice); maximum gage height, 5.33 ft Mar. 31 (backwater from ice); no flow for many days.
Period of record: Maximum discharge, 16 cfs Apr. 10, 1969 (gage height, 5.45 ft, backwater from ice); maximum gage height, 5.61 ft Apr. 9, 1969 (backwater from ice); no flow for several days during most years.

REMARKS.--Records poor.

COOPERATION.--Gage-height record furnished by Pelican River Watershed District.

DISCHARGE, IN CUBIC FEET PER SECOND, OCTOBER 1970 TO JULY 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.20	1.0	.10			0	2.4	1.6	.80	1.1		
2	.20	1.0	.10			0	2.8	1.5	.80	1.0		
3	.20	.90	.10			0	3.0	1.4	.70	1.0		
4	.10	.90	.10			0	3.4	1.3	.60	1.2		
5	.10	.80	.10			0	3.8	1.2	.60	1.0		
6	.10	.70	.10			0	4.1	1.2	.60	1.1		
7	.10	.70	.10			0	4.1	1.1	.50	1.1		
8	.20	.70	.10			0	4.0	1.0	.50	1.0		
9	.40	.60	.10			0	4.0	.90	.50	.90		
10	.50	.60	.10			0	3.8	.90	.50	.90		
11	.50	.60	.10			0	3.6	.80	.50	.80		
12	.50	.60	.10			0	3.1	.80	.50	1.2		
13	.50	.50	.10			0	3.0	.80	.50	1.4		
14	.50	.40	.10			0	3.0	.70	.50	1.3		
15	.60	.30	0			0	2.2	.70	.30			
16	.50	.30	0			0	2.0	.70	.20			
17	.50	.20	0			0	1.9	.70	.30			
18	.40	.10	0			0	1.8	.60	.40			
19	.40	.10	0			0	1.8	.60	.50			
20	.40	.10	0			0	1.7	.60	1.0			
21	.40	.10	0			0	1.7	.50	1.1			
22	.40	.10	0			0	1.6	.50	1.2			
23	.30	.10	0			.10	1.5	1.0	1.2			
24	.30	.10	0			.20	1.3	1.2	1.2			
25	.30	.10	0			.40	1.2	1.2	1.2			
26	.60	.10	0			.60	1.2	1.2	1.1			
27	.90	.10	0			1.0	1.2	1.0	.90			
28	.90	.10	0			1.0	1.2	1.0	.80			
29	.90	.10	0		------	1.0	1.3	.90	.90			
30	.90	.10	0		------	1.4	1.5	.80	1.2			
31	1.0	------	0		------	2.0	------	.80	------			------
TOTAL	13.80	12.10	1.40	0	0	7.70	73.2	29.20	21.60			
MEAN	.45	.40	.045	0	0	.25	2.44	.94	.72			
MAX	1.0	1.0	.10	0	0	2.0	4.1	1.6	1.2			
MIN	.10	.10	0	0	0	0	1.2	.50	.20			
AC-FT	27	24	2.8	0	0	15	145	58	43			

CAL YR 1970 TOTAL 210.90 MEAN .58 MAX 5.0 MIN 0 AC-FT 418

05035300 East Branch County Ditch No. 14 near Detroit Lakes, Minn.

LOCATION.--Lat 46°48'35", long 95°52'23", in SW¼ sec.33, T.139 N. R.41 W., Becker County, on left bank near downstream end of culvert on U. S. Highway 59, approximately 1,000 ft upstream from St. Clair Lake, and 1.5 miles west of city of Detroit Lakes.

PERIOD OF RECORD.--July 1968 to September 1971 (discontinued).

GAGE.--Water-stage recorder. Datum of gage is 1,333.96 ft above mean sea level, datum of 1929 (Minnesota Highway Department bench mark).

EXTREMES.--Current year: Maximum discharge, 7.9 cfs Sept. 4 (gage height, 2.88 ft); minimum daily discharge, 0.53 cfs Feb. 14 to Mar. 4
Period of record: Maximum discharge, 7.9 cfs Sept. 4, 1971 (gage height, 2.88 ft); maximum gage height, 2.90 ft July 20, 1968; no flow Aug. 21, 1969.

REMARKS.--Records fair.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.2	2.0	.81	.56	.54	.53	2.4	1.7	1.1	2.7	3.0	3.3
2	1.2	1.8	.80	.56	.54	.53	2.2	1.7	1.1	2.7	2.8	3.0
3	1.1	1.7	.76	.56	.54	.53	2.1	1.6	1.1	2.7	2.8	2.9
4	1.1	1.6	.73	.56	.54	.53	2.1	1.7	1.1	3.0	2.8	7.8
5	1.1	1.5	.71	.56	.54	.54	2.2	1.6	1.1	2.9	2.7	7.8
6	1.2	1.4	.69	.56	.54	.54	2.4	1.5	1.0	2.8	2.7	7.1
7	1.2	1.3	.67	.56	.54	.54	2.6	1.5	.98	3.2	2.7	6.1
8	1.2	1.2	.65	.56	.54	.54	2.7	1.4	.96	3.2	2.6	5.3
9	1.3	1.2	.63	.56	.54	.55	2.7	1.3	.92	3.1	2.5	5.0
10	1.5	1.1	.61	.56	.54	.56	2.7	1.2	1.1	3.0	2.5	4.7
11	1.4	1.1	.59	.56	.54	.56	2.7	1.2	1.0	3.0	2.5	4.5
12	1.5	1.1	.58	.56	.54	.58	2.5	1.1	1.0	3.5	2.5	4.2
13	1.9	.97	.57	.56	.54	.60	2.4	1.1	.91	4.1	2.5	4.1
14	1.7	.91	.57	.56	.53	.62	2.3	1.1	.88	3.6	2.6	3.9
15	1.6	.85	.56	.56	.53	.64	2.2	1.1	.89	3.4	2.5	3.8
16	1.6	.80	.56	.56	.53	.68	2.2	1.1	.89	3.2	2.4	3.6
17	1.6	.75	.56	.56	.53	.76	2.2	1.1	1.3	3.1	2.8	3.5
18	1.6	.76	.56	.56	.53	.84	2.2	1.0	1.2	3.1	3.1	3.4
19	1.6	.76	.56	.56	.53	.86	2.3	1.0	1.3	3.5	2.9	3.4
20	1.6	.75	.56	.56	.53	.88	2.2	1.0	2.6	3.4	2.7	3.3
21	1.6	.76	.56	.56	.53	.90	2.1	.97	1.8	3.2	3.1	3.3
22	1.6	.82	.56	.56	.53	.94	2.0	1.2	1.6	3.1	4.1	3.3
23	1.6	.83	.56	.55	.53	.98	1.9	1.6	2.1	3.0	3.5	3.2
24	1.6	.84	.56	.55	.53	1.1	1.8	1.5	2.4	3.0	3.0	3.2
25	1.9	.84	.56	.55	.53	1.2	1.8	1.3	2.3	2.9	2.9	3.2
26	2.1	.83	.56	.55	.53	1.4	1.7	1.2	2.2	2.8	2.8	3.3
27	2.4	.83	.56	.55	.53	1.5	1.9	1.2	2.1	2.8	2.7	3.4
28	2.1	.81	.56	.54	.53	1.7	2.0	1.2	2.1	2.8	2.7	3.6
29	1.9	.77	.56	.54	------	1.7	1.8	1.1	2.4	3.0	2.7	3.4
30	1.8	.76	.56	.54	------	2.2	1.8	1.1	3.1	3.2	2.7	3.5
31	2.0	------	.56	.54	------	2.7	------	1.2	------	3.1	3.2	------
TOTAL	48.8	31.64	18.89	17.23	14.97	28.73	66.1	39.57	44.53	96.1	87.0	124.1
MEAN	1.57	1.05	.61	.56	.53	.93	2.20	1.28	1.48	3.10	2.81	4.14
MAX	2.4	2.0	.81	.56	.54	2.7	2.7	1.7	3.1	4.1	4.1	7.8
MIN	1.1	.75	.56	.54	.53	.53	1.7	.97	.88	2.7	2.4	2.9
AC-FT	97	63	37	34	30	57	131	78	88	191	173	246

CAL YR 1970 TOTAL 511.63 MEAN 1.40 MAX 5.8 MIN .31 AC-FT 1,010
WTR YR 1971 TOTAL 617.66 MEAN 1.69 MAX 7.8 MIN .53 AC-FT 1,230

05035400 St. Clair Lake near Detroit Lakes, Minn.

LOCATION.--Lat 46°47'52", long 95°52'49", in NE¼ sec.5, T.138 N., R.41 W., Becker County, at south end of lake, 2,000 ft south at St. Clair Lake outlet and 2.2 miles southwest of Detroit Lakes.

PERIOD OF RECORD.--July 1968 to July 1971 (discontinued).

GAGE.--Nonrecording gage read once daily. Datum of gage is 1,330.653 ft above mean sea level, datum of 1929 (Minnesota Highway Department benchmark).

EXTREMES.--Current year: Maximum gage height observed, 6.11 ft Apr. 2; minimum observed, 4.53 ft Oct. 6.
Period of record: Maximum gage height observed, 6.11 ft Apr. 2, 1971; minimum observed, 4.22 ft Sept. 15, 1968.

REMARKS.--Water level subject to fluctuation caused by wind action.

COOPERATION.--Gage reading furnished by Pelican River Watershed District.

GAGE HEIGHT, IN FEET, OCTOBER 1970 TO SEPTEMBER 1971

Oct. 31	4.89	Mar. 31	6.01	June 30	5.42
Nov. 30	4.87	Apr. 30	5.19	July 14	5.37
Dec. 17	4.74	May 31	4.88		

NOTE.--Gage-height record other than that shown above is available.

05035500 St. Clair Lake Outlet near Detroit Lakes, Minn.

LOCATION.--Lat 46°48'03", long 95°52'37", in NW¼ sec.4, T.138 N., R.41 W., Becker County, near right bank 25 ft upstream from culvert on U.S. Highway 59, 500 ft downstream from outlet of St. Clair Lake, 1 mile upstream from Pelican River and 2 miles southwest of Detroit Lakes.

PERIOD OF RECORD.--July 1968 to current year.

GAGE.--Nonrecording gage read once daily. Datum of gage is 1,333.35 ft above mean sea level, datum of 1929 (Minnesota Highway Department bench mark).

EXTREMES.--Current year: Maximum daily discharge, 17 cfs Apr. 12; maximum gage height, 2.49 ft July 4; minimum daily discharge, 1.0 cfs, Jan. 31 to Feb. 17.
Period of record: Maximum discharge, 31 cfs Apr. 29, 1969 (gage height, 3.15 ft); minimum daily, 0.4 cfs Jan. 16 to Feb. 1, 1970.

REMARKS.--Records good except those for winter periods, which are fair. Records of chemical analyses for the current year are published in Part 2 of this report.

COOPERATION.--Gage reading furnished by Pelican River Watershed District.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.2	4.0	3.6	1.3	1.0	2.6	8.8	10	4.8	9.4	3.6	2.8
2	2.6	4.0	3.6	1.3	1.0	2.6	9.2	10	4.8	9.2	3.3	2.8
3	2.4	4.0	3.6	1.3	1.0	2.6	9.7	9.5	4.5	8.8	3.1	2.8
4	2.1	4.8	3.6	1.3	1.0	2.6	10	9.5	4.5	9.8	3.1	8.6
5	2.1	4.7	3.3	1.3	1.0	2.6	11	9.2	4.3	9.6	3.0	13
6	2.1	4.5	3.2	1.3	1.0	2.6	12	9.0	4.1	9.4	2.7	15
7	2.1	4.3	3.0	1.3	1.0	2.6	14	8.7	3.8	9.6	2.6	15
8	2.3	4.2	2.9	1.2	1.0	2.6	14	8.2	3.8	9.6	2.6	15
9	2.5	4.2	2.7	1.2	1.0	2.6	15	7.7	3.7	9.4	2.6	15
10	2.5	4.1	2.6	1.2	1.0	2.6	16	7.6	3.8	9.0	2.6	14
11	2.6	4.1	2.6	1.2	1.0	2.7	16	7.3	3.9	8.3	2.6	13
12	2.8	4.1	2.5	1.2	1.0	2.8	17	6.8	4.1	8.8	2.6	12
13	2.9	4.0	2.4	1.2	1.0	2.9	15	6.5	4.3	9.1	2.6	11
14	2.9	4.0	2.4	1.2	1.0	3.1	14	6.3	4.1	8.7	2.6	10
15	3.5	3.9	2.4	1.2	1.0	3.5	14	5.8	4.0	8.4	2.6	9.4
16	3.7	3.9	2.2	1.2	1.0	3.7	12	5.9	4.1	8.0	2.6	8.8
17	3.6	3.9	2.2	1.2	1.0	4.4	12	5.4	4.0	7.6	2.7	8.3
18	3.6	3.7	2.1	1.2	1.1	5.0	12	5.3	4.1	6.9	2.7	7.7
19	3.6	3.6	2.0	1.2	1.2	5.8	12	5.2	4.3	6.7	2.7	7.6
20	3.5	3.5	1.9	1.2	1.5	6.8	12	5.2	5.8	6.9	2.7	7.0
21	3.5	3.5	1.8	1.2	1.9	7.3	13	5.1	6.3	6.9	3.1	6.6
22	3.5	3.4	1.8	1.1	2.7	7.9	12	5.1	6.3	6.7	3.0	6.2
23	3.4	3.4	1.7	1.1	3.4	7.9	12	6.2	6.9	5.9	3.0	5.8
24	3.4	3.4	1.7	1.1	3.5	7.9	11	6.7	7.7	5.6	3.0	5.8
25	3.4	3.4	1.6	1.1	3.4	7.8	11	6.6	8.2	5.4	2.8	5.7
26	3.9	3.4	1.6	1.1	3.0	7.8	10	6.2	8.4	4.7	2.8	5.7
27	4.1	3.4	1.5	1.1	2.6	7.8	9.0	5.8	8.4	4.4	2.8	5.6
28	4.5	3.4	1.5	1.1	2.6	7.9	10	5.5	8.2	4.3	2.8	5.6
29	4.7	3.4	1.5	1.1	------	7.9	10	5.2	8.3	3.8	2.8	5.7
30	4.7	3.5	1.4	1.1	------	8.2	10	5.0	9.6	3.7	2.8	5.7
31	4.8	------	1.4	1.0	------	8.5	------	4.8	------	3.6	2.8	------
TOTAL	100.5	118.4	72.3	36.8	43.9	153.6	364.6	211.3	163.1	228.2	87.3	257.2
MEAN	3.24	3.95	2.33	1.19	1.57	4.95	12.2	6.82	5.44	7.36	2.82	8.57
MAX	4.9	4.9	3.6	1.3	3.5	8.5	17	10	9.6	9.8	3.6	15
MIN	2.1	3.4	1.4	1.0	1.0	2.6	8.8	4.8	3.7	3.6	2.6	2.8
AC-FT	199	235	143	73	87	305	723	419	324	453	173	510

CAL YR 1970 TOTAL 1,802.40 MEAN 4.94 MAX 18 MIN .40 AC-FT 3,580
WTR YR 1971 TOTAL 1,837.20 MEAN 5.03 MAX 17 MIN 1.0 AC-FT 3,640

05035600 Pelican River at Muskrat Lake Outlet near Detroit Lakes, Minn.

LOCATION.--Lat 46°46'55", long 95°52'57 , in SE¼ sec.8, T.138 N., R.41 W., Becker County, on downstream side of dam between Muskrat Lake and Sallie Lake at State Fish Hatchery, 3 miles sdouthwest of Detroit Lakes.

PERIOD OF RECORD.--July 1968 to current year.

GAGE.--Two nonrecording gages. Datum of gage in the boat lock is 1,327.63 ft above mean sea level, datum of 1929, and in the spillway the datum of gage is 1,328.98 ft above mean sea level, datum of 1929.

EXTREMES.--Current year: Maximum daily discharge, 58 cfs May 5; minimum daily, 1.9 cfs Oct. 5, 6.
Period of Record: Maximum daily discharge, 135 cfs Apr. 15, 1969; no flow for several days in 1968 and 1969.

REMARKS.--Records fair. Some regulation by manipulation of stoplogs in controls above station.

COOPERATION.--Gage readings and record of stoplog changes in dam furnished by Pelican River Watershed District.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.4	6.7	5.9	12	11	32	20	53	14	28	18	4.8
2	2.2	6.7	6.3	11	11	32	22	52	13	28	18	5.1
3	2.2	6.0	6.5	12	10	26	24	52	15	29	17	5.4
4	2.2	4.9	6.1	13	11	25	24	56	15	32	16	22
5	1.9	4.4	6.3	12	11	25	27	58	15	28	15	27
6	1.9	4.1	5.8	11	11	27	27	48	15	28	14	28
7	2.2	3.8	5.4	10	11	26	29	46	15	40	14	30
8	2.2	3.7	5.8	9.4	11	25	33	44	15	40	13	42
9	2.2	3.7	6.0	9.4	11	25	36	41	15	36	13	45
10	2.2	3.7	6.6	9.4	12	25	37	39	15	38	8.9	45
11	2.2	3.7	7.0	10	12	25	40	30	15	36	7.8	46
12	2.4	3.7	7.1	10	11	25	39	22	15	38	7.2	43
13	2.4	3.7	7.8	10	11	24	40	22	14	34	7.8	41
14	2.4	3.7	7.8	10	11	25	43	21	14	31	8.1	38
15	2.4	3.7	7.8	11	12	24	44	18	14	29	8.1	38
16	2.2	3.7	8.2	11	16	24	44	18	13	28	7.2	34
17	2.2	4.0	8.6	10	26	24	38	17	14	28	8.3	32
18	2.4	3.7	8.6	10	36	24	46	16	15	28	8.0	31
19	2.4	3.7	9.1	9.8	44	24	50	15	15	27	8.0	30
20	2.4	3.7	9.6	9.8	43	25	51	12	20	30	6.9	31
21	2.4	3.7	9.6	9.8	46	25	55	10	20	28	7.2	32
22	2.4	4.0	10	9.3	40	26	52	9.5	18	27	8.6	33
23	2.4	4.0	12	9.2	36	25	52	13	22	27	8.6	31
24	2.4	4.0	12	8.7	37	25	53	14	25	25	7.5	32
25	2.4	4.0	12	11	37	25	50	14	24	24	5.9	32
26	3.2	4.0	12	11	37	25	51	13	24	22	5.6	32
27	3.7	3.7	12	10	36	25	53	12	22	20	5.1	31
28	3.7	3.7	12	11	32	26	54	12	22	20	5.1	29
29	4.1	3.7	13	11	------	27	54	12	25	19	4.8	29
30	4.1	3.6	12	11	------	28	52	12	35	18	4.8	32
31	5.3	------	12	11	------	21	------	12	------	18	5.4	------
TOTAL	81.1	123.4	270.9	323.8	633	790	1,240	813.5	533	884	292.9	931.3
MEAN	2.62	4.11	8.74	10.4	22.6	25.5	41.3	26.2	17.8	28.5	9.45	31.0
MAX	5.3	6.7	13	13	46	32	55	58	35	40	18	46
MIN	1.9	3.6	5.4	8.7	10	21	20	9.5	13	18	4.8	4.8
AC-FT	161	245	537	642	1,260	1,570	2,460	1,610	1,060	1,750	581	1,850

CAL YR 1970 TOTAL 6,723.50 MEAN 18.4 MAX 117 MIN .20 AC-FT 13,340
WTR YR 1971 TOTAL 6,916.90 MEAN 19.0 MAX 58 MIN 1.9 AC-FT 13,720

05037100 Pelican River at Sallie Lake Outlet, near Detroit Lakes, Minn.

LOCATION.--Lat 46°45'27", long 95°53'57", in NW¼ sec.20, T.138 N., R.41 W., Becker County, on left bank near downstream end of culvert on County Highway 22, 250 ft downstream from Sallie Lake, 800 ft upstream from Minnesota Department of Conservation dam and 5 miles southwest of city of Detroit Lakes.

PERIOD OF RECORD.--July 1968 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,327.58 ft above mean sea level, datum of 1929.

EXTREMES.--Current year: Maximum discharge, 145 cfs Apr. 28 (gage height, 1.54 ft); minimum, 0.13 cfs Oct. 6.
Period of record: Maximum discharge, 145 cfs Apr. 28, 1971 (gage height, 1.54 ft); no flow for several days in 1969, 1970.

REMARKS.--Records good.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.72	5.9	8.5	13	12	38	33	103	18	35	10	4.4
2	.65	6.9	8.6	13	12	40	32	101	21	32	9.7	4.5
3	.30	7.4	8.8	13	12	40	30	98	22	31	8.4	4.8
4	.21	7.4	9.2	13	12	40	27	103	24	40	7.7	10
5	.19	6.8	8.8	13	12	40	27	101	23	37	6.6	20
6	.19	8.0	8.5	13	12	40	27	98	25	33	6.3	24
7	.24	7.4	8.9	13	12	39	29	91	21	46	6.2	26
8	.27	8.0	9.2	13	12	37	32	79	17	44	5.8	28
9	.58	8.6	9.2	14	12	36	31	68	16	56	5.7	32
10	.51	9.4	9.2	15	12	34	36	60	18	49	6.6	34
11	.51	11	8.8	16	12	34	38	61	19	47	5.7	34
12	.58	9.8	8.6	15	12	34	39	44	22	51	5.4	34
13	.86	9.8	9.2	15	12	34	42	38	20	44	5.7	34
14	.79	7.3	9.2	16	12	34	45	34	16	39	6.1	34
15	.79	8.0	9.2	15	12	38	48	28	13	38	5.9	34
16	.79	8.6	9.2	15	12	34	53	25	12	37	5.9	34
17	.79	8.1	9.7	15	12	34	58	22	16	32	6.9	33
18	.79	8.0	9.8	15	14	34	69	21	18	35	8.8	32
19	.77	7.3	9.8	15	19	31	77	20	20	35	9.0	31
20	.71	7.3	9.8	15	23	31	84	18	30	38	8.1	30
21	.74	7.6	9.8	13	24	31	83	15	25	35	7.2	30
22	.72	8.4	10	14	26	30	83	13	23	27	7.9	30
23	.78	8.4	11	12	29	30	88	18	30	21	6.6	30
24	.73	8.3	11	12	31	29	92	22	35	19	6.1	31
25	1.0	7.5	11	12	32	28	95	21	35	19	5.7	31
26	1.3	7.3	12	12	37	28	95	18	31	15	5.0	30
27	2.1	7.3	12	12	38	30	105	18	28	13	4.8	30
28	2.4	7.3	12	12	37	31	120	15	27	12	4.6	30
29	2.8	8.0	12	12	------	32	104	15	33	12	4.3	31
30	4.3	8.0	13	12	------	32	104	14	40	11	4.4	29
31	5.9	------	13	12	------	32	------	16	------	11	4.4	------
TOTAL	34.01	239.1	309.0	420	514	1,055	1,826	1,398	698	994	201.5	819.7
MEAN	1.10	7.97	9.97	13.5	18.4	34.0	60.9	45.1	23.3	32.1	6.50	27.3
MAX	5.9	11	13	16	38	40	120	103	40	56	10	34
MIN	.19	5.9	8.5	12	12	28	27	13	12	11	4.3	4.4
AC-FT	67	474	613	833	1,020	2,090	3,620	2,770	1,380	1,970	400	1,630

CAL YR 1970 TOTAL 8,101.20 MEAN 22.2 MAX 86 MIN 0 AC-FT 16,070
WTR YR 1971 TOTAL 8,508.31 MEAN 23.3 MAX 120 MIN .19 AC-FT 16,880

05039100 Pelican River at Lake Melissa Outlet near Detroit Lakes, Minn.

LOCATION.--Lat 46°43'50", long 95°53'40", in NW¼ sec.32, T.138 N., R.41 W., Becker County, on left bank 50 ft downstream from Lake Melissa, 400 ft upstream from culvert on county road and 6 miles southwest of Detroit Lakes.

PERIOD OF RECORD.--July 1968 to current year.

GAGE.--Nonrecording gage read once daily. Altitude of gage is 1,330 ft (from topographic map).

EXTREMES.--Current year: Maximum discharge, 88 cfs Apr. 22 (gage height, 1.98 ft); minimum daily discharge, 0.1 cfs Oct. 3-11.
Period of record: Maximum discharge, 115 cfs May 5-11, 1969 (gage height, 2.20 ft); maximum gage height, 2.28 ft June 18; no flow Sept. 10-20, 1969.

REMARKS.--Records good. Records of chemical analyses for the current year are published in Part 2 of this report. Flow affected by storage in lakes above station.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.30	2.7	7.8	13	16	35	36	82	24	29	19	9.8
2	.20	2.7	8.0	13	16	36	36	80	25	31	19	13
3	.10	3.3	8.4	13	16	36	36	79	25	31	18	16
4	.10	3.3	8.8	13	16	36	36	79	25	33	17	18
5	.10	3.7	9.0	13	16	36	36	77	25	34	16	21
6	.10	4.2	9.2	13	16	36	36	76	24	33	15	25
7	.10	4.7	9.4	13	16	35	36	72	23	33	14	27
8	.10	4.7	9.6	13	16	34	38	69	22	33	13	30
9	.10	5.4	9.6	13	16	34	40	66	21	33	12	31
10	.10	5.4	9.8	14	16	34	42	63	21	33	11	33
11	.10	6.0	9.8	15	16	34	44	60	20	33	10	34
12	.20	6.0	10	16	16	34	48	55	20	33	10	35
13	.20	6.0	10	16	16	34	52	52	18	33	10	34
14	.20	6.0	10	16	16	34	58	47	18	31	10	33
15	.30	6.0	10	16	16	34	65	44	18	31	10	32
16	.30	6.7	11	16	16	34	72	39	17	31	9.5	31
17	.30	6.7	11	16	16	34	81	35	17	31	9.5	31
18	.30	7.0	11	16	17	34	83	32	18	31	9.5	31
19	.30	7.2	11	16	18	34	85	30	20	30	9.2	31
20	.40	7.2	11	16	19	34	86	28	21	28	9.0	31
21	.40	7.4	11	16	20	34	87	27	21	28	8.7	31
22	.40	8.0	11	16	21	34	88	26	21	27	8.2	30
23	.60	8.0	11	16	22	34	87	25	22	26	7.7	30
24	.60	7.9	12	15	25	36	86	25	22	24	7.2	30
25	.60	7.9	12	15	27	36	86	24	22	23	6.4	30
26	.60	7.9	12	15	29	36	86	23	24	23	6.2	30
27	1.0	7.9	12	16	32	36	86	23	24	22	6.2	30
28	1.5	7.8	12	16	34	36	86	23	25	21	6.2	30
29	1.9	7.8	12	16	------	36	87	23	28	20	6.2	31
30	2.2	7.7	13	16	------	36	84	23	29	19	6.7	31
31	2.2	------	13	16	------	36	------	23	------	19	7.7	------
TOTAL	15.90	183.2	325.4	463	536	1,082	1,909	1,430	660	887	328.1	849.8
MEAN	.51	6.11	10.5	14.9	19.1	34.9	63.6	46.1	22.0	28.6	10.6	28.3
MAX	2.2	8.0	13	16	34	36	88	82	29	34	19	35
MIN	.10	2.7	7.8	13	16	34	36	23	17	19	6.2	9.8
AC-FT	32	363	645	918	1,060	2,150	3,790	2,840	1,310	1,760	651	1,690

CAL YR 1970 TOTAL 9,146.00 MEAN 25.1 MAX 95 MIN .10 AC-FT 18,140
WTR YR 1971 TOTAL 8,669.40 MEAN 23.8 MAX 88 MIN .10 AC-FT 17,200

05040500 Pelican River near Fergus Falls, Minn.

LOCATION.--Lat 46°20'10", long 96°07'10", in NE¼ sec.17, T.133 N., R.43 W., Otter Tail County, on left bank 990 ft downstream from bridge on U. S. Highway 52, 3 miles northwest of Fergus Falls, and 7.5 miles upstream from mouth.

DRAINAGE AREA.--482 sq mi.

PERIOD OF RECORD.--June 1909 to December 1912, July 1942 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,176.98 ft above mean sea level, datum of 1929 (levels by Minnesota Highway Department). June 19, 1909, to Dec. 31, 1912, nonrecording gage at site 1 mile downstream at different datum. July 1, 1942, to Nov. 6, 1955, nonrecording gage and Nov. 7, 1955, to Sept. 30, 1963, water-stage recorder, at site 900 ft upstream at datum 3.00 ft higher.

AVERAGE DISCHARGE.--32 years (1909-12, 1942-71), 76.5 cfs (55,420 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 251 cfs July 3 (gage height, 4.16 ft); maximum gage height, 6.56 ft Mar. 22 (backwater from ice); minimum discharge, 10 cfs Oct. 5, 6, 7 (gage height, 3.08 ft).
Period of record: Maximum discharge, 756 cfs Mar. 29, 1943 (gage height, 8.53 ft, present datum); maximum gage height, 8.99 ft Mar. 21, 1966 (backwater from ice); no flow on many days in 1946, 1949-50.

REMARKS.--Records good except those for winter periods, which are fair.

REVISIONS (WATER YEARS).--WSP 955: Drainage area. WSP 1728: 1958.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	12	17	14	17	17	43	130	114	59	88	69	38
2	12	19	14	17	17	45	150	113	61	84	67	38
3	11	20	14	17	17	46	165	107	65	104	64	34
4	11	19	14	17	17	47	180	106	62	200	59	32
5	11	17	15	17	17	48	190	105	61	193	55	39
6	10	16	15	17	17	49	205	101	58	184	52	46
7	10	16	15	17	17	50	215	82	57	183	49	62
8	11	16	15	17	17	52	215	66	56	178	46	73
9	12	16	15	17	17	53	205	58	57	170	44	77
10	13	17	15	17	17	54	186	54	55	154	42	76
11	14	18	16	17	18	55	140	51	54	142	41	76
12	14	21	16	17	18	56	127	50	63	157	39	73
13	15	19	16	17	19	57	119	45	64	150	37	68
14	15	19	16	17	19	58	114	43	64	134	36	67
15	15	19	16	17	20	59	112	45	60	125	35	67
16	15	18	16	16	22	60	114	42	55	114	33	64
17	14	17	16	16	23	61	113	39	54	103	31	63
18	14	17	16	16	26	62	110	37	53	97	30	60
19	14	17	16	16	27	63	120	38	52	98	30	57
20	13	17	16	16	29	64	125	38	64	105	30	55
21	13	17	16	16	32	65	123	38	62	97	30	53
22	15	15	16	16	33	66	116	38	61	93	29	51
23	18	13	16	16	34	67	115	40	62	91	27	47
24	18	13	16	16	36	69	114	42	67	84	27	42
25	14	13	17	16	38	70	112	46	70	81	27	39
26	14	13	17	16	39	73	106	47	74	79	27	37
27	16	13	17	16	40	77	107	48	76	75	26	37
28	18	14	17	17	41	84	114	48	74	73	26	37
29	18	14	17	17	------	91	114	48	83	71	26	36
30	17	14	17	17	------	103	114	48	91	73	29	37
31	16	------	17	17	------	110	------	52	------	71	33	------
TOTAL	433	494	490	515	684	1,957	4,170	1,829	1,893	3,651	1,196	1,583
MEAN	14.0	16.5	15.8	16.6	24.4	63.1	139	59.0	63.1	118	38.6	52.8
MAX	18	21	17	17	41	110	215	114	91	200	69	78
MIN	10	13	14	16	17	43	106	37	52	71	26	32
AC-FT	859	980	972	1,020	1,360	3,880	8,270	3,630	3,750	7,240	2,370	3,140

CAL YR 1970 TOTAL 22,661 MEAN 62.0 MAX 300 MIN 16 AC-FT 45,340
WTR YR 1971 TOTAL 18,695 MEAN 51.5 MAX 215 MIN 10 AC-FT 37,480

05045950 Orwell Reservoir near Fergus Falls, Minn.

LOCATION.--Lat 46°12'55", long 96°10'40", in SW¼ sec.26, T.132 N., R.44 W., Otter Tail County, at dam on Otter Tail River at outlet of Orwell Reservoir, 7 miles southwest of Fergus Falls, Minn.

DRAINAGE AREA.--1,830 sq mi, approximately.

PERIOD OF RECORD.--March 1953 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,000.00 ft above mean sea level, adjustment of 1912. Gage readings reduced to elevations above mean sea level.

EXTREMES.--Current year: Maximum contents, 14,080 acre-ft Sept. 29 (elevation, 1,069.98 ft); minimum, 924 acre-ft May 15 (elevation, 1,047.49 ft).
Period of record: Maximum contents, 16,920 acre-ft June 17, 1962, May 23, 1966 (elevation, 1,072.38 ft); minimum (after initial filling), 844 acre-ft Aug. 26, 27, 1953 (elevation, 1,046.96 ft).

REMARKS.--Reservoir is formed by earth dam with concrete spillway with one taintor gate; storage began in March 1953. Capacity to elevation 1,070 ft (maximum operating stage) is 14,100 acre-ft of which 13,100 acre-ft is controlled storage above elevation 1,048 ft (minimum operating stage). Dead storage, 210 acre-ft. Figures given herein represent total contents. Reservoir is used for flood control and to increase low flow for water supply and pollution abatement.

COOPERATION.--Records furnished by Corps of Engineers.

MONTHEND ELEVATION AND CONTENTS, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

Date	Gage height (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept.30	1,067.93	11,940	-
Oct. 31	1,068.69	12,690	+750
Nov. 30	1,064.41	8,930	-3,760
Dec. 31	1,058.20	4,710	-4,220
CAL YR 1970	-	-	-2,250
Jan. 31	1,054.42	2,970	-1,740
Feb. 28	1,052.03	2,060	-910
Mar. 31	1,049.57	1,340	-720
Apr. 30	1,048.38	1,080	-260
May 31	1,049.03	1,210	+130
June 30	1,050.23	1,520	+310
July 31	1,059.10	5,210	+3,690
Aug. 31	1,065.27	9,620	+4,410
Sept.30	1,069.97	14,070	+4,450
WTR YR 1971	-	-	+2,130

05046000 Otter Tail River below Orwell Dam, near Fergus Falls, Minn.

LOCATION.--Lat 46°12'35", long 96°11'05", in NE¼ sec.34, T.132 N., R.44 W., Otter Tail County, on left bank 0.7 mile downstream from Orwell Dam, 6.1 miles downstream from Dayton Hollow Dam, 8 miles southwest of Fergus Falls, and 11.1 miles downstream from Pelican River.

DRAINAGE AREA.--1,830 sq mi, approximately.

PERIOD OF RECORD.--October 1930 to current year. Prior to October 1952, published as Otter Tail River below Pelican River, near Fergus Falls. Monthly discharge only for some periods, published in WSP 1308.

GAGE.--Water-stage recorder. Datum of gage is 1,029.65 ft above mean sea level, adjustment of 1912 (levels by Corps of Engineers). Oct. 11, 1930, to Nov. 17, 1933, at same site at datum 2.00 ft higher; Nov. 18, 1933, to Mar. 21, 1953, at site 6.1 miles upstream at datum 40.30 ft higher.

AVERAGE DISCHARGE.--41 years, 285 cfs (206,500 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 755 cfs Apr. 9 (gage height, 3.53 ft); minimum, 24 cfs Aug. 31 (gage height, 1.88 ft) result of regulation.
Period of record: Maximum discharge, 1,710 cfs June 17, 1953 (gage height, 5.60 ft, backwater from aquatic vegetation); minimum, 0.70 cfs Aug. 5, 1970 (gage height, 1.28 ft), result of regulation.

REMARKS.--Records good except those for winter periods, which are fair. Flow regulated by Orwell Reservoir beginning Mar. 21, 1953 (see preceding page) and powerplants upstream.

REVISIONS (WATER YEARS).--WSP 785: 1934(M). WSP 1208: 1947(M). WSP 1308: 1931(M).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	147	89	134	173	152	228	406	380	310	322	235	103
2	149	110	133	173	150	226	360	381	314	307	230	107
3	148	190	134	173	150	221	320	451	336	297	230	107
4	147	224	136	168	150	219	300	466	358	313	235	110
5	124	224	136	165	150	240	300	468	354	336	235	111
6	88	224	137	163	150	265	386	462	348	352	235	112
7	80	219	149	165	150	230	475	435	330	367	235	110
8	70	219	170	161	150	210	619	418	248	378	235	113
9	71	219	189	161	148	165	719	414	24[illegible]	418	235	113
10	70	219	174	161	145	158	732	370	272	482	235	148
11	69	219	179	166	145	160	680	368	290	478	187	182
12	68	219	196	156	142	165	584	372	311	479	145	182
13	68	215	196	136	142	135	527	377	306	468	145	202
14	69	214	196	156	142	195	515	369	296	474	145	241
15	69	214	196	159	142	282	479	284	287	462	145	237
16	69	214	194	152	142	408	427	196	271	384	143	216
17	70	207	191	146	160	315	431	264	255	322	144	192
18	71	203	191	142	175	280	434	324	241	328	122	182
19	79	205	191	138	170	295	423	312	261	328	88	182
20	88	205	191	137	170	291	406	315	294	328	89	183
21	88	206	189	130	170	290	446	308	291	328	90	185
22	87	206	187	118	168	290	477	262	287	334	89	182
23	87	202	190	106	168	290	454	244	288	334	90	182
24	87	180	184	108	206	289	433	252	294	339	90	182
25	87	140	182	135	232	289	420	257	293	339	92	182
26	88	86	182	150	233	289	373	277	297	334	92	182
27	88	105	180	145	233	290	322	299	293	328	92	182
28	89	116	178	145	226	300	362	300	297	261	92	184
29	89	114	176	148	------	320	506	301	301	224	93	193
30	89	125	178	158	------	390	433	307	312	230	96	201
31	89	------	175	155	------	415	------	309	------	230	94	------
TOTAL	2,782	5,532	5,416	4,649	4,661	8,140	13,749	10,542	8,875	10,904	4,703	4,988
MEAN	89.7	184	175	150	166	263	458	340	296	352	152	166
MAX	149	224	196	173	233	415	732	468	358	482	235	241
MIN	68	86	133	106	142	135	300	196	240	224	88	103
AC-FT	5,520	10,970	10,740	9,220	9,250	16,150	27,270	20,910	17,600	21,630	9,330	9,890

CAL YR 1970 TOTAL 105,278.2 MEAN 288 MAX 885 MIN 5.0 AC-FT 208,800
WTR YR 1971 TOTAL 84,941.0 MEAN 233 MAX 732 MIN 68 AC-FT 168,500

05050000 Bois de Sioux River near White Rock, S. Dak.

LOCATION.--Lat 45°51'45", long 96°34'25", in SW¼SW¼ sec.27, T.128 N., R.47 W., Roberts County, on left bank just downstream from Big Slough Outlet, 300 ft downstream from White Rock Dam, 4 miles south of White Rock, and 5 miles northwest of Wheaton, Minn.

DRAINAGE AREA.--1,160 sq mi, approximately.

PERIOD OF RECORD.--October 1941 to current year.

GAGE.--Water-stage recorder. Datum of gage is 960.00 ft above mean sea level, adjustment of 1912 (levels by Corps of Engineers). Prior to Jan. 14, 1943, nonrecording gage at same site at datum 0.11 ft lower. Jan. 15, 1943, to Sept. 30, 1963, water stage recorder at same site at datum 0.11 ft lower.

AVERAGE DISCHARGE.--30 years, 82.9 cfs (60,060 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 188 cfs, June 26 (gage height, 5.93 ft); no flow for many days. Period of record: Maximum discharge 3,770 cfs, occurred during period Apr. 19-21, 1969 (gage height, 15.07 ft, from flood mark); no flow at times in most years.

REMARKS.--Records poor. Flow regulated by Lake Traverse-Bois de Sioux Flood Control and Water Conservation project (available capacity for flood control, 137,000 acre-ft.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1		.10	.10			0	8.0	5.8	4.8	115	.30	20
2		.10	.10			0	7.5	5.8	7.2	100	.30	22
3		.10	.10			0	5.0	5.8	14	85	.30	27
4		.10	.10			0	4.0	5.8	17	65	.10	13
5		.10	.10			0	3.5	5.8	23	48	0	22
6		.10	.10			0	3.0	5.6	19	32	0	13
7		.10	.10			0	8.0	5.4	10	28	0	11
8		.10	.10			0	15	5.1	7.5	24	0	4.8
9		.20	.10			0	28	4.8	22	25	0	6.1
10		.20	.10			0	13	4.8	81	23	0	3.8
11		.20	.10			.10	2.4	4.8	86	23	.10	5.1
12		.20	.10			.20	2.4	4.6	57	21	.10	3.0
13		.20	.10			.50	2.4	4.6	54	19	.10	8.5
14		.20	.10			1.0	2.4	4.6	52	20	.20	.70
15		.20	.10			1.5	2.4	4.6	51	19	.20	.10
16		.20	.10			2.7	2.4	4.4	40	18	.20	.20
17		.20	.10			3.0	2.2	4.6	26	19	.30	.20
18		.20	.10			3.2	2.2	4.4	22	16	.30	.10
19		.20	.10			3.4	2.2	4.4	21	6.8	.30	.10
20		.20	.10			3.6	2.2	4.6	16	6.1	.20	.10
21		.20	.10			3.8	2.4	4.4	31	5.1	.20	.10
22		.20	.10			4.0	2.1	4.4	101	5.1	.20	.20
23		.10	.10			3.5	2.1	4.4	174	3.0	1.4	.20
24		.10	.10			3.5	2.0	4.4	180	2.0	26	.10
25		.10	.10			4.0	1.9	4.4	184	1.0	43	.10
26		.10	.10			4.5	1.9	4.4	187	1.0	32	.20
27		.10	.10			5.0	1.9	4.4	185	.80	7.9	.20
28		.10	0			5.5	2.4	4.4	122	.80	6.4	.20
29		.10	0		------	6.0	3.8	4.4	150	.50	2.4	.20
30		.10	0		------	7.5	5.4	4.4	135	.50	1.8	.30
31		------	0		------	8.0	------	4.4	------	.30	12	------
TOTAL	0	4.40	2.70	0	0	74.50	144.1	148.7	2,079.5	733.00	136.30	162.60
MEAN	0	.15	.087	0	0	2.40	4.80	4.80	69.3	23.6	4.40	5.42
MAX	0	.20	.10	0	0	8.0	28	5.8	187	115	43	27
MIN	0	.10	0	0	0	0	1.9	4.4	4.8	.30	0	.10
AC-FT	0	8.7	5.4	0	0	148	286	295	4,120	1,450	270	323

CAL YR 1970 TOTAL 780.80 MEAN 2.14 MAX 38 MIN 0 AC-FT 1,550
WTR YR 1971 TOTAL 3,485.80 MEAN 9.55 MAX 187 MIN 0 AC-FT 6,910

05051500 Red River of the North at Wahpeton, N. Dak.

LOCATION.--Lat 46°15'55", long 96°35'40", in NE¼ sec.8, T.132 N., R.47 W., Richland County, on left bank in Wahpeton, 800 ft downstream from confluence of Bois de Sioux and Otter Tail Rivers and at mile 548.6.

DRAINAGE AREA.--4,010 sq mi, approximately.

PERIOD OF RECORD.--April 1942 to current year. Gage-height records collected in this vicinity since 1917 are contained in reports of U.S. Weather Bureau.

GAGE.--Water-stage recorder and concrete and wooden dam. Datum of gage is 942.97 ft above mean sea level. Prior to Aug. 6, 1943, U.S. Weather Bureau nonrecording gage 800 ft upstream, converted to present datum. Aug. 6, 1943, to Oct. 27, 1950, nonrecording gage at present site and datum.

AVERAGE DISCHARGE.--28 years (1943-71), 526 cfs (381,100 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 927 cfs Mar. 18 (gage height, 6.74 ft, backwater from ice); minimum, 56 cfs Nov. 23 (gage height, 3.07 ft); minimum gage height, 3.05 ft Oct. 19.
Period of record: Maximum discharge, 9,200 cfs Apr. 10, 1969 (gage height, 16.34 ft); minimum, 8 cfs Aug. 25, 1961 (gage height, 2.26 ft); minimun gage height 1.76 ft Sept. 8, 9, 1969 (gates open).
A stage of 17.0 ft (discharge, 10,500 cfs) occurred in the spring of 1897 and has not been exceeded since.

REMARKS.--Records good. Flow regulated by Orwell Reservoir (capacity, 14,100 acre-ft at elevation 1,070 ft above mean sea level, adjustment of 1912); Lake Traverse (capacity, 137,000 acre-ft), available for flood control; numerous other controlled lakes and ponds, and several powerplants.

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	83	103	105	150	110	210	650	531	326	436	236	130
2	122	96	110	150	110	205	555	459	321	435	239	126
3	136	97	110	150	110	200	400	438	312	480	244	120
4	140	161	110	145	135	195	500	484	334	632	243	189
5	142	209	110	145	150	190	551	522	356	530	240	160
6	130	217	110	145	140	210	570	523	348	497	240	159
7	91	220	130	145	137	250	433	515	336	517	242	157
8	89	221	135	145	136	240	445	500	328	521	240	153
9	72	226	150	145	135	205	709	471	259	503	239	146
10	78	225	155	145	135	180	794	452	228	507	243	139
11	73	243	155	145	135	164	808	422	266	566	247	157
12	70	222	155	145	120	180	772	407	304	659	213	185
13	72	213	165	145	110	214	686	406	340	682	164	186
14	70	206	165	140	120	308	610	405	357	648	154	186
15	68	201	165	130	120	510	568	389	353	617	150	224
16	69	249	160	130	120	639	550	326	344	593	145	231
17	69	217	160	130	120	755	513	207	338	526	145	217
18	67	206	155	125	120	874	500	225	305	404	153	194
19	66	200	140	122	130	872	493	309	276	400	141	177
20	69	198	150	118	140	781	491	316	336	406	97	165
21	83	199	160	128	130	756	476	314	376	390	94	169
22	81	131	160	126	120	626	496	306	340	388	90	169
23	88	76	160	120	125	549	530	281	327	390	89	165
24	88	150	165	110	130	531	523	249	359	387	87	167
25	92	140	170	110	140	497	493	250	369	379	86	159
26	94	110	170	110	160	449	483	259	397	384	91	158
27	95	85	165	110	190	429	463	269	413	385	92	155
28	94	85	163	110	190	424	421	290	408	374	96	159
29	92	100	160	110	------	435	407	284	447	315	100	162
30	95	100	155	110	------	477	526	294	466	255	149	172
31	99	------	150	110	------	600	------	321	------	237	152	------
TOTAL	2,777	5,106	4,573	4,049	3,718	13,155	16,416	11,424	10,269	14,443	5,141	5,036
MEAN	89.6	170	148	131	133	424	547	369	342	466	166	168
MAX	142	249	170	150	190	874	808	531	466	682	247	231
MIN	66	76	105	110	110	164	400	207	228	237	86	120
AC-FT	5,510	10,130	9,070	8,030	7,370	26,090	32,560	22,660	20,370	28,650	10,200	9,990

CAL YR 1970 TOTAL 115,566.9 MEAN 317 MAX 1,400 MIN 9.9 AC-FT 229,200
WTR YR 1971 TOTAL 96,107.0 MEAN 263 MAX 874 MIN 66 AC-FT 190,600

05054000 Red River of the North at Fargo, N. Dak.

LOCATION.--Lat 46°51'40", long 96°47'00", in NW¼NE¼ sec.18, T.139 N., R.48 W., Cass County, at city waterplant on 4th St. S. in Fargo, 25 miles upstream from mouth of Sheyenne River and at mile 453.

DRAINAGE AREA.--6,800 sq mi, approximately.

PERIOD OF RECORD.--May 1901 to current year. Published as "at Moorhead, Minn." 1901. Monthly discharge only for some periods, published in WSP 1308.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 861.8 ft above mean sea level. Oct. 1, 1960, to Sept. 30, 1962, water-stage recorder at present site at datum 5.6 ft higher. Since Oct. 1, 1960, auxiliary water-stage recorder 2 miles upstream. See WSP 1728 or 1913 for history of changes prior to Oct. 1, 1960.

AVERAGE DISCHARGE (UNADJUSTED).--70 years, 533 cfs (386,200 acre-ft per year); median of yearly mean discharges, 440 cfs (319,000 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 1,910 cfs July 7 (gage height, 15.87 ft); no flow Oct. 1, 2 (gage height, 12.77 ft).
Period of record: Maximum discharge, 25,300 cfs Apr. 15, 1969 (gage height, 37.34 ft); no flow for many days in each year for period 1932-41, Sept. 30, Oct. 1, 2, 1970.
Flood of Apr. 7, 1897 reached a stage of 39.1 ft, present datum (discharge, 25,000 cfs) at site 1.5 miles downstream.

REMARKS.--Records good. Flow regulated by Orwell Reservoir (capacity, 14,100 acre-ft at elevation 1,070 ft above mean sea level, adjustment of 1912); Lake Traverse (capacity, 137,000 acre-ft, available for flood control); other controlled lakes and ponds and several powerplants. Some small diversions for municipal supply. Figures of daily discharge do not include diversion by cities of Fargo and Moorhead. Records of chemical analyses for current year are published in Part 2 of Water Resources Data for North Dakota.

REVISION (WATER YEARS).--WSP 1308: 1902-4, 1906-7, 1910-14, 1916, 1918, 1924. WSP 1388: 1905-6, 1917-20(M), 1935(M), 1938-39(M), 1943.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0	107	94	145	125	122	905	430	310	475	257	111
2	1.8	107	94	145	125	133	764	475	310	489	213	125
3	23	107	94	140	125	148	732	510	316	489	199	122
4	39	104	94	140	125	165	764	475	332	612	194	489
5	59	101	94	140	125	208	692	436	356	1,190	194	1,150
6	84	94	94	140	125	227	620	449	339	1,850	194	788
7	101	129	91	140	125	213	676	489	344	1,750	194	496
8	111	177	88	140	130	199	820	503	350	1,440	181	310
9	107	213	91	140	135	203	1,100	496	344	1,200	181	218
10	98	213	98	140	140	236	1,200	475	350	977	177	181
11	81	218	107	140	140	251	1,000	462	316	828	186	177
12	65	222	120	140	140	257	878	449	272	772	181	160
13	59	222	125	140	135	236	836	416	272	692	181	148
14	57	241	130	140	135	232	796	398	299	804	181	156
15	57	208	133	140	135	232	716	398	327	905	165	177
16	57	165	137	140	125	288	628	386	356	844	125	177
17	52	160	140	140	125	392	575	362	442	772	107	177
18	33	213	140	140	115	708	552	356	598	684	104	194
19	26	232	135	140	105	1,030	503	283	462	620	107	203
20	23	232	130	145	105	1,320	489	222	374	496	111	190
21	21	222	130	150	105	1,430	468	241	339	416	118	177
22	21	199	135	145	110	1,280	462	310	339	404	114	169
23	32	169	140	140	115	1,140	442	362	410	386	84	160
24	50	111	145	135	120	1,000	449	339	436	374	91	156
25	70	104	150	130	125	941	468	316	392	368	76	160
26	91	104	150	125	135	860	475	288	374	368	73	160
27	91	125	150	125	130	844	468	270	380	356	73	160
28	98	141	155	125	125	820	496	251	380	350	68	165
29	98	125	155	130	------	748	482	262	468	344	65	169
30	98	104	155	125	------	772	436	277	475	339	73	160
31	98	------	150	125	------	905	------	316	------	304	104	------
TOTAL	1,901.8	4,869	3,844	4,270	3,505	17,540	19,892	11,702	11,062	21,898	4,371	7,385
MEAN	61.3	162	124	138	125	566	663	377	369	706	141	246
MAX	111	241	155	150	140	1,430	1,200	510	598	1,850	257	1,150
MIN	0	94	88	125	105	122	436	222	272	304	65	111
AC-FT	3,770	9,660	7,620	8,470	6,950	34,790	39,460	23,210	21,940	43,430	8,670	14,650
(≠)	704	702	738	756	757	722	682	877	820	818	1,190	760
MEAN ≠	72.7	174	136	150	139	578	675	392	382	720	160	259
AC-FT ≠	4,470	10,360	8,360	9,230	7,710	35,510	40,140	24,090	22,760	44,250	9,860	15,410

CAL YR 1970 TOTAL 140,668.0 MEAN 385 MAX 2,390 MIN 0 AC-FT 279,000 MEAN ≠ 400 AC-FT ≠ 289,400
WTR YR 1971 TOTAL 112,239.8 MEAN 308 MAX 1,850 MIN 0 AC-FT 222,600 MEAN ≠ 321 AC-FT ≠ 232,100

≠ Diversion in acre-feet by cities of Fargo and Moorhead.
≠ Adjusted for diversion in acre-feet by cities of Fargo and Moorhead.

05061000 Buffalo River near Hawley, Minn.

LOCATION.--Lat 46°51'00", long 96°19'45", near center of SE¼ sec.14, T.139 N., R.45 W., Clay County, near left downstream end of bridge on farm lane, 2 miles southwest of Hawley.

DRAINAGE AREA.--322 sq mi.

PERIOD OF RECORD.--March 1945 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,111.91 ft above mean sea level, datum of 1929. Prior to Jan. 29, 1953, nonrecording gage at bridge 1,800 ft upstream at datum 3.17 ft lower.

AVERAGE DISCHARGE.--26 years, 71.1 cfs (51,510 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 382 cfs Apr. 2 (gage height, 6.45 ft); maximum gage height, 6.72 ft about Mar. 24 (backwater from ice); minimum discharge, 7.5 cfs Oct. 3 (gage height, 2.89 ft).
Period of record: Maximum discharge, 1,880 cfs Apr. 9, 1969 (gage height, 9.07 ft); maximum gage height, 9.31 ft Aug. 5, 1955; minimum discharge, 4.8 cfs Aug. 27, 1969; minimum gage height, 2.55 ft Sept. 5, 1961.
Maximum stage known, about 11.3 ft, present datum, spring of 1921, from information by local resident.

REMARKS.--Records good except those for winter periods, which are fair.

REVISIONS (WATER YEARS).--WSP 1308: 1945-46(M), 1948(M).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	11	36	16	11	13	15	134	73	39	41	22	19
2	9.2	40	16	11	13	15	324	70	40	42	20	19
3	8.9	38	16	11	13	15	296	66	38	41	2[illegible]	19
4	9.8	40	16	11	13	15	249	64	36	54	18	91
5	9.8	36	15	11	13	15	209	64	35	57	18	182
6	9.9	32	15	11	13	16	204	62	34	50	17	202
7	10	29	15	11	14	15	211	57	33	45	16	209
8	11	29	15	12	14	16	281	56	28	40	16	201
9	12	28	14	12	14	16	293	55	27	41	15	196
10	14	27	14	12	14	16	230	52	28	36	17	175
11	14	27	13	12	14	17	195	55	29	33	17	130
12	15	26	13	12	14	18	158	56	32	35	18	108
13	20	25	13	12	14	20	129	52	32	36	17	96
14	23	24	13	12	14	24	109	46	31	34	16	85
15	24	24	12	12	14	31	99	48	27	31	15	77
16	21	23	12	13	14	45	97	47	25	28	15	71
17	19	23	12	13	14	58	94	43	28	27	15	67
18	19	22	12	13	14	76	92	41	39	26	20	65
19	19	22	12	13	14	95	90	40	51	26	18	60
20	18	22	12	13	14	120	97	42	38	29	18	56
21	18	21	12	13	14	100	93	41	33	29	17	53
22	18	21	12	13	14	90	85	40	31	29	19	49
23	18	20	12	13	14	110	79	44	32	26	28	46
24	18	19	12	13	14	140	74	51	34	24	25	43
25	20	18	12	13	14	130	74	56	36	22	23	40
26	22	18	12	13	14	115	76	52	37	22	22	39
27	29	17	12	13	15	95	74	48	34	22	20	38
28	31	17	11	13	15	85	77	43	31	22	18	38
29	32	16	11	13	------	82	81	40	32	23	17	37
30	29	16	11	13	------	98	77	38	34	21	16	38
31	31	------	11	13	------	119	------	39	------	22	17	------
TOTAL	563.6	756	404	381	388	1,817	4,372	1,583	1,004	1,014	570	2,549
MEAN	18.2	25.2	13.0	12.3	13.9	58.6	146	51.1	33.5	32.7	18.4	85.0
MAX	32	40	16	13	15	140	324	73	51	57	28	209
MIN	8.9	16	11	11	13	15	74	38	25	21	15	19
AC-FT	1,120	1,500	801	756	770	3,600	8,670	3,140	1,990	2,010	1,130	5,060

CAL YR 1970 TOTAL 19,968.7 MEAN 54.7 MAX 478 MIN 7.3 AC-FT 39,610
WTR YR 1971 TOTAL 15,401.6 MEAN 42.2 MAX 324 MIN 8.9 AC-FT 30,550

05061500 South Branch Buffalo River at Sabin, Minn.

LOCATION.--Lat 46°46'20", long 96°37'40", in SW¼SW¼ sec.9, T.138 N., R.47 W., Clay County, near center of span on downstream side of highway bridge, 0.3 mile downstream from Stony Creek and 1 mile east of Sabin.

DRAINAGE AREA.--522 sq mi.

PERIOD OF RECORD.--March 1945 to current year.

GAGE.--Nonrecording gage read once or twice daily and crest-stage gage. Datum of gage is 902.39 ft above mean sea level, datum of 1929 (levels by Soil Conservation Service). Prior to Aug. 17, 1948, nonrecording gage at site 1 mile downstream at different datum.

AVERAGE DISCHARGE.--26 years, 54.9 cfs (39,780 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 326 cfs Sept. 6 (gage height, 9.32 ft); maximum gage height, 10.59 ft Mar. 19 (backwater from ice); no flow Jan. 16 to Mar. 6.
Period of record: Maximum discharge, 6,410 cfs Apr. 10, 1969 (gage height, 18.12 ft); no flow for many days in most years.

REMARKS.--Records fair.

REVISIONS (WATER YEARS).--WSP 1308: 1949(M).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.8	14	5.0	1.1		0	145	48	18	29	13	2.2
2	1.7	14	5.0	1.0		0	125	47	18	28	12	2.3
3	1.7	14	4.8	.90		0	100	45	18	34	10	3.2
4	1.6	15	4.7	.80		0	80	42	17	140	9.1	38
5	1.6	15	4.6	.70		0	85	37	19	230	8.1	210
6	1.4	15	4.5	.60		0	95	36	18	228	7.2	282
7	1.7	14	4.4	.50		.10	130	34	17	299	5.8	188
8	2.8	13	4.2	.40		.20	164	32	16	295	4.5	127
9	3.2	12	4.1	.30		.40	140	29	14	283	3.6	88
10	4.9	11	4.0	.30		2.0	108	27	12	254	4.6	62
11	5.2	11	3.9	.20		3.5	98	24	12	220	3.7	40
12	5.3	10	3.8	.20		5.5	84	22	11	176	3.4	30
13	5.8	9.2	3.8	.10		10	71	20	10	141	2.6	21
14	6.9	8.5	3.7	.10		17	63	18	9.7	113	2.2	16
15	7.2	8.0	3.6	.10		30	56	15	10	99	1.9	13
16	7.2	7.6	3.6	0		45	50	14	11	85	1.5	13
17	7.2	7.4	3.5	0		70	46	13	12	76	1.6	13
18	7.0	7.3	3.3	0		110	46	11	34	64	1.9	12
19	6.7	7.3	3.1	0		160	45	11	29	58	2.1	12
20	6.7	7.1	3.0	0		152	43	11	25	51	2.0	11
21	8.1	6.8	2.9	0		145	46	10	18	43	1.8	11
22	10	6.6	2.7	0		130	46	9.7	17	39	2.0	9.5
23	11	6.4	2.5	0		115	42	12	14	33	2.2	7.9
24	10	6.2	2.4	0		100	40	15	14	29	2.6	6.4
25	10	6.0	2.2	0		95	37	18	14	26	2.9	4.7
26	10	5.8	2.1	0		90	34	24	16	24	3.2	4.7
27	9.8	5.5	2.0	0		86	34	24	18	20	3.2	4.7
28	9.8	5.3	1.8	0		95	38	23	20	20	3.1	4.7
29	10	5.2	1.6	0	------	105	40	20	26	18	2.7	5.0
30	10	5.1	1.4	0	------	115	45	19	28	17	2.4	5.5
31	14	------	1.3	0	------	135	------	19	------	14	2.0	------
TOTAL	200.3	279.3	103.5	7.30	0	1,816.70	2,176	729.7	515.7	3,186	128.9	1,247.8
MEAN	6.46	9.31	3.34	.24	0	58.6	72.5	23.5	17.2	103	4.16	41.6
MAX	14	15	5.0	1.1	0	160	164	48	34	299	13	282
MIN	1.4	5.1	1.3	0	0	0	34	9.7	9.7	14	1.5	2.2
AC-FT	397	554	205	14	0	3,600	4,320	1,450	1,020	6,320	256	2,480

CAL YR 1970 TOTAL 9,979.30 MEAN 27.3 MAX 420 MIN .10 AC-FT 19,790
WTR YR 1971 TOTAL 10,391.20 MEAN 28.5 MAX 299 MIN 0 AC-FT 20,610

05062000 Buffalo River near Dilworth, Minn.

LOCATION.--Lat 46°57'40", long 96°39'40", in SW¼SE¼ sec.6, T.140 N., R.47 W., Clay County, on left bank 4.5 miles southeast of Kragnes, 6.5 miles northeast of Dilworth, and 9 miles downstream from South Branch.

DRAINAGE AREA.--1,040 sq mi, approximately.

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

GAGE.--Water-stage recorder. Datum of gage is 878.31 ft above mean sea level, datum of 1929 (levels by Corps of Engineers). Prior to Apr. 5, 1937, nonrecording gage at same site and datum.

AVERAGE DISCHARGE.--40 years, 122 cfs (88,390 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 493 cfs Apr. 10 (gage height, 9.81 ft); maximum gage height, 10.90 ft about Mar. 21 (from floodmark, backwater from ice); minimum discharge, 6.5 cfs Oct. 2 (gage height, 2.17 ft).

Period of record: Maximum discharge, 10,400 cfs Apr. 11, 1969 (gage height, 25.55 ft); no flow at times in 1936.

REMARKS.--Records good except those for winter periods, which are fair. Records of suspended-sediment loads for the current year are published in Part 2 of this report.

REVISIONS (WATER YEARS).--WSP 1308: 1931(M).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7.7	43	23	13	13	15	290	130	67	59	37	14
2	6.9	45	23	13	13	15	378	130	66	64	36	15
3	7.3	48	22	13	13	15	450	129	64	68	34	15
4	7.9	49	22	13	13	15	430	123	65	70	28	33
5	8.1	50	22	13	13	16	370	117	64	77	26	73
6	7.5	50	22	13	13	16	300	110	62	103	24	257
7	7.4	49	21	13	13	16	320	105	58	175	22	363
8	9.0	45	21	13	13	16	400	98	55	236	21	358
9	11	42	21	12	13	16	450	92	53	260	19	322
10	11	39	20	12	13	16	485	89	51	262	18	284
11	13	38	20	12	13	16	465	84	50	253	15	251
12	17	36	20	12	14	17	380	80	50	240	17	212
13	19	34	20	12	14	19	307	80	51	216	18	169
14	19	32	20	12	14	25	256	79	53	186	19	141
15	22	31	19	12	14	35	217	74	51	160	18	124
16	25	31	19	12	14	55	190	68	47	139	16	108
17	26	31	18	12	14	65	175	66	42	120	14	96
18	26	31	18	12	14	80	166	64	48	108	13	88
19	25	30	18	12	14	110	160	59	75	97	17	83
20	23	29	17	12	14	180	155	55	85	87	25	79
21	23	28	17	12	14	235	151	52	88	80	19	74
22	25	27	16	12	14	195	152	54	72	74	18	69
23	30	26	16	12	14	160	146	61	61	69	16	66
24	28	26	16	12	14	175	137	67	57	64	15	60
25	27	25	15	13	15	195	126	74	58	58	24	56
26	27	25	15	13	15	170	117	80	61	52	27	54
27	29	24	15	13	15	145	117	86	59	51	24	51
28	31	24	14	13	15	130	120	86	58	44	23	49
29	35	24	14	13	------	120	123	81	54	43	21	47
30	36	23	14	13	------	130	125	73	53	42	18	49
31	39	------	14	13	------	180	------	69	------	41	15	------
TOTAL	628.8	1,035	572	387	385	2,593	7,658	2,615	1,778	3,598	657	3,660
MEAN	20.3	34.5	18.5	12.5	13.8	83.6	255	84.4	59.3	116	21.2	122
MAX	39	50	23	13	15	235	485	130	88	262	37	363
MIN	6.9	23	14	12	13	15	117	52	42	41	13	14
AC-FT	1,250	2,050	1,130	768	764	5,140	15,190	5,190	3,530	7,140	1,300	7,260

CAL YR 1970 TOTAL 35,389.1 MEAN 97.0 MAX 770 MIN 4.5 AC-FT 70,190
WTR YR 1971 TOTAL 25,566.8 MEAN 70.0 MAX 485 MIN 6.9 AC-FT 50,710

05062500 Wild Rice River at Twin Valley, Minn.

LOCATION.--Lat 47°16'00", long 96°14'40", in NE¼ sec.27, T.144 N., R.44 W., Norman County, on left bank 100 ft upstream from highway bridge, 0.8 mile northeast of village of Twin Valley, and 2 miles upstream from small tributary.

DRAINAGE AREA.--888 sq mi.

PERIOD OF RECORD.--June 1909 to September 1917, July 1930 to current year. Monthly discharge only for some periods, published in WSP 1308.

GAGE.--Water-stage recorder. Datum of gage is 1,008.16 ft above mean sea level, datum of 1929 (Corps of Engineers bench mark). June 1909 to September 1917, nonrecording gage at site a quarter of a mile downstream at different datum. July 23, 1930, to Nov. 24, 1934, nonrecording gage at highway bridge 100 ft downstream from present site at present datum. Nov. 25, 1934, to Aug. 2, 1950, water-stage recorder 80 ft upstream from present site at present datum.

AVERAGE DISCHARGE.--49 years, 166 cfs (120,300 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 1,060 cfs Apr. 10 (gage height, 6.01 ft); maximum gage height, 6.57 ft Apr. 7 (backwater from ice); minimum discharge, 14 cfs Oct. 3, 4, 5, 6 (gage height, 0.96 ft).
Period of record: Maximum discharge, 9,200 cfs July 22, 1909 (gage height, 20.0 ft, site and datum then in use), from rating curve extended above 3,300 cfs; minimum, 0.5 cfs Nov. 4, 1939.

REMARKS.--Records good except those for winter periods, which are fair. Flow slightly regulated by Rice Lake and many other small lakes above station. Records of suspended-sediment loads for the current year are published in Part 2 of this report.

REVISIONS (WATER YEARS).--WSP 955: 1941. WSP 1308: 1915(M), 1917(M).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	17	57	52	34	37	37	600	422	202	64	48	21
2	15	74	52	34	37	37	645	411	210	64	46	22
3	14	82	50	34	37	38	600	396	206	64	46	26
4	14	93	47	34	37	38	545	385	196	63	43	82
5	14	93	46	34	37	38	510	378	192	61	40	85
6	15	103	46	34	37	38	540	376	176	58	37	105
7	14	99	45	34	37	38	690	365	166	66	35	115
8	14	89	45	34	37	38	842	352	155	57	35	113
9	16	89	44	33	36	38	866	339	142	47	35	101
10	22	91	43	33	36	38	941	320	133	46	33	89
11	24	95	42	33	36	39	882	308	135	43	30	74
12	24	89	41	32	36	39	785	299	149	44	28	62
13	32	79	40	32	36	39	671	282	147	41	33	56
14	33	46	40	32	35	40	617	267	135	37	37	52
15	31	57	39	33	35	44	600	252	117	35	31	46
16	33	68	39	33	35	47	589	240	106	33	32	45
17	35	65	39	33	35	60	569	231	103	31	36	42
18	39	60	38	34	35	90	568	208	104	33	37	40
19	33	58	38	34	35	120	567	204	121	36	30	38
20	27	44	37	34	35	145	576	184	109	64	29	36
21	25	35	37	34	35	170	576	170	93	83	28	34
22	23	26	37	34	36	165	554	162	84	73	27	33
23	21	33	36	34	37	160	525	190	81	61	23	35
24	20	42	36	34	37	150	495	214	82	60	26	34
25	23	50	35	34	37	145	468	256	85	58	28	32
26	25	54	35	34	37	138	441	271	81	55	26	28
27	49	56	35	34	37	135	429	254	75	60	25	27
28	43	56	35	35	37	135	426	242	71	65	24	28
29	51	56	35	35	------	145	431	233	69	55	22	30
30	52	54	34	36	------	175	433	219	68	56	20	41
31	53	------	34	37	------	600	------	214	------	55	20	------
TOTAL	851	1,993	1,252	1,049	1,014	3,159	17,981	8,644	3,793	1,668	990	1,572
MEAN	27.5	66.4	40.4	33.8	36.2	102	599	279	126	53.8	31.9	52.4
MAX	53	103	52	37	37	600	941	422	210	83	48	115
MIN	14	26	34	32	35	37	426	162	68	31	20	21
AC-FT	1,690	3,950	2,480	2,080	2,010	6,270	35,670	17,150	7,520	3,310	1,960	3,120

CAL YR 1970 TOTAL 83,325 MEAN 228 MAX 1,700 MIN 11 AC-FT 165,300
WTR YR 1971 TOTAL 43,966 MEAN 120 MAX 941 MIN 14 AC-FT 87,210

05064000 Wild Rice River at Hendrum, Minn.

LOCATION.--Lat 47°16'05", long 96°47'50", in SE¼ sec.19, T.144 N., R.48 W., Norman County, near center of span on downstream side of highway bridge, 0.5 mile east of Hendrum and 4 miles upstream from mouth.

DRAINAGE AREA.--1,600 sq mi, approximately.

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

GAGE.--Nonrecording gage and crest-stage gage. Datum of gage is 836.75 ft above mean sea level, datum of 1929 (levels by Corps of Engineers).

AVERAGE DISCHARGE.--27 years, 235 cfs (170,300 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 1,500 cfs Apr. 10 (gage height, 13.20 ft, from graph based on gage readings); maximum gage height, 13.76 ft Apr. 9 (backwater from ice); minimum discharge observed, 13 cfs Oct. 8 (gage height, 2.09 ft).
Period of record: Maximum discharge, 8,300 cfs Apr. 15, 1969 (gage height, 31.42 ft); no flow some days in 1948-49.

REMARKS.--Records good except those for winter periods, which are fair. Large part of high flow diverted into Marsh River basin at overflow section 3.5 miles east of Ada. Another diversion into Marsh River basin, formed 1.5 miles southeast of Ada, diverted water at all stages 1947-51, after which it was closed except for small regulated flow diverted at same point. Amount of diversion not known.

REVISIONS (WATER YEARS).--WSP 1728: 1958.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	24	78	58	37	38	38	850	481	253	94	59	30
2	21	90	56	37	38	38	1,010	477	240	90	52	30
3	18	87	55	37	38	38	890	461	240	88	52	31
4	18	102	53	36	38	39	730	443	240	85	48	100
5	18	103	52	36	39	39	750	428	235	81	46	435
6	17	109	52	36	39	40	860	417	225	74	41	524
7	17	109	51	35	39	40	1,010	402	215	102	39	370
8	14	108	50	35	39	40	1,200	397	201	122	39	288
9	17	108	49	35	39	40	1,420	385	191	110	39	245
10	20	105	48	35	39	40	1,440	372	169	95	37	195
11	22	103	48	34	39	40	1,180	356	168	84	36	174
12	27	100	47	34	38	41	1,020	341	167	73	36	153
13	35	96	47	34	38	41	958	328	171	67	36	115
14	40	72	46	34	38	42	866	319	167	70	36	88
15	42	66	45	34	37	47	748	310	160	60	37	79
16	43	81	45	33	37	60	706	294	142	55	35	72
17	44	86	44	33	37	105	689	280	132	48	35	68
18	44	82	44	32	37	155	662	273	125	46	34	65
19	45	75	43	32	37	195	653	255	143	45	31	59
20	55	59	43	32	37	250	647	253	135	50	31	52
21	50	48	42	33	36	330	650	235	128	80	31	51
22	46	40	42	34	36	450	650	243	124	99	30	46
23	42	38	41	35	36	420	617	255	124	79	28	46
24	37	44	41	35	36	400	581	267	120	73	28	46
25	38	54	40	35	36	390	546	293	115	66	28	46
26	41	64	40	35	37	385	519	316	113	64	28	45
27	38	67	39	35	38	380	504	317	109	64	31	45
28	45	64	39	35	38	390	495	295	102	70	30	47
29	51	60	38	36	------	415	497	279	97	78	28	44
30	61	59	38	37	------	500	490	266	96	67	28	44
31	68	------	37	38	------	630	------	257	------	62	29	------
TOTAL	1,098	2,357	1,413	1,079	1,054	6,058	23,838	10,295	4,847	2,341	1,118	3,633
MEAN	35.4	78.6	45.6	34.8	37.6	195	795	332	162	75.5	36.1	121
MAX	68	109	58	38	39	630	1,440	481	253	122	59	524
MIN	14	38	37	32	36	38	490	235	96	45	28	30
AC-FT	2,180	4,680	2,800	2,140	2,090	12,020	47,280	20,420	9,610	4,640	2,220	7,210

CAL YR 1970 TOTAL 134,533 MEAN 369 MAX 3,890 MIN 13 AC-FT 266,800
WTR YR 1971 TOTAL 59,131 MEAN 162 MAX 1,440 MIN 14 AC-FT 117,300

05064500 Red River of the North at Halstad, Minn.

LOCATION.--Lat 47°21'10", long 96°50'50", on line between secs.24 and 25, T.145 N., R.49 W., Traill County, on left bank on upstream side of highway bridge, 0.5 mile west of Halstad, 2.5 miles downstream from Wild Rice River, and at mile 375.2.

DRAINAGE AREA.--21,800 sq mi, approximately (includes 3,800 sq mi in closed basins).

PERIOD OF RECORD.--April 1936 to June 1937 (no winter records), April 1942 to September 1960 (spring and summer months only), May 1961 to current year.

GAGE.--Water-stage recorder. Datum of gage is 826.65 ft above mean sea level. Prior to July 17, 1961, nonrecording gage at same site and datum.

AVERAGE DISCHARGE.--10 years, 1,800 cfs (1,304,000 acre-ft per year); median of yearly mean discharges, 1,640 cfs (1,188,000 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 5,480 cfs Apr. 1 (gage height, 15.62 ft, backwater from ice); minimum, 117 cfs Oct. 4 (gage height, 2.00 ft).
Period of record: Maximum discharge, 35,700 cfs Apr. 18, 1969 (gage height, 38.29 ft); minimum discharge observed, 5.4 cfs Oct. 8, 9, 12-14, 1936.
Flood in 1897 reached a stage of about 38.5 ft.

REMARKS.--Records good. Some regulation by many controlled lakes and reservoirs on tributaries.

REVISIONS (WATER YEARS).--WSP 1388: 1936, 1950. WSP 1728: Drainage area.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	150	326	305	235	180	280	5,400	2,800	955	1,190	664	194
2	139	349	295	235	185	280	5,190	2,800	971	1,170	619	208
3	132	367	280	235	185	290	4,290	2,790	936	1,170	555	236
4	126	394	270	235	190	300	3,700	2,760	936	1,190	504	272
5	121	399	265	232	200	305	3,510	2,530	955	1,200	471	751
6	130	396	270	230	200	310	3,600	2,180	971	1,350	451	1,520
7	155	394	275	230	210	340	4,500	1,920	971	1,920	434	1,680
8	180	396	275	230	210	350	5,050	1,780	933	2,360	418	1,660
9	195	415	270	225	210	354	4,960	1,700	917	2,390	407	1,590
10	210	459	260	225	210	380	4,200	1,680	895	2,270	396	1,400
11	220	492	250	225	215	435	3,900	1,550	868	2,110	391	1,170
12	215	507	245	222	215	550	3,790	1,450	857	1,940	380	986
13	210	504	250	220	215	650	3,340	1,350	845	1,800	375	864
14	208	501	255	220	230	720	2,880	1,300	812	1,650	370	758
15	208	505	255	220	235	750	2,530	1,230	772	1,540	359	657
16	210	508	250	215	235	800	2,320	1,190	758	1,520	354	576
17	203	510	250	215	235	830	2,140	1,140	787	1,500	329	540
18	196	445	245	210	235	1,000	1,970	1,110	819	1,390	294	519
19	196	440	245	210	240	1,280	1,820	1,070	906	1,280	269	489
20	192	440	245	200	245	1,770	1,740	1,010	993	1,180	262	474
21	187	430	240	195	245	2,640	1,680	933	1,000	1,080	257	468
22	169	410	240	195	245	3,000	1,660	834	971	978	250	445
23	160	380	240	190	245	3,420	1,740	841	978	910	248	412
24	153	375	240	190	250	3,510	1,900	933	993	853	253	391
25	148	380	235	185	255	3,440	2,070	1,050	986	798	229	370
26	153	350	235	185	260	3,280	2,230	1,080	1,000	772	217	357
27	194	330	235	185	270	3,060	2,390	1,050	1,020	754	208	349
28	241	290	235	185	280	3,000	2,570	1,000	1,060	736	190	346
29	265	290	230	185	------	3,100	2,710	963	1,090	733	185	344
30	282	300	235	185	------	3,380	2,770	952	1,150	718	180	359
31	294	------	235	180	------	4,420	------	948	------	700	190	------
TOTAL	5,842	12,282	7,855	6,529	6,330	48,224	92,550	45,924	28,105	41,152	10,709	20,385
MEAN	188	409	253	211	226	1,556	3,085	1,481	937	1,327	345	680
MAX	294	510	305	235	280	4,420	5,400	2,800	1,150	2,390	664	1,680
MIN	121	290	230	180	180	280	1,660	834	758	700	180	194
AC-FT	11,590	24,360	15,580	12,950	12,560	95,650	183,600	91,090	55,750	81,620	21,240	40,430

CAL YR 1970 TOTAL 544,847 MEAN 1,493 MAX 11,400 MIN 115 AC-FT 1,081,000
WTR YR 1971 TOTAL 325,887 MEAN 893 MAX 5,400 MIN 121 AC-FT 646,400

05067500 Marsh River near Shelly, Minn.

LOCATION.--Lat 47°24'45", long 96°45'50", in NE¼NW¼ sec.3, T.145 N., R.48 W., Norman County, near center of span on downstream truss of bridge, 3.8 miles southeast of Shelly and 10 miles upstream from mouth.

DRAINAGE AREA.--151 sq mi.

PERIOD OF RECORD.--March 1944 to current year. Monthly discharge only for March 1944, published in WSP 1308.

GAGE.--Nonrecording gage read once or twice daily and crest-stage gage. Datum of gage is 841.14 ft above mean sea level, datum of 1929 (levels by Corps of Engineers). Prior to Oct. 1, 1965, nonrecording gage at datum 3.0 ft higher.

AVERAGE DISCHARGE.--27 years, 75.8 cfs (54,920 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 619 cfs Apr. 1 (gage height, 10.11 ft, backwater from ice); no flow on many days.
Period of record: Maximum discharge, 4,660 cfs May 11, 1950 (gage height, 21.96 ft, from floodmark, present datum); no flow for many days most years.

REMARKS.--Records good. Large part of high flow of Wild Rice River diverted into Marsh River basin at overflow section 3.5 miles east of Ada. Another diversion from Wild Rice River formed 1 mile southeast of Ada supplemented flow at all stages 1947-51, after which it was closed except for small regulated flow diverted at same point for abatement of pollution from Ada sewage plant effluent.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0	1.0	.20			0	580	8.7	6.4	.70		
2	0	1.0	.20			0	370	7.2	5.8	.90		
3	0	1.0	.10			0	235	6.2	5.3	.70		
4	0	1.0	.10			0	200	5.6	5.3	.70		
5	0	.80	.10			0	185	6.2	4.5	.70		
6	0	.70	0			0	210	9.0	4.4	.50		
7	0	.60	0			0	248	8.0	4.3	.70		
8	0	.70	0			0	264	5.8	4.0	.40		
9	0	.80	0			0	206	4.7	3.3	.20		
10	0	.80	0			0	132	4.0	2.8	.20		
11	0	.80	0			0	79	3.7	2.6	.30		
12	0	.70	0			.70	52	3.3	2.5	.70		
13	0	.60	0			8.0	32	2.8	4.7	.70		
14	0	.50	0			12	26	2.6	5.2	.10		
15	0	.40	0			17	25	2.5	3.1	.20		
16	0	.40	0			23	23	2.2	1.8	1.6		
17	0	.40	0			27	18	2.0	1.4	.90		
18	.10	.50	0			29	17	1.0	1.8	.80		
19	.60	.50	0			33	15	1.0	1.4	.80		
20	.50	.50	0			70	14	.90	.90	.70		
21	.40	.50	0			98	13	.90	.80	.30		
22	.30	.40	0			86	11	.80	.80	.30		
23	.20	.40	0			65	10	2.3	.80	.50		
24	.20	.30	0			60	8.4	4.5	.90	.20		
25	.20	.30	0			62	7.7	18	1.0	.20		
26	.70	.30	0			66	7.7	16	1.6	.10		
27	1.0	.30	0			72	7.7	11	1.4	.10		
28	.80	.30	0			80	7.7	8.0	1.2	0		
29	.90	.20	0		------	95	8.4	5.8	1.6	0		
30	1.0	.20	0		------	160	9.0	5.1	1.1	0		
31	1.0	------	0		------	385	------	7.2	------	0		------
TOTAL	7.90	16.90	.70	0	0	1,448.70	3,021.6	167.00	82.70	14.20	0	0
MEAN	.25	.56	.023	0	0	46.7	101	5.39	2.76	.46	0	0
MAX	1.0	1.0	.20	0	0	385	580	18	6.4	1.6	0	0
MIN	0	.20	0	0	0	0	7.7	.80	.80	0	0	0
AC-FT	16	34	1.4	0	0	2,870	5,990	331	164	28	0	0

CAL YR 1970 TOTAL 16,596.10 MEAN 45.5 MAX 1,280 MIN 0 AC-FT 32,920
WTR YR 1971 TOTAL 4,759.70 MEAN 13.0 MAX 580 MIN 0 AC-FT 9,440

05069000 Sandhill River at Climax, Minn.

LOCATION.--Lat 47°36'43", long 96°48'52", in NE¼NE¼ sec.30, T.148 N., R.48 W., Polk County, near center of span on downstream side of bridge on U.S. Highway 75 in Climax and 3.7 miles upstream from mouth.

PERIOD OF RECORD.--March 1943 to current year (winter records incomplete in some years). Monthly discharge only for some periods, published in WSP 1308 and 1728.

GAGE.--Nonrecording gage and crest-stage gage. Datum of gage is 820.10 ft above mean sea level, datum of 1929 (levels by Corps of Engineers). Prior to Oct. 1, 1966, nonrecording gage at site 3.2 miles upstream at datum 12.78 ft higher.

AVERAGE DISCHARGE.--25 years (1946-71), 66.1 cfs (47,890 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 1,460 cfs Apr. 8 (gage height, 13.60 ft, from graph based on gage readings, backwater from ice); minimum, 7.1 cfs Aug. 23 (gage height, 4.61 ft).
Period of record: Maximum discharge, 4,560 cfs Apr. 14, 1965 (gage height, 17.81 ft, site and datum then in use); maximum gage height, 28.32 ft Apr. 17, 1969 (from floodmark, backwater from Red River of the North); minimum discharge not determined.

REMARKS.--Records good except those for winter periods, which are fair.

REVISIONS (WATER YEARS).--WSP 1388: 1943(M), 1944, 1947(M). WSP 1728: 1951(M), 1960 (Average discharge).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	13	54	14	10	12	13	540	77	49	23	16	11
2	12	46	14	10	12	12	360	80	47	21	15	14
3	11	42	13	10	12	12	340	70	44	21	14	13
4	11	43	13	10	12	12	375	70	48	21	13	21
5	12	39	13	10	12	12	420	72	49	20	13	43
6	11	49	13	10	12	12	690	68	48	19	12	50
7	13	56	13	10	12	12	1,130	72	45	18	12	57
8	13	53	12	10	12	12	1,400	72	43	18	9.6	68
9	14	48	12	10	12	12	1,110	68	41	18	9.1	66
10	17	44	12	11	12	12	752	59	38	18	8.6	64
11	24	43	11	11	12	12	531	57	39	18	9.1	64
12	21	39	11	11	12	12	353	54	44	14	8.1	60
13	25	31	11	11	12	13	261	54	44	15	11	54
14	27	22	11	11	12	15	229	44	38	18	12	46
15	27	23	11	12	12	18	204	46	35	15	10	38
16	27	25	11	12	13	20	184	42	33	15	9.6	33
17	22	26	11	12	13	22	172	41	36	16	8.6	28
18	22	25	11	12	13	28	148	38	33	16	9.1	27
19	26	24	11	13	13	45	128	37	31	16	14	23
20	29	21	11	13	13	50	123	36	31	18	9.6	21
21	30	19	10	13	13	47	116	35	28	16	8.6	20
22	33	18	10	13	13	36	106	34	28	18	7.6	19
23	31	17	10	13	13	27	100	40	34	19	7.1	18
24	31	16	10	13	13	22	95	95	31	16	9.6	18
25	32	16	10	13	13	20	88	85	28	14	11	20
26	34	15	10	13	13	19	85	83	28	13	11	18
27	38	15	10	13	13	20	78	83	26	14	11	18
28	42	15	10	13	13	35	83	88	26	16	10	16
29	43	14	10	12	------	80	78	72	26	18	9.1	18
30	39	14	10	12	------	190	75	68	24	17	8.1	31
31	44	------	10	12	------	490	------	59	------	16	7.6	------
TOTAL	774	912	349	359	349	1,342	10,354	1,899	1,095	535	324.1	997
MEAN	25.0	30.4	11.3	11.6	12.5	43.3	345	61.3	36.5	17.3	10.5	33.2
MAX	44	56	14	13	13	490	1,400	95	49	23	16	68
MIN	11	14	10	10	12	12	75	34	24	13	7.1	11
AC-FT	1,540	1,810	692	712	692	2,660	20,540	3,770	2,170	1,060	643	1,980

CAL YR 1970 TOTAL 40,203.1 MEAN 110 MAX 1,820 MIN 9.1 AC-FT 79,740
WTR YR 1971 TOTAL 19,289.1 MEAN 52.8 MAX 1,400 MIN 7.1 AC-FT 38,260

05074000 Lower Red Lake near Red Lake, Minn.

LOCATION.--Lat 47°57'27", long 95°16'34", in NW¼ sec.28, T.152 N., R.36 W., Clearwater County, on left bank just upstream from dam at outlet, 13 miles northwest of village of Red Lake.

DRAINAGE AREA.--1,950 sq mi, approximately.

PERIOD OF RECORD.--June 1930 to November 1932 (published as Red Lake at Redby), May 1933 to current year (published as Red Lake near Red Lake 1933-40); records on Upper Red Lake published as Red Lake at Waskish, April 1930 to September 1933, all in reports of Geological Survey. October 1921 to September 1929 gage heights at Redby and on Upper Red Lake at Waskish in files of Minnesota Department of Conservation (fragmentary).

GAGE.--Water-stage recorder. Datum of gage is 1,169.00 ft above mean sea level, adjustment of 1912 (levels by Corps of Engineers). May 1933 to Sept. 6, 1934, nonrecording gage at same site and datum. Nonrecording gages at Waskish and Redby at datum 69.00 ft lower.

EXTREMES.--Current year: Maximum gage height, 5.88 ft June 19 (affected by wind action); maximum daily, 5.30 ft May 31; minimum, 3.87 ft July 25 (affected by wind action); minimum daily, 4.35 ft Sept. 23.
Period of record: Maximum gage height, 9.53 ft June 25, 1950; minimum recorded, 0.80 ft Nov. 20, 1936.

REMARKS.--Water level subject to fluctuation caused by change in direction and velocity of wind and by seiches.

MONTHEND GAGE HEIGHT, IN FEET, OCTOBER 1970 TO SEPTEMBER 1971

Oct. 31	4.96	Feb. 28	4.64	June 30	5.08
Nov. 30	4.92	Mar. 31	4.62	July 31	4.62
Dec. 31	4.88	Apr. 30	4.98	Aug. 31	4.71
Jan. 31	4.79	May 31	5.30	Sept.30	4.63

NOTE.--Mean daily gage heights are available.

05074500 Red Lake River near Red Lake, Minn.

LOCATION.--Lat 47°57'27", long 95°16'35", in NW¼ sec.28, T.152 N., R.36 W., Clearwater County, on left bank 50 ft downstream from dam at outlet of Lower Red Lake and 13 miles northwest of village of Red Lake.

DRAINAGE AREA.--1,950 sq mi, approximately.

PERIOD OF RECORD.--May 1933 to current year. Monthly discharge only for May 1933, published in WSP 1308.

GAGE.--Water-stage recorder. Datum of gage is 1,167.00 ft above mean sea level, adjustment of 1912 (levels by Corps of Engineers). Prior to Sept. 7, 1934, nonrecording gage at site 50 ft upstream at datum 2.00 ft higher. Sept. 7, 1934, to Nov. 26, 1951, water-stage recorder at present site at datum 2.00 ft higher.

AVERAGE DISCHARGE.--38 years, 457 cfs (331,100 acre-ft per year).

EXTREMES.--Current year: Maximum daily discharge, 889 cfs June 19, 20; maximum gage height, 6.52 ft Aug. 9 (affected by backwater from aquatic vegetation, and by wind action); minimum discharge, 87 cfs Apr. 15 (gage height, 1.60 ft).

Period of record: Maximum discharge, 3,600 cfs June 25, 1950 (gage height, 11.19 ft, affected by seiches and backwater from aquatic vegetation, present datum), from rating curve extended above 1,400 cfs; no flow at times.

REMARKS.--Records fair. Flow completely regulated by outlet dam on Lower Red Lake.

REVISIONS (WATER YEARS).--WSP 1308: 1934(M), 1943(M). WSP 1438: 1950(M).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	859	634	615	680	610	795	546	602	878	763	598	325
2	863	626	610	680	615	795	510	598	882	759	598	317
3	859	623	600	675	615	790	490	606	882	730	595	320
4	863	616	595	670	620	790	485	612	882	730	592	320
5	863	609	585	665	620	785	485	606	885	730	592	317
6	874	612	580	660	620	780	491	620	885	716	592	323
7	837	609	580	655	625	780	491	620	882	691	588	320
8	687	606	580	650	625	775	286	620	882	702	584	317
9	669	612	590	645	630	770	124	620	874	691	584	307
10	644	616	660	640	630	770	112	634	882	669	588	301
11	612	612	690	635	635	770	110	680	882	669	581	296
12	606	598	700	630	790	775	112	804	878	669	578	294
13	630	575	700	625	830	775	102	808	878	680	584	286
14	620	550	695	625	835	780	94	815	874	680	584	284
15	612	615	690	620	825	785	247	830	878	669	570	277
16	602	585	690	615	820	790	584	789	878	651	570	267
17	609	565	685	615	815	795	644	804	882	640	574	272
18	592	555	680	610	810	805	634	811	885	616	564	269
19	595	545	680	610	810	810	637	815	889	630	519	263
20	592	535	675	610	810	810	637	800	889	630	488	263
21	581	560	675	605	810	815	630	796	885	634	478	272
22	588	640	675	605	810	825	640	808	874	630	474	260
23	592	670	670	605	805	835	637	856	867	612	468	256
24	588	660	670	600	805	845	623	885	841	609	458	252
25	581	655	675	600	800	852	616	882	833	602	454	247
26	588	650	680	600	800	852	623	870	822	630	451	241
27	609	640	685	600	800	833	616	870	833	620	445	241
28	592	630	690	605	800	874	612	874	793	623	441	249
29	584	625	690	605	------	870	602	882	778	620	441	237
30	602	620	690	610	------	800	606	882	770	616	419	227
31	630	------	685	610	------	602	------	870	------	616	345	------
TOTAL	20,623	18,248	20,365	19,460	20,620	24,728	14,026	23,569	25,923	20,527	16,397	8,420
MEAN	665	608	657	628	736	798	468	760	864	662	529	281
MAX	874	670	700	680	835	874	644	885	889	763	598	325
MIN	581	535	580	600	610	602	94	598	770	602	345	227
AC-FT	40,910	36,190	40,390	38,600	40,900	49,050	27,820	46,750	51,420	40,720	32,520	16,700

CAL YR 1970 TOTAL 280,512 MEAN 769 MAX 1,180 MIN 157 AC-FT 556,400
WTR YR 1971 TOTAL 232,906 MEAN 638 MAX 889 MIN 94 AC-FT 462,000

05075000 Red Lake River at High Landing, near Goodridge, Minn.

LOCATION.--Lat 48°02'34", long 95°48'28", on line between secs. 28 and 29, T.153 N., R.40 W., Pennington County, on left bank 50 ft upstream from highway bridge at High Landing, 7 miles south of Goodridge and 33 miles upstream from Thief River.

DRAINAGE AREA.--2,300 sq mi, approximately.

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

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

AVERAGE DISCHARGE.--42 years, 492 cfs (356,500 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 1,610 cfs Apr. 8 (gage height, 10.54 ft, backwater from ice); minimum, 270 cfs Apr. 15 (gage height, 3.33 ft).
Period of record: Maximum discharge, 3,720 cfs May 11, 1950 (gage height, 13.42 ft); no flow during infrequent periods in 1931-34, 1936-37.

REMARKS.--Records good except those for winter periods, which are fair. Flow regulated by outlet dam on Lower Red Lake.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	943	837	650	730	625	840	940	773	1,070	800	645	530
2	937	864	640	725	630	840	700	776	1,040	783	640	452
3	931	867	630	720	630	840	850	789	992	776	640	437
4	934	854	630	715	635	835	950	789	986	768	635	478
5	945	835	625	710	640	835	930	818	983	757	625	484
6	957	827	620	705	640	835	1,100	827	968	742	618	484
7	960	818	620	700	640	835	1,250	813	968	732	618	495
8	960	816	620	695	645	830	1,510	816	983	724	621	504
9	929	813	615	685	645	830	1,200	816	977	707	625	501
10	864	808	615	680	645	825	724	805	968	682	628	487
11	805	802	625	670	650	825	550	802	954	674	630	464
12	776	780	640	665	650	820	454	835	957	672	633	447
13	765	740	680	660	660	820	345	920	951	674	637	422
14	773	610	710	650	740	825	288	974	926	664	652	405
15	770	630	715	640	800	830	278	977	915	640	672	391
16	763	700	715	635	820	840	480	977	901	635	687	379
17	755	680	710	630	830	845	752	995	881	633	714	370
18	747	630	710	630	835	855	851	997	873	630	742	362
19	747	600	700	630	840	870	878	1,000	867	635	750	362
20	750	580	700	625	840	880	892	1,000	895	640	752	360
21	747	540	695	625	845	895	892	995	901	650	707	353
22	742	490	690	625	845	910	840	992	915	665	628	350
23	744	560	690	625	845	925	829	1,020	912	660	594	355
24	744	630	695	620	850	935	824	1,090	898	655	594	348
25	747	700	700	620	850	930	816	1,130	887	650	594	343
26	755	720	710	620	850	930	816	1,130	878	650	573	340
27	757	700	715	620	845	925	816	1,110	870	660	559	338
28	773	690	720	620	845	920	794	1,090	856	670	548	334
29	783	680	725	620	------	915	783	1,070	837	665	539	332
30	786	670	725	620	------	910	786	1,060	818	655	550	350
31	797	------	730	620	------	990	------	1,070	------	650	564	------
TOTAL	25,386	21,471	20,965	20,335	20,815	26,940	24,118	29,256	27,827	21,198	19,614	12,257
MEAN	819	716	676	656	743	869	804	944	928	684	633	409
MAX	960	867	730	730	850	990	1,510	1,130	1,070	800	752	530
MIN	742	490	615	620	625	820	278	773	818	630	539	332
AC-FT	50,350	42,590	41,580	40,330	41,290	53,440	47,840	58,030	55,190	42,050	38,900	24,310

CAL YR 1970 TOTAL 338,811 MEAN 928 MAX 1,940 MIN 424 AC-FT 672,000
WTR YR 1971 TOTAL 270,182 MEAN 740 MAX 1,510 MIN 278 AC-FT 535,900

05076000 Thief River near Thief River Falls, Minn.

LOCATION.--Lat 48°11'08", long 96°10'11", in NW¼SW¼ sec.3, T.154 N., R.43 W., Marshall County, on right bank 0.2 miles upstream from highway bridge, 5 miles north of city of Thief River Falls, 7 miles upstream from mouth, and 9 miles downstream from Mud Lake National Wild Life Refuge.

DRAINAGE AREA.--959 sq mi.

PERIOD OF RECORD.--July 1909 to September 1917, April 1920 to September 1921, October 1922 to September 1924, October 1928 to current year. Monthly discharge only for some periods, annual maximums for water years 1919, 1922, 1925, 1926, published in WSP 1308.

GAGE.--Water-stage recorder and control of grouted boulders. Datum of gage is 1,112.33 ft above mean sea level, datum of 1929 (levels by Minnesota Highway Department). Prior to May 4, 1939, nonrecording gages at same site and datum.

AVERAGE DISCHARGE.--54 years, 153 cfs (110,800 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 1,780 cfs Apr. 9 (gage height, 11.40 ft, from graph based on gage readings, backwater from ice); maximum gage height, 12.52 ft Apr. 8 (from floodmark, backwater from ice); minimum discharge, 0.1 cfs Aug. 15, 16, 17, 28, 29, 30, 31; minimum gage height, 3.63 ft Aug. 17.
Period of record: Maximum discharge, 5,610 cfs May 13, 1950 (gage height, 17.38 ft); no flow at times in some years.

REMARKS.--Records good except those for period of no gage-height record and those for winter period, which are fair. Some regulation by Thief and Mud Lakes.

REVISIONS (WATER YEARS).--WSP 925: Drainage area. WSP 1308: 1917(M), 1924(M), 1929(M), 1931-33(M), 1935(M), 1937(M),

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.9	373	2.0	1.4	.90	1.0	180	306	30	19	6.6	.20
2	1.6	373	2.0	1.4	.90	1.0	210	300	26	18	5.8	.20
3	1.5	369	1.9	1.4	.90	1.0	180	221	24	15	4.5	.60
4	1.3	344	1.8	1.4	.90	1.0	130	164	2[illegible]	13	4.1	15
5	1.6	85	1.7	1.4	.90	1.0	155	157	17	9.6	3.2	31
6	1.6	25	1.6	1.4	.90	1.1	320	150	20	6.9	1.7	34
7	3.1	19	1.5	1.4	.9	1.1	620	129	23	7.8	.80	34
8	3.3	12	1.5	1.4	.90	1.1	1,370	92	25	8.1	.50	32
9	5.8	12	1.4	1.4	.90	1.1	1,530	71	24	5.9	.40	23
10	8.6	12	1.3	1.3	.90	1.1	1,080	44	20	4.3	.30	16
11	8.5	10	1.1	1.3	1.0	1.1	770	36	18	3.7	.30	12
12	9.6	7.7	.90	1.3	1.0	1.2	573	28	25	8.1	.30	7.7
13	11	6.6	.80	1.3	1.0	1.3	404	28	24	12	.30	5.5
14	12	5.8	.80	1.3	1.0	1.5	286	19	79	8.4	.20	3.8
15	13	5.4	.80	1.3	1.0	2.0	225	14	125	6.5	.10	2.6
16	12	5.1	.80	1.3	1.0	3.3	196	15	55	5.5	.10	12
17	14	4.8	.80	1.2	1.0	4.5	181	17	16	4.7	.20	11
18	12	4.5	.90	1.2	1.0	5.5	175	16	11	7.1	.20	3.7
19	16	4.2	1.0	1.2	1.0	5.8	203	20	30	7.8	.60	1.7
20	194	3.5	1.1	1.2	1.0	6.0	299	23	42	26	.50	.94
21	205	3.0	1.1	1.2	1.0	5.8	443	55	67	35	.30	.74
22	202	2.5	1.2	1.1	1.0	5.0	412	73	70	32	.20	.65
23	201	2.2	1.2	1.1	1.0	4.7	297	95	55	25	.20	.59
24	199	2.0	1.2	1.1	1.0	5.0	268	403	43	18	.30	.57
25	200	1.9	1.3	1.0	1.0	5.6	253	569	32	13	.30	.57
26	201	1.9	1.3	1.0	1.0	7.1	248	504	27	10	.30	.59
27	203	1.9	1.3	1.0	1.0	8.6	316	130	26	8.2	.20	.64
28	213	1.8	1.3	1.0	1.0	10	317	75	24	9.6	.20	.82
29	359	1.8	1.4	.90	------	13	315	57	22	9.9	.10	.93
30	373	1.9	1.4	.90	------	35	308	46	21	8.3	.10	.9
31	374	------	1.4	.90	------	95	------	36	------	7.3	.10	------
TOTAL	3,064.4	1,702.5	39.80	37.70	27.00	237.5	12,264	3,893	1,041	373.7	33.00	261.94
MEAN	98.9	56.8	1.28	1.22	.96	7.66	409	126	34.7	12.1	1.06	8.73
MAX	374	373	2.0	1.4	1.0	95	1,530	569	125	35	6.6	34
MIN	1.3	1.8	.80	.90	.90	1.0	130	14	11	3.7	.10	.20
AC-FT	6,080	3,380	79	75	54	471	24,330	7,720	2,060	741	65	520

CAL YR 1970 TOTAL 102,778.06 MEAN 282 MAX 2,760 MIN 0 AC-FT 203,900
WTR YR 1971 TOTAL 22,975.54 MEAN 62.9 MAX 1,530 MIN .10 AC-FT 45,570

NOTE.--No gage-height record Jan. 6 to Mar. 24.

05077700 Ruffy Brook near Gonvick, Minn.

LOCATION.--Lat 47°44'50", long 95°24'45", on line between secs. 5 and 8, T.149 N., R.37 W., Clearwater County, on downstream side of bridge on County Highway 17, 4 miles upstream from mouth, and 4.8 miles east of Gonvick.

DRAINAGE AREA.--45.2 sq mi.

PERIOD OF RECORD.--April 1960 to current year. Monthly and daily figures for Apr. 1, 1960 to June 30, 1960, published in WSP 1913.

GAGE.--Nonrecording gage read once daily and crest-stage gage. Datum of gage is 1,227.93 ft above mean sea level, adjustment of 1912 (levels by Corps of Engineers). Prior to Sept. 9, 1960, reference point at same site and datum.

AVERAGE DISCHARGE.--11 years, 14.2 cfs (10,290 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 176 cfs Apr. 8 (gage height, 5.40 ft, from graph based on gage readings, backwater from ice); minimum discharge, 1.0 cfs Aug. 29, 30 (gage height, 0.97 ft).
Period of record: Maximum discharge, 453 cfs Mar. 30, 1967 (gage height, 6.35 ft, from graph based on gage readings); maximum gage height, 6.62 ft Apr. 9, 1969 (from graph based on gage readings, backwater from ice); no flow Feb. 20 to Mar. 6, 1968.

REMARKS.--Records good except those for winter periods, which are fair.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.6	25	4.8	2.3	1.1	1.4	3.6	21	22	3.4	3.4	1.4
2	1.6	18	5.1	2.1	1.1	1.4	5.7	18	9.6	3.0	3.0	1.4
3	1.4	15	5.2	2.0	1.1	1.4	12	16	9.0	2.6	3.2	12
4	1.6	8.8	5.2	1.9	1.1	1.4	18	18	8.2	3.4	2.6	8.2
5	1.6	7.9	5.1	1.8	1.1	1.5	26	18	7.4	2.6	2.4	8.2
6	1.8	7.1	4.9	1.8	1.1	1.5	90	15	6.9	2.2	2.2	9.0
7	1.6	6.2	4.8	1.7	1.1	1.5	145	14	5.7	3.0	2.0	8.8
8	1.8	5.7	4.7	1.6	1.1	1.5	165	11	5.7	2.6	1.8	3.9
9	2.4	5.4	4.7	1.6	1.1	1.5	150	10	5.0	2.2	1.6	3.2
10	3.0	5.0	4.6	1.5	1.1	1.5	142	9.0	4.3	2.0	1.8	2.8
11	2.6	5.0	4.6	1.5	1.1	1.6	114	7.6	4.3	2.0	2.0	2.4
12	3.0	4.8	4.5	1.5	1.1	1.6	93	6.9	11	3.0	3.4	2.0
13	7.6	4.5	4.5	1.4	1.2	1.7	69	6.6	10	2.4	3.0	2.0
14	7.4	4.0	4.4	1.4	1.2	1.8	65	5.9	6.9	2.4	2.6	2.0
15	5.2	3.8	4.3	1.4	1.2	1.9	54	5.7	5.9	2.6	2.6	1.8
16	4.8	3.7	4.3	1.3	1.2	2.0	43	5.4	5.2	2.0	2.2	1.8
17	4.1	3.7	4.2	1.3	1.2	2.1	41	5.0	28	1.6	2.6	1.8
18	3.9	3.9	4.2	1.3	1.3	2.2	40	4.8	11	27	2.0	1.8
19	3.2	3.9	4.1	1.3	1.3	2.3	44	4.8	7.9	6.2	1.8	1.8
20	3.2	5.2	3.9	1.2	1.3	2.4	39	4.8	5.9	6.2	1.8	1.6
21	2.8	5.2	3.7	1.2	1.3	2.4	36	4.8	5.0	6.6	2.6	1.4
22	3.2	5.0	3.6	1.2	1.4	2.5	34	5.4	7.9	9.3	2.0	1.6
23	3.7	4.7	3.5	1.2	1.4	2.5	25	10	5.0	8.5	1.8	1.6
24	3.4	4.5	3.3	1.2	1.4	2.6	22	36	5.4	7.6	2.0	1.6
25	4.5	4.3	3.2	1.2	1.4	2.6	20	45	5.2	6.6	1.8	1.6
26	7.4	4.2	3.1	1.2	1.4	2.7	24	43	6.9	5.7	1.6	1.6
27	11	4.1	3.0	1.1	1.4	2.7	20	44	4.1	5.2	1.6	1.8
28	11	4.1	2.8	1.1	1.4	2.8	34	41	3.9	5.4	1.4	2.0
29	7.6	4.2	2.7	1.1	------	2.9	28	33	3.7	4.8	1.0	2.0
30	6.9	4.4	2.5	1.1	------	3.0	25	26	4.3	4.3	1.0	2.4
31	14	------	2.4	1.1	------	3.2	------	24	------	3.9	1.4	------
TOTAL	138.9	191.3	125.9	44.6	34.2	64.1	1,627.3	519.7	231.3	150.3	66.2	95.5
MEAN	4.48	6.38	4.06	1.44	1.22	2.07	54.2	16.8	7.71	4.85	2.14	3.18
MAX	14	25	5.2	2.3	1.4	3.2	165	45	28	27	3.4	12
MIN	1.4	3.7	2.4	1.1	1.1	1.4	3.6	4.8	3.7	1.6	1.0	1.4
AC-FT	276	379	250	88	68	127	3,230	1,030	459	298	131	189

CAL YR 1970 TOTAL 5,615.60 MEAN 15.4 MAX 246 MIN .70 AC-FT 11,140
WTR YR 1971 TOTAL 3,289.30 MEAN 9.01 MAX 165 MIN 1.0 AC-FT 6,520

PEAK DISCHARGE (BASE, 65 CFS)

DATE	TIME	G.HT.	DISCHARGE
4-8	0200	5.40	176

05078000 Clearwater River at Plummer, Minn.

LOCATION.--Lat 47°55'24", long 96°02'46", in SE¼SW¼ sec.4, T.151 N., R.42 W., Red Lake County, on right bank 200 ft downstream from Soo Line Railroad bridge, 300 ft downstream from bridge on U.S. Highway 59, 0.9 mile northwest of railroad depot in Plummer, and 8 miles upstream from Hill River.

DRAINAGE AREA.--512 sq mi.

PERIOD OF RECORD.--April 1939 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,099.12 ft above mean sea level, adjustment of 1912 (levels by Corps of Engineers). Prior to Nov. 10, 1939, nonrecording gage at site 100 ft upstream at same datum.

AVERAGE DISCHARGE.--32 years, 175 cfs (126,800 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 1,520 cfs Apr. 10 (gage height, 8.32 ft); maximum gage height, 9.98 ft Apr. 9 (backwater from ice); minimum discharge, 23 cfs Oct. 10 (gage height, 2.32 ft).
Period of record: Maximum discharge, 3,640 cfs June 9, 1962 (gage height, 11.90 ft); maximum gage height, 12.31 ft Apr. 10, 1969 (backwater from ice); minimum discharge, 7.9 cfs July 8, 1940.

REMARKS.--Records good except those for winter periods which are fair.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	47	191	117	118	48	49	175	262	187	96	86	66
2	45	227	122	122	47	50	170	245	188	90	83	65
3	44	229	122	120	46	51	165	233	166	57	83	79
4	46	214	120	118	46	51	150	223	150	75	80	132
5	44	212	117	115	45	52	180	199	140	82	75	172
6	42	221	115	112	45	52	280	181	144	86	74	192
7	43	198	113	108	44	51	420	169	141	92	72	194
8	44	179	112	104	44	50	790	149	129	98	71	168
9	48	169	110	98	43	48	1,150	203	116	105	73	137
10	42	172	108	90	43	47	1,390	173	115	105	70	119
11	77	171	106	82	42	48	1,280	140	114	91	73	99
12	74	166	106	76	42	50	1,030	134	119	97	85	84
13	78	148	106	72	42	52	795	126	149	83	83	75
14	86	145	105	69	41	53	672	111	158	73	82	69
15	99	155	105	67	41	54	595	111	130	63	92	64
16	98	170	105	64	40	56	516	106	134	62	96	61
17	96	180	105	62	40	58	469	116	124	59	117	60
18	93	178	103	61	40	59	412	96	157	68	116	55
19	90	165	101	60	40	61	371	92	193	97	100	54
20	88	140	98	60	41	62	363	64	213	128	89	51
21	85	115	96	60	41	62	349	65	201	119	84	49
22	85	95	95	59	41	61	304	62	111	114	68	47
23	84	88	94	58	42	60	263	94	91	102	59	46
24	88	95	92	57	42	59	237	186	99	103	63	44
25	90	100	90	56	42	58	215	279	98	102	75	44
26	93	102	89	55	43	62	199	315	124	92	70	42
27	102	104	87	54	45	67	208	312	123	86	67	42
28	120	100	86	53	47	69	226	285	119	103	63	42
29	138	95	85	51	------	71	247	265	111	91	56	44
30	136	107	94	50	------	76	271	252	105	78	52	60
31	141	------	105	49	------	95	------	220	------	80	62	------
TOTAL	2,486	4,631	3,209	2,380	1,203	1,794	13,892	5,468	4,149	2,777	2,419	2,456
MEAN	80.2	154	104	76.8	43.0	57.9	463	176	138	89.6	78.0	81.9
MAX	141	229	122	122	48	95	1,390	315	213	128	117	194
MIN	42	88	85	49	40	47	150	62	91	57	52	42
AC-FT	4,930	9,190	6,370	4,720	2,390	3,560	27,550	10,850	8,230	5,510	4,800	4,870

CAL YR 1970 TOTAL 74,109 MEAN 203 MAX 1,960 MIN 33 AC-FT 147,000
WTR YR 1971 TOTAL 46,864 MEAN 128 MAX 1,390 MIN 40 AC-FT 92,950

PEAK DISCHARGE (BASE, 500 CFS)

DATE	TIME	G.HT.	DISCHARGE
4-10	1200	8.32	1,520

05078230 Lost River at Oklee, Minn.

LOCATION.--Lat 47°50'35", long 95°51'30", on west edge of sec.1, T.150 N., R.41 W., Red Lake County, on downstream side of bridge on State Highway 222 at northwest edge of Oklee, 12 miles upstream from mouth.

DRAINAGE AREA.--266 sq mi.

PERIOD OF RECORD.--April 1960 to current year. Monthly and daily figures for April 1, 1960 to June 30, 1960, published in WSP 2113.

GAGE.--Nonrecording gage read once or twice daily and crest-stage gage. Datum of gage is 1,126.94 ft above mean sea level, adjustment of 1912 (levels by Corps of Engineers). Prior to Sept. 9, 1960, reference points at same site at datum 8.00 ft higher. Sept. 9, 1960, to Sept. 30, 1964, nonrecording gage at same site at datum 8.00 ft higher.

AVERAGE DISCHARGE.--11 years, 75.5 cfs (54,700 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 1,430 cfs Apr. 8 (gage height, 12.34 ft, from floodmark, backwater from ice); minimum daily discharge, 3.6 cfs Oct. 2-7.
Period of record: Maximum discharge, 3,210 cfs Apr. 11, 1969 (gage height, 14.91 ft, from floodmark); no flow Feb. 16 to Mar. 21, 1963, Feb. 15 to Mar. 2, 1964.
Maximum stage known since at least 1897, 18.39 ft Apr. 21, 1950 (present datum), from floodmarks (discharge, 2,790 cfs).

REMARKS.--Records fair.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.7	90	20	9.0	6.8	10	590	106	33	14	16	22
2	3.6	120	20	8.8	6.8	10	550	87	31	13	15	20
3	3.6	100	20	8.6	6.8	10	480	83	28	13	15	30
4	3.6	75	20	8.5	6.8	10	460	78	24	12	14	181
5	3.6	65	20	8.4	6.9	10	440	66	22	12	14	216
6	3.6	59	19	8.2	6.9	10	500	62	20	14	13	258
7	3.6	57	19	8.0	6.9	10	610	51	18	16	13	223
8	3.9	55	18	7.9	6.9	10	1,130	45	17	16	12	162
9	4.3	53	17	7.8	6.9	10	1,020	42	16	17	13	104
10	4.6	52	17	7.7	6.9	11	600	50	15	18	13	53
11	3.9	50	16	7.6	7.0	11	490	44	15	18	14	45
12	8.0	46	16	7.5	7.0	11	373	37	17	17	17	36
13	11	42	15	7.5	7.0	12	265	35	28	15	21	30
14	14	38	15	7.4	7.1	12	212	33	29	14	19	26
15	21	36	14	7.3	7.2	13	210	35	26	13	21	22
16	24	35	13	7.2	7.4	14	170	38	25	12	28	20
17	25	35	13	7.1	7.6	16	199	45	28	13	33	19
18	24	34	13	7.1	7.8	17	228	43	35	19	39	18
19	21	33	12	7.0	8.1	18	206	40	43	24	37	18
20	20	31	12	7.0	8.3	18	216	37	45	73	32	18
21	18	29	12	7.0	8.6	19	194	39	40	63	29	18
22	18	28	12	7.0	8.8	19	172	45	35	46	25	18
23	18	25	11	7.0	9.0	19	147	80	31	40	22	18
24	17	23	11	7.0	9.1	20	130	119	27	34	22	18
25	17	21	11	7.0	9.4	21	118	114	20	26	21	18
26	25	20	11	7.0	9.5	21	110	119	19	22	26	19
27	64	19	10	6.9	9.7	22	106	106	20	22	26	19
28	68	19	10	6.8	10	24	119	83	21	22	24	18
29	66	19	9.9	6.8	------	40	110	73	18	21	22	16
30	66	19	9.6	6.8	------	150	124	48	16	20	21	30
31	70	------	9.4	6.8	------	270	------	39	------	18	20	------
TOTAL	657.0	1,328	445.9	231.7	217.2	868	10,279	1,922	762	697	657	1,713
MEAN	21.2	44.3	14.4	7.47	7.76	28.0	343	62.0	25.4	22.5	21.2	57.1
MAX	70	120	20	9.0	10	270	1,130	119	45	73	39	258
MIN	3.6	19	9.4	6.8	6.8	10	106	33	15	12	12	16
AC-FT	1,300	2,630	884	460	431	1,720	20,390	3,810	1,510	1,380	1,300	3,400

CAL YR 1970 TOTAL 32,472.2 MEAN 89.0 MAX 2,180 MIN 1.5 AC-FT 64,410
WTR YR 1971 TOTAL 19,777.8 MEAN 54.2 MAX 1,130 MIN 3.6 AC-FT 39,230

05078500 Clearwater River at Red Lake Falls, Minn.

LOCATION.--Lat 47°53'15", long 96°16'25", in NW¼NE¼ sec.22, T.151 N., R.44 W., Red Lake County, on left bank 40 ft downstream from Great Northern Railroad bridge in Red Lake Falls, 1.4 miles upstream from mouth, and 3 miles downstream from Badger Creek.

DRAINAGE AREA.--1,370 sq mi, approximately.

PERIOD OF RECORD.--June 1909 to September 1917, October 1934 to current year. Monthly discharge only for October, November, 1934, published in WSP 1308.

GAGE.--Water-stage recorder. Datum of gage is 949.49 ft above mean sea level, adjustment of 1912 (levels by Corps of Engineers). Prior to Sept. 12, 1911, nonrecording gage at site 0.5 mile upstream and Sept. 12, 1911, to Sept. 30, 1917, nonrecording gage at site 40 ft upstream at different datum.

AVERAGE DISCHARGE.--45 years, 304 cfs (220,200 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 3,500 cfs Apr. 10 (gage height, 7.58 ft, from graph based on gage readings, backwater from ice); maximum gage height, 9.11 ft Apr. 9 (backwater from ice); minimum discharge, 49 cfs Oct. 8 (gage height, 1.88 ft).

Period of record: Maximum discharge, 9,740 cfs Apr. 12, 1969 (gage height, 11.82 ft); maximum gage height observed, 17.5 ft Apr. 5, 1913, site and datum then in use (backwater from ice); no flow Sept. 15, 1936, Sept. 14, 1939, Aug. 19-22, 1940.

REMARKS.--Records good except those for winter periods, which are fair. Slight regulation by Clearwater Lake and several smaller lakes.

REVISIONS (WATER YEARS).--WSP 355: 1911-12. WSP 1438: 1910-11, 1917(M).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	66	318	125	128	68	65	800	522	330	115	139	111
2	59	449	132	140	66	67	900	483	297	101	137	111
3	55	469	138	145	66	68	1,010	456	290	97	130	148
4	54	430	140	148	64	67	1,000	425	255	83	130	181
5	53	387	140	145	64	66	930	397	243	81	126	438
6	56	381	140	143	64	66	950	351	217	98	115	529
7	52	360	137	140	62	65	1,600	342	202	110	113	597
8	50	310	135	134	62	64	2,000	309	189	103	106	534
9	54	284	132	130	61	63	2,600	293	172	106	102	413
10	70	263	130	125	61	62	3,350	364	160	113	104	312
11	74	266	127	118	60	61	2,690	280	165	113	98	254
12	90	256	124	110	60	64	2,140	242	194	107	96	202
13	106	238	122	100	60	70	1,630	229	212	111	121	166
14	116	170	120	95	59	75	1,350	219	256	93	123	143
15	145	155	119	92	58	78	1,180	196	247	86	117	126
16	156	177	118	90	58	77	1,080	185	203	71	130	115
17	154	213	116	88	58	76	974	194	199	71	148	104
18	151	223	114	86	58	90	928	189	176	104	171	98
19	146	215	114	85	57	130	878	163	272	126	178	92
20	143	189	113	84	57	155	853	154	320	199	166	88
21	137	164	112	83	57	162	834	132	351	257	148	82
22	131	83	111	81	57	168	760	131	240	245	132	77
23	128	94	110	80	58	170	676	154	165	219	111	75
24	141	104	108	78	59	168	607	255	146	199	117	72
25	146	108	108	76	59	155	551	453	146	202	102	71
26	145	120	106	75	60	145	502	568	144	196	128	69
27	157	130	104	74	62	140	493	582	165	181	128	71
28	182	125	103	73	64	138	492	553	153	169	123	71
29	232	118	102	71	------	140	507	474	142	174	106	71
30	252	115	100	70	------	160	538	451	134	157	96	117
31	254	------	110	69	------	640	------	394	------	143	96	------
TOTAL	3,755	6,914	3,710	3,156	1,699	3,715	34,803	10,140	6,385	4,230	3,837	5,538
MEAN	121	230	120	102	60.7	120	1,160	327	213	136	124	185
MAX	254	469	140	148	68	640	3,350	582	351	257	178	597
MIN	50	83	100	69	57	61	492	131	134	71	96	69
AC-FT	7,450	13,710	7,360	6,260	3,370	7,370	69,030	20,110	12,660	8,390	7,610	10,980

CAL YR 1970 TOTAL 160,904 MEAN 441 MAX 5,250 MIN 35 AC-FT 319,200
WTR YR 1971 TOTAL 87,882 MEAN 241 MAX 3,350 MIN 50 AC-FT 174,300

05079000 Red Lake River at Crookston, Minn.

LOCATION.--Lat 47°46'32", long 96°36'33", in SW¼SW¼ sec.30, T.150 N., R.46 W., Polk County, on right bank at downstream side of highway bridge in Crookston, 0.3 mile downstream from Interstate Power Co.'s dam, 0.6 mile downstream from bridge on U.S. Highway 75, and 53 miles above mouth.

DRAINAGE AREA.--5,280 sq mi, approximately.

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

GAGE.--Water-stage recorder. Datum of gage is 832.72 ft above mean sea level, datum of 1929. May 18, 1901, to June 30, 1909, nonrecording gage at bridge 300 ft upstream at same datum. July 1, 1909, to Sept. 25, 1911, nonrecording gage, Sept. 26, 1911, to Sept. 30, 1919, water-stage recorder, Oct. 1, 1919, to Sept. 30, 1930, nonrecording gage, at present site and datum.

AVERAGE DISCHARGE.--70 years, 1,069 cfs (774,500 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 15,300 cfs Apr. 10 (gage height, 20.74 ft); minimum, 291 cfs Nov. 24 (gage height, 3.31 ft, result of freezeup).
Period of record: Maximum discharge, 28,400 cfs Apr. 12, 1969 (gage height, 27.33 ft); no flow for part of July 13, 1960 (caused by regulation of power plant upstream).

REMARKS.--Records good except those for winter periods, which are fair. Diurnal fluctuation caused by power plant upstream. Flow partially regulated by outlet dam at Lower Red Lake.

REVISIONS (WATER YEARS).--WSP 1115: 1906, 1915-16, 1919-20, 1922, 1925, 1927, 1929. WSP 1308: 1916(M), 1919(M), 1928(M), 1930(M). See also PERIOD OF RECORD.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	937	1,340	935	790	755	920	2,000	1,670	1,410	921	703	550
2	944	1,450	900	795	760	920	2,780	1,620	1,350	875	694	601
3	933	1,570	870	800	770	920	2,470	1,600	1,300	841	672	663
4	912	1,550	830	800	795	930	2,150	1,490	1,270	808	672	634
5	911	1,470	805	805	805	930	1,960	1,410	1,210	761	654	717
6	935	1,240	790	810	805	925	2,440	1,370	1,170	794	645	936
7	954	1,090	775	810	805	925	3,270	1,380	1,160	886	632	973
8	942	1,060	765	805	810	920	4,620	1,340	1,130	855	632	1,000
9	946	1,020	755	805	810	920	7,000	1,250	1,130	831	632	906
10	971	995	745	800	815	920	11,000	1,320	1,130	817	645	790
11	899	995	740	795	815	920	7,600	1,310	1,160	808	636	695
12	847	980	740	790	815	915	5,070	1,070	1,160	812	623	634
13	844	960	745	785	810	915	3,650	1,110	1,180	822	667	572
14	814	736	770	785	835	920	2,890	1,150	1,170	767	689	522
15	835	627	780	780	860	930	2,310	1,190	1,190	771	663	479
16	842	653	790	775	910	935	2,010	1,190	1,220	730	672	459
17	829	800	795	765	925	945	1,800	1,170	1,170	680	715	437
18	804	987	800	760	935	960	1,950	1,200	1,070	707	786	430
19	790	1,110	800	750	935	990	2,130	1,170	1,060	786	793	415
20	801	1,020	795	745	930	1,030	2,160	1,150	1,200	730	773	398
21	858	751	785	745	930	1,100	2,230	1,140	1,210	845	745	398
22	968	610	780	740	930	1,150	2,320	1,130	1,270	874	723	391
23	954	424	780	740	925	1,110	2,190	1,240	1,290	836	670	385
24	949	338	775	735	925	1,060	1,910	1,380	1,180	808	642	385
25	971	366	775	735	925	1,020	1,760	1,880	1,100	798	605	385
26	976	449	770	740	920	1,000	1,670	2,330	1,070	775	585	389
27	1,000	764	770	745	920	1,000	1,590	2,360	1,080	907	586	391
28	1,020	936	775	745	920	1,000	1,650	1,910	1,040	580	571	406
29	1,030	1,030	780	755	------	1,020	1,640	1,700	1,020	739	559	414
30	1,200	973	785	760	------	1,030	1,630	1,560	985	703	543	539
31	1,320	------	790	755	------	1,300	------	1,480	------	694	530	------
TOTAL	28,906	28,294	24,490	23,945	24,095	30,480	89,850	44,270	35,065	24,560	20,357	16,894
MEAN	932	943	790	772	861	983	2,995	1,428	1,170	792	657	563
MAX	1,320	1,570	935	810	935	1,300	11,000	2,360	1,410	921	793	1,000
MIN	790	338	740	735	755	915	1,590	1,070	985	580	530	385
AC-FT	57,340	56,120	48,580	47,490	47,790	60,460	178,200	87,810	69,590	48,710	40,380	33,510

CAL YR 1970 TOTAL 689,437 MEAN 1,889 MAX 13,100 MIN 338 AC-FT 1,367,000
WTR YR 1971 TOTAL 391,226 MEAN 1,072 MAX 11,000 MIN 338 AC-FT 776,000

05082500 Red River of the North at Grand Forks, N. Dak.

LOCATION.--Lat 47°56'34", long 97°03'10", in SW¼NE¼ sec.33, T.152 N., R.50 W., Grand Forks County, on left bank on second floor of old sewage plant in Grand Forks, 2.3 miles downstream from Red Lake River, and at mile 296.0.

DRAINAGE AREA.--30,100 sq mi, approximately (includes 3,800 sq mi in closed basins).

PERIOD OF RECORD.--April 1882 to current year. Monthly discharge only prior to May 1901, published in WSP 1308.

GAGE.--Water-stage recorder. Datum of gage is 778.35 ft above mean sea level. Nov. 3, 1933, to Apr. 13, 1965, water-stage recorder 0.3 mile upstream at present datum. See WSP 1728 or 1913 for history of changes prior to Nov. 3, 1933.

AVERAGE DISCHARGE.--89 years, 2,435 cfs (1,764,000 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 15,800 cfs Apr. 11 (gage height, 27.86 ft); minimum, 696 cfs Sept. 27-30 (gage height, 4.69 ft).
Period of record: Maximum discharge about 80,000 cfs Apr. 10, 1897 (gage height, 50.2 ft, site and datum then in use), from rating curve extended above 54,000 cfs; minimum, 2.4 cfs Feb. 3-5, 12, 14, 16-19, 1937 (caused by unusual regulation during repair of dam at Grand Forks).

REMARKS.--Records good. Flow regulated by many lakes and reservoirs on tributaries. Records of chemical analyses and water temperatures for the current year are published in Part 2 of Water Resources Data for North Dakota.

REVISIONS (WATER YEARS).--WSP 855: 1936(M). WSP 1115: 1942. WSP 1175: 1897(M). WSP 1388: 1904, 1914-15, 1917-19, 1921-22, 1927, 1950. WSP 1728: Drainage area.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1,110	1,660	1,250	1,100	1,100	1,250	5,500	4,440	2,560	2,190	1,410	756
2	1,100	1,740	1,300	1,100	1,100	1,250	7,000	4,510	2,470	2,190	1,380	746
3	1,100	1,800	1,300	1,100	1,100	1,250	7,750	4,500	2,410	2,200	1,340	812
4	1,070	1,910	1,250	1,100	1,100	1,250	7,600	4,460	2,340	2,160	1,280	882
5	1,060	1,940	1,250	1,100	1,100	1,300	7,300	4,370	2,320	2,120	1,210	1,020
6	1,030	1,940	1,200	1,100	1,100	1,300	7,050	4,140	2,280	2,110	1,140	1,150
7	1,020	1,850	1,150	1,100	1,100	1,300	7,650	3,800	2,240	2,120	1,090	1,860
8	1,020	1,660	1,150	1,100	1,150	1,300	9,600	3,480	2,200	2,370	1,050	2,380
9	1,040	1,560	1,150	1,100	1,150	1,300	12,400	3,230	2,150	2,780	1,020	2,550
10	1,080	1,510	1,150	1,100	1,150	1,350	14,800	3,050	2,130	2,960	1,010	2,530
11	1,140	1,490	1,100	1,100	1,150	1,350	15,800	2,950	2,140	2,940	1,010	2,350
12	1,170	1,490	1,100	1,100	1,100	1,350	14,600	2,900	2,160	2,890	984	2,070
13	1,140	1,490	1,100	1,100	1,100	1,350	12,400	2,630	2,130	2,720	1,010	1,770
14	1,120	1,420	1,050	1,100	1,100	1,450	9,950	2,510	2,110	2,570	1,020	1,620
15	1,100	1,260	1,050	1,100	1,150	1,600	7,900	2,440	2,060	2,420	1,020	1,450
16	1,070	1,170	1,100	1,100	1,150	1,650	6,200	2,420	2,020	2,260	1,000	1,290
17	1,070	1,180	1,100	1,100	1,150	1,700	5,100	2,370	2,020	2,160	1,010	1,150
18	1,100	1,330	1,100	1,100	1,150	1,750	4,500	2,330	1,990	2,240	1,020	1,060
19	1,090	1,420	1,100	1,100	1,200	1,900	4,280	2,290	1,940	2,170	1,050	992
20	1,060	1,500	1,100	1,100	1,200	2,050	4,220	2,280	1,940	2,040	1,060	942
21	1,060	1,390	1,100	1,100	1,200	2,400	4,210	2,220	2,060	1,930	1,050	903
22	1,070	1,400	1,100	1,100	1,200	3,000	4,150	2,160	2,180	1,860	1,010	858
23	1,160	1,050	1,100	1,100	1,200	3,800	4,130	2,180	2,210	1,830	984	830
24	1,190	950	1,100	1,100	1,200	4,700	4,130	2,260	2,260	1,760	952	802
25	1,200	1,000	1,100	1,100	1,200	4,900	4,020	2,330	2,240	1,700	917	756
26	1,190	950	1,100	1,100	1,200	4,950	3,980	2,660	2,160	1,620	896	710
27	1,210	1,000	1,100	1,100	1,250	4,800	4,010	3,140	2,110	1,570	837	696
28	1,220	1,050	1,100	1,100	1,250	4,600	4,070	3,340	2,110	1,610	802	696
29	1,260	1,150	1,100	1,100	------	4,250	4,210	3,140	2,140	1,500	794	696
30	1,340	1,200	1,100	1,100	------	4,200	4,360	2,860	2,170	1,420	766	732
31	1,480	------	1,100	1,100	------	4,500	------	2,680	------	1,420	749	------
TOTAL	35,070	42,460	35,150	34,100	32,300	75,100	212,870	94,070	65,250	65,830	31,871	37,059
MEAN	1,131	1,415	1,134	1,100	1,154	2,423	7,096	3,035	2,175	2,124	1,028	1,235
MAX	1,480	1,940	1,300	1,100	1,250	4,950	15,800	4,510	2,560	2,960	1,410	2,550
MIN	1,020	950	1,050	1,100	1,100	1,250	3,980	2,160	1,940	1,420	749	696
AC-FT	69,560	84,220	69,720	67,640	64,070	149,000	422,200	186,600	129,400	130,600	63,220	73,510

CAL YR 1970 TOTAL 1,383,295 MEAN 3,790 MAX 23,600 MIN 903 AC-FT 2,744,000
WTR YR 1971 TOTAL 761,130 MEAN 2,085 MAX 15,800 MIN 696 AC-FT 1,510,000

05087500 Middle River at Argyle, Minn.

LOCATION.--Lat 48°20'27", long 96°49'02", in SE¼SW¼ sec. 10, T.156 N., R.48 W., Marshall County, on left bank 20 ft upstream from bridge on U.S. Highway 75 in Argyle and 14 miles upstream from mouth.

DRAINAGE AREA.--265 sq mi.

PERIOD OF RECORD.--March to September 1945, October 1950 to current year. Monthly discharge only for some periods, published in WSP 1728.

GAGE.--Water-stage recorder. Datum of gage is 828.53 ft above mean sea level, datum of 1929. Prior to Nov. 8, 1951, nonrecording gages and Nov. 8, 1951, to Sept. 18, 1952, water-stage recorder at present site at datum 1.0 ft higher.

AVERAGE DISCHARGE.--21 years (1950-71), 44.7 cfs (32,390 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 773 cfs Apr. 9 (gage height, 11.74 ft, from floodmark, backwater from ice); no flow for many days in August and September.
Period of record: Maximum discharge, 2,590 cfs Apr. 12, 1965 (gage height, 15.29 ft); maximum gage height, 16.00 ft Apr. 3, 1966 (backwater from ice); no flow at times in most years.
Flood of April 1950 reached a stage of 15.25 ft, present datum, from floodmarks (discharge, 2,790 cfs).

REMARKS.--Records fair.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.30	4.1	3.1	1.7	1.5	1.6	13	51	28	4.2	1.5	.20
2	.46	3.4	3.0	1.7	1.5	1.6	18	46	25	4.2	1.2	0
3	.77	2.9	2.9	1.7	1.5	1.6	27	42	21	4.1	.90	0
4	.64	2.8	2.8	1.7	1.5	1.5	40	37	19	4.0	.70	0
5	.45	2.9	2.8	1.6	1.5	1.5	60	33	17	4.0	.50	.50
6	.50	2.8	2.7	1.6	1.4	1.5	100	31	14	3.8	.40	.40
7	.82	4.5	2.7	1.6	1.4	1.5	160	29	13	3.8	.40	.40
8	1.2	9.2	2.6	1.6	1.4	1.5	270	28	11	3.7	.30	.40
9	1.7	9.7	2.5	1.6	1.4	1.5	680	27	11	3.3	.20	.30
10	2.8	8.5	2.5	1.6	1.4	1.6	590	25	9.3	3.1	.20	.20
11	2.2	7.1	2.4	1.5	1.4	1.7	475	24	8.5	3.0	.10	.20
12	1.8	6.2	2.4	1.5	1.4	2.0	360	23	8.7	3.7	.10	.10
13	2.6	5.4	2.3	1.5	1.4	3.0	310	22	8.5	3.7	.20	0
14	2.8	5.0	2.3	1.5	1.4	5.0	250	20	8.7	3.4	.20	0
15	3.0	4.7	2.2	1.5	1.4	8.0	200	19	11	3.4	.20	0
16	3.2	4.6	2.2	1.5	1.4	9.0	170	18	16	4.0	.10	0
17	3.0	4.5	2.2	1.5	1.4	10	150	17	14	3.6	.20	0
18	2.7	4.5	2.1	1.5	1.4	10	130	16	12	4.1	.10	0
19	2.8	4.4	2.1	1.5	1.4	11	110	15	11	5.5	.20	0
20	2.6	4.2	2.1	1.5	1.4	11	100	15	14	4.7	.20	0
21	2.8	4.1	2.0	1.5	1.4	11	90	14	16	4.0	.10	0
22	2.9	3.9	2.0	1.5	1.4	10	80	14	13	3.6	0	0
23	2.3	3.8	1.9	1.5	1.4	10	72	15	11	3.2	0	0
24	1.9	3.6	1.9	1.5	1.4	9.5	63	17	9.5	2.8	.10	0
25	1.9	3.4	1.9	1.5	1.4	9.2	55	17	7.5	2.6	0	0
26	2.0	3.2	1.9	1.5	1.6	9.0	54	23	6.5	2.3	0	0
27	2.1	3.1	1.8	1.5	1.7	8.5	57	51	5.6	2.0	0	0
28	2.1	3.0	1.8	1.5	1.6	8.5	61	52	4.9	1.8	0	0
29	2.5	3.0	1.8	1.5	------	9.0	59	47	4.5	1.7	0	0
30	2.2	3.1	1.8	1.5	------	9.5	56	40	4.3	2.0	0	0
31	5.1	------	1.8	1.5	------	11	------	33	------	1.8	0	------
TOTAL	64.14	135.6	70.5	47.9	40.4	191.3	4,860	861	363.5	105.1	8.10	2.70
MEAN	2.07	4.52	2.27	1.55	1.44	6.17	162	27.8	12.1	3.39	.26	.090
MAX	5.1	9.7	3.1	1.7	1.7	11	680	52	28	5.5	1.5	.50
MIN	.30	2.8	1.8	1.5	1.4	1.5	13	14	4.3	1.7	0	0
AC-FT	127	269	140	95	80	379	9,640	1,710	721	208	16	5.4

CAL YR 1970 TOTAL 40,291.64 MEAN 110 MAX 1,950 MIN 0 AC-FT 79,920
WTR YR 1971 TOTAL 6,750.24 MEAN 18.5 MAX 680 MIN 0 AC-FT 13,390

NOTE.--No gage-height record Apr. 9-12.

05092000 Red River of the North at Drayton, N. Dak.

LOCATION.--Lat 48°34'20", long 97°08'50", in SE¼SE¼SE¼ sec.24, T.159 N., R.51 W., Pembina County, on downstream end of east pier of interstate highway bridge, 1.5 miles northeast of Drayton and at mile 206.7.

DRAINAGE AREA.--34,800 sq mi, approximately (includes 3,800 sq mi in closed basins).

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

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

AVERAGE DISCHARGE.--22 years (1949-71) 3,665 cfs (2,655,000 acre-ft per year); median of yearly mean discharges, 2,630 cfs (1,910,000 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 23,400 cfs Apr. 11; maximum gage height 31.75 ft Apr. 14; minimum discharge, 685 cfs Nov. 22 (gage height, 9.55 ft).
Period of record: Maximum discharge, 86,500 cfs May 12, 1950 (gage height, 41.58 ft, former site and datum); minimum observed, 7.7 cfs Oct. 16, 1936 (gage height, 1.75 ft, former site and datum).
Maximum discharge known since 1860, that of May 12, 1950. Flood of April 1897 reached a stage of about 41 ft, at site and datum in use prior to Nov. 30, 1954.

REMARKS.--Records good. Some regulation by reservoirs on tributaries. Records of water temperatures for the current year are published in Part 2 of Water Resources Data for North Dakota.

REVISIONS (WATER YEARS).--WSP 1388: 1949-50. WSP 1728: Drainage area.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1,170	1,370	980	1,120	1,000	1,310	6,450	4,780	3,190	2,350	1,530	890
2	1,150	1,530	1,080	1,120	990	1,310	6,820	4,780	3,000	2,400	1,510	860
3	1,150	1,670	1,160	1,110	1,070	1,320	7,300	4,790	2,850	2,450	1,490	880
4	1,110	1,790	1,200	1,110	1,030	1,330	7,820	4,800	2,750	2,460	1,450	950
5	1,090	1,880	1,200	1,110	1,050	1,340	8,020	4,800	2,650	2,450	1,400	1,100
6	1,070	1,990	1,190	1,110	1,050	1,350	8,400	4,750	2,600	2,410	1,320	1,170
7	1,050	2,060	1,160	1,120	1,050	1,350	8,950	4,610	2,560	2,350	1,250	1,230
8	1,020	2,030	1,140	1,120	1,050	1,350	10,700	4,400	2,520	2,300	1,200	1,500
9	990	1,880	1,110	1,110	1,050	1,350	16,700	4,150	2,500	2,300	1,130	2,280
10	1,030	1,730	1,090	1,100	1,050	1,370	22,400	3,850	2,450	2,500	1,090	2,800
11	1,030	1,620	1,090	1,100	1,050	1,380	23,300	3,700	2,400	3,000	1,080	2,960
12	1,030	1,550	1,080	1,100	1,050	1,390	22,300	3,500	2,400	3,490	1,040	2,830
13	1,070	1,500	1,080	1,100	1,100	1,400	21,100	3,400	2,400	3,460	1,050	2,590
14	1,120	1,490	1,050	1,100	1,100	1,400	20,200	3,250	2,350	3,300	1,050	2,250
15	1,100	1,460	1,050	1,100	1,100	1,410	19,300	3,110	2,310	3,090	1,060	1,970
16	1,080	1,380	1,040	1,080	1,100	1,600	17,700	2,980	2,280	2,920	1,040	1,740
17	1,050	1,260	1,050	1,060	1,150	1,800	15,100	2,890	2,270	2,760	1,070	1,530
18	1,050	1,200	1,050	1,040	1,200	1,930	12,200	2,860	2,250	2,600	1,080	1,380
19	1,050	1,200	1,060	1,040	1,200	2,100	10,000	2,780	2,240	2,620	1,080	1,230
20	1,060	1,280	1,070	1,040	1,200	2,200	8,400	2,710	2,210	2,650	1,090	1,130
21	1,060	1,120	1,080	1,040	1,200	2,400	7,550	2,660	2,200	2,580	1,110	1,070
22	1,050	766	1,080	1,020	1,200	2,600	7,150	2,600	2,170	2,540	1,110	1,030
23	1,060	739	1,080	1,020	1,200	2,950	6,950	2,540	2,170	2,370	1,110	970
24	1,080	840	1,080	1,020	1,250	3,600	6,700	2,500	2,160	2,250	1,080	960
25	1,170	920	1,080	1,020	1,250	4,650	6,300	2,480	2,200	2,130	1,080	920
26	1,200	920	1,090	1,010	1,300	5,400	5,850	2,480	2,300	2,060	1,050	880
27	1,220	900	1,090	1,000	1,310	5,900	5,450	2,480	2,400	1,920	1,010	850
28	1,220	880	1,100	1,000	1,310	6,050	5,050	2,900	2,440	1,820	960	830
29	1,220	870	1,110	1,000	------	6,100	4,870	3,350	2,350	1,750	910	811
30	1,220	890	1,130	1,000	------	6,050	4,790	3,600	2,300	1,730	890	793
31	1,290	------	1,140	1,000	------	6,150	------	3,400	------	1,600	880	------
TOTAL	34,260	40,715	33,990	33,020	31,660	81,840	333,820	107,880	72,870	76,610	35,200	42,384
MEAN	1,105	1,357	1,096	1,065	1,131	2,640	11,130	3,480	2,429	2,471	1,135	1,413
MAX	1,290	2,060	1,200	1,120	1,310	6,150	23,300	4,800	3,190	3,490	1,530	2,960
MIN	990	739	980	1,000	990	1,310	4,790	2,480	2,160	1,600	880	793
AC-FT	67,950	80,760	67,420	65,500	62,800	162,300	662,100	214,000	144,500	152,000	69,820	84,070

CAL YR 1970 TOTAL 1,751,785 MEAN 4,799 MAX 31,600 MIN 739 AC-FT 3,475,000
WTR YR 1971 TOTAL 924,249 MEAN 2,532 MAX 23,300 MIN 739 AC-FT 1,833,000

05094000 South Branch Two Rivers at Lake Bronson, Minn.

LOCATION.--Lat 48°43'50", long 96°39'50", in SW¼SW¼ sec.30, T.161 N., R.46 W., Kittson County, on left bank 70 ft upstream from culvert on U.S. Highway 59 at town of Lake Bronson and 2 miles downstream from dam at outlet of Bronson Lake.

DRAINAGE AREA.--444 sq mi.

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

GAGE.--Water-stage recorder. Datum of gage is 928.53 ft above mean sea level, datum of 1929 (Minnesota Highway Department bench mark). Prior to Nov. 23, 1953, nonrecording gage at bridge 100 ft downstream at datum 2.00 ft higher. Nov. 23, 1953, to Oct. 5, 1963, water-stage recorder at same site at datum 2.00 ft higher.

AVERAGE DISCHARGE.--30 years (1928-36, 1941-43, 1945-47, 1953-71), 94.5 cfs (68,500 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 1,500 cfs Apr. 8 (gage height, 9.00 ft); maximum gage height, 9.90 ft Mar. 31 (backwater from ice); minimum discharge, 0.5 cfs Aug. 24, 25.
Period of record: Maximum discharge, 5,410 cfs Apr. 5, 1966 (gage height, 18.23 ft); no flow at times in 1937, 1941, 1960.

REMARKS.--Records good except those for winter periods, which are fair. Flow partly regulated since 1937 by Bronson Lake (usable capacity, 3,700 acre-ft).

REVISIONS (WATER YEARS).--WSP 1308: 1929(M), 1931(M), 1936(M), 1944(M), 1947(M).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7.4	47	5.1	4.1	2.4	3.1	180	135	33	5.8	3.8	2.6
2	7.1	59	5.0	4.1	2.4	3.1	80	135	28	5.6	3.8	2.9
3	7.2	74	5.0	4.1	2.3	3.2	75	130	24	5.7	3.7	1.3
4	12	85	4.9	4.0	2.3	3.3	90	89	24	5.5	3.6	1.5
5	12	84	4.8	4.0	2.3	3.5	210	115	23	4.8	3.5	1.7
6	11	237	4.8	4.0	2.3	3.6	300	144	21	4.7	3.4	1.6
7	9.7	24	4.7	4.0	2.3	3.6	420	42	19	5.7	3.7	1.6
8	9.5	22	4.7	4.0	2.3	3.7	960	14	17	4.4	3.7	1.7
9	8.9	4.9	4.7	3.9	2.3	3.9	1,370	27	15	4.4	3.7	1.8
10	10	12	4.6	3.9	2.3	4.1	1,240	44	13	4.9	2.3	1.9
11	9.2	24	4.6	3.9	2.3	4.3	1,290	50	13	5.4	1.3	2.0
12	9.7	29	4.6	3.8	2.3	4.5	1,290	50	15	7.3	1.1	1.8
13	10	26	4.6	3.8	2.3	4.8	1,150	45	14	7.3	1.2	1.8
14	9.8	24	4.6	3.8	2.4	5.0	854	40	13	6.5	1.2	1.9
15	9.7	23	4.6	3.8	2.4	5.2	518	34	12	5.9	1.4	1.9
16	12	21	4.6	3.7	2.4	5.4	316	32	13	6.2	1.3	2.1
17	15	20	4.5	3.6	2.4	5.5	203	31	12	5.9	1.1	2.5
18	16	19	4.5	3.5	2.5	5.6	289	30	9.8	5.9	.98	2.3
19	16	173	4.5	3.4	2.5	5.6	726	28	9.1	5.0	1.3	2.3
20	16	5.5	4.5	3.3	2.6	5.7	956	27	8.3	4.8	1.2	2.1
21	17	4.0	4.4	3.3	2.6	5.8	858	26	7.5	4.8	1.1	1.9
22	18	3.6	4.4	3.3	2.7	5.8	583	27	7.1	4.6	1.1	1.9
23	22	4.1	4.4	3.3	2.8	5.8	331	30	7.1	4.1	.81	2.1
24	22	4.7	4.3	3.2	2.9	6.0	207	33	6.9	4.4	.66	2.0
25	20	5.4	4.3	3.1	3.0	7.6	215	135	6.6	4.2	.62	1.9
26	18	6.1	4.3	3.0	3.0	10	205	141	6.8	3.9	.73	1.9
27	20	6.8	4.2	2.9	3.0	50	190	9.9	6.7	4.0	46	1.9
28	24	6.3	4.2	2.8	3.1	120	150	30	6.5	4.0	2.3	1.6
29	32	5.6	4.1	2.7	------	130	108	45	6.4	4.1	1.1	33
30	38	5.2	4.1	2.6	------	200	134	47	6.3	4.0	1.0	2.0
31	42	------	4.1	2.5	------	370	------	41	------	4.1	1.2	------
TOTAL	491.2	1,065.2	140.7	109.4	70.4	997.7	15,498	1,806.9	404.1	157.9	103.90	89.5
MEAN	15.8	35.5	4.54	3.53	2.51	32.2	517	58.3	13.5	5.09	3.35	2.98
MAX	42	237	5.1	4.1	3.1	370	1,370	144	33	7.3	46	33
MIN	7.1	3.6	4.1	2.5	2.3	3.1	75	9.9	6.3	3.9	.62	1.3
AC-FT	974	2,110	279	217	140	1,980	30,740	3,580	802	313	206	178

CAL YR 1970 TOTAL 110,632.50 MEAN 303 MAX 3,970 MIN 1.4 AC-FT 219,400
WTR YR 1971 TOTAL 20,934.90 MEAN 57.4 MAX 1,370 MIN .62 AC-FT 41,520

NOTE.--No gage-height record Dec. 12 to Jan. 14, Jan. 16 to Feb. 24.

05102500 Red River of the North at Emerson, Manitoba

(International gaging station)

LOCATION.--Lat 49°00'30", long 97°12'40", in sec.2, T.1, R.2 E., on right bank 1,500 ft downstream from Canadian National Railway bridge in Emerson, 0.8 mile downstream from international boundary, 3.6 miles downstream from Pembina River, and at mile 154.3.

DRAINAGE AREA.--40,200 sq mi, approximately (includes 3,800 sq mi in closed basins).

PERIOD OF RECORD.--March to November 1902 (gage heights only), May 1912 to September 1929 (monthly discharge only, published in WSP 1308), October 1929 to current year.

GAGE.--Water-stage recorder. Datum of gage is 700.00 ft above mean sea level, datum of 1929, by Geodetic Survey of Canada. See WSP 1728 or 1913 for history of changes prior to Apr. 10, 1953.

AVERAGE DISCHARGE.--59 years (1912-71) 3,100 cfs (2,246,000 acre-ft per year); median of yearly mean discharges, 2,630 cfs (1,910,000 acre-ft per year).

EXTREMES.--Current year: Maximum daily discharge, 26,600 cfs Apr. 16; maximum gage height, 78.28 ft Apr. 15; minimum daily discharge, 887 cfs Sept. 30.
Period of record: Maximum discharge, 95,500 cfs May 13, 1950 (gage height, 90.89 ft); minimum observed, 0.9 cfs Feb. 6-8, 1937 (gage height, 44.00 ft).

REMARKS.--Records good. Discharge partially regulated by reservoirs on tributaries.

COOPERATION.--This station is one of the international gaging stations maintained by Canada under agreement with the United States.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1,390	1,430	1,120	1,000	968	1,130	5,150	8,330	4,340	2,890	2,020	1,080
2	1,350	1,480	1,080	1,020	962	1,130	5,380	8,210	4,140	2,900	1,960	1,070
3	1,320	1,570	1,090	1,040	957	1,120	5,750	8,140	3,930	2,930	1,900	1,050
4	1,310	1,710	1,150	1,040	951	1,120	6,330	8,070	3,740	2,950	1,860	1,030
5	1,300	1,860	1,230	1,050	947	1,130	7,050	7,960	3,590	2,930	1,830	1,060
6	1,270	1,990	1,290	1,060	948	1,140	7,820	7,810	3,470	2,890	1,790	1,140
7	1,240	2,100	1,310	1,070	954	1,140	8,710	7,620	3,380	2,850	1,720	1,250
8	1,230	2,210	1,300	1,080	959	1,130	10,300	7,370	3,310	2,820	1,660	1,320
9	1,200	2,290	1,280	1,090	965	1,110	12,600	7,030	3,230	2,780	1,580	1,480
10	1,180	2,200	1,230	1,100	959	1,110	15,500	6,610	3,150	2,830	1,510	1,950
11	1,180	2,050	1,180	1,110	952	1,110	19,200	6,220	3,100	3,070	1,450	2,450
12	1,200	1,920	1,130	1,110	959	1,120	21,600	5,910	3,240	3,430	1,410	2,720
13	1,210	1,800	1,090	1,100	975	1,130	23,500	5,620	3,300	3,680	1,380	2,730
14	1,240	1,700	1,050	1,100	973	1,140	25,000	5,350	3,310	3,750	1,360	2,610
15	1,300	1,660	996	1,090	970	1,190	26,200	5,050	3,260	3,670	1,340	2,390
16	1,330	1,660	966	1,080	976	1,220	26,600	4,760	3,200	3,510	1,330	2,160
17	1,310	1,630	944	1,080	990	1,270	24,600	4,510	3,190	3,340	1,340	1,940
18	1,270	1,550	935	1,070	999	1,340	22,000	4,330	3,180	3,180	1,330	1,750
19	1,260	1,450	936	1,070	1,010	1,440	20,300	4,180	3,140	3,050	1,340	1,600
20	1,250	1,360	953	1,040	1,010	1,550	18,800	4,070	3,050	2,980	1,340	1,460
21	1,240	1,360	984	1,010	1,010	1,670	17,400	3,970	2,950	2,960	1,330	1,340
22	1,240	1,570	1,010	1,000	1,030	1,790	16,100	3,870	2,880	2,920	1,330	1,250
23	1,240	1,620	1,030	995	1,050	1,960	14,700	3,780	2,840	2,850	1,330	1,180
24	1,250	1,610	1,050	982	1,080	2,220	13,400	3,690	2,880	2,740	1,330	1,120
25	1,250	1,540	1,070	958	1,080	2,680	12,100	3,630	2,950	2,610	1,310	1,080
26	1,280	1,470	1,080	945	1,090	3,360	11,000	3,610	2,990	2,510	1,310	1,030
27	1,330	1,420	1,080	940	1,110	4,020	10,100	3,660	3,000	2,420	1,280	989
28	1,370	1,350	1,090	938	1,130	4,520	9,370	3,830	2,980	2,300	1,230	946
29	1,390	1,270	1,080	944	------	4,810	8,870	4,080	2,940	2,200	1,190	909
30	1,400	1,170	1,080	956	------	4,940	8,560	4,360	2,900	2,130	1,140	887
31	1,400	------	1,110	968	------	5,010	------	4,450	------	2,100	1,100	------
TOTAL	39,730	50,000	33,924	32,036	27,964	60,750	433,990	170,080	97,560	90,170	45,330	44,971
MEAN	1,282	1,667	1,094	1,033	999	1,960	14,470	5,486	3,252	2,909	1,462	1,499
MAX	1,400	2,290	1,310	1,110	1,130	5,010	26,600	8,330	4,340	3,750	2,020	2,730
MIN	1,180	1,170	935	938	947	1,110	5,150	3,610	2,840	2,100	1,100	887
AC-FT	78,800	99,180	67,290	63,540	55,470	120,500	860,800	337,400	193,500	178,900	89,910	89,200

CAL YR 1970 TOTAL 2,315,914 MEAN 6,345 MAX 39,600 MIN 935 AC-FT 4,594,000
WTR YR 1971 TOTAL 1,126,505 MEAN 3,086 MAX 26,600 MIN 887 AC-FT 2,234,000

05104500 Roseau River below South Fork near Malung, Minn.

LOCATION.--Lat 48°47'30", long 95°44'40", in SW¼ sec.6, T.161 N., R.39 W., Roseau County, on left bank 0.3 mile downstream from South Fork and 1.5 miles northwest of Malung.

DRAINAGE AREA.--573 sq mi.

PERIOD OF RECORD.--October 1946 to current year.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 1,029.67 ft above mean sea level, adjustment of 1912.

AVERAGE DISCHARGE.--25 years, 157 cfs (113,700 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 1,670 cfs Apr. 8 (gage height, 14.44 ft, backwater from ice); minimum, 1.6 cfs Sept. 26, 27 (gage height, 4.47 ft).
Period of record: Maximum discharge, 5,750 cfs July 18, 1968 (gage height, 22.32 ft); maximum gage height, 23.37 ft Apr. 3, 1966, backwater from ice; no flow for part of Jan. 15, 1952 (caused by construction of concrete control) and July 23 to Sept. 8, 1961.

REMARKS.--Records good except those for winter periods, which are fair.

REVISIONS (WATER YEARS).--WRD MINN 1970: 1948, 1950, 1951, 1956(M), 1957(M), 1962(M), 1966(M), 1967(M), 1968.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	12	153	26	14	8.5	7.2	25	259	142	74	14	2.3
2	13	204	25	14	8.3	7.0	37	252	124	59	12	3.1
3	11	230	24	14	8.1	7.0	45	241	109	46	11	3.7
4	9.6	239	22	13	7.8	7.1	48	231	94	44	10	3.8
5	8.4	230	21	12	7.6	7.6	80	212	83	39	8.5	4.7
6	8.6	195	20	14	7.5	7.6	250	207	79	32	7.6	4.7
7	8.3	175	19	13	7.3	7.3	650	204	69	32	6.8	3.0
8	7.8	165	18	12	7.2	7.1	1,580	190	61	28	6.2	2.0
9	9.5	162	17	14	6.8	7.6	1,400	176	58	23	5.8	2.0
10	11	155	16	14	6.6	7.3	1,280	164	53	20	3.5	2.0
11	10	143	16	14	7.0	7.3	1,200	151	51	17	3.0	2.1
12	18	113	16	14	7.0	7.3	1,110	139	50	15	3.2	2.0
13	19	89	15	14	6.6	7.3	1,050	128	53	19	3.2	1.9
14	21	72	15	14	7.0	7.8	914	118	62	23	3.4	2.1
15	27	63	15	13	7.0	7.1	720	101	55	22	3.2	2.4
16	30	58	15	13	7.3	7.3	594	98	51	19	3.2	2.4
17	36	52	15	12	7.3	8.5	562	89	55	15	2.7	2.7
18	38	48	15	12	7.1	8.8	560	89	50	16	2.3	2.8
19	34	43	14	12	6.8	8.8	708	92	45	16	2.6	2.8
20	39	39	14	12	7.2	9.3	668	90	48	15	2.8	2.7
21	44	37	15	11	7.0	9.3	626	87	55	14	2.7	2.8
22	41	36	15	11	6.8	11	582	85	52	12	2.7	2.4
23	33	35	14	11	6.8	13	522	89	48	11	2.7	2.3
24	31	34	14	11	6.8	15	456	124	41	9.9	2.8	2.1
25	34	33	13	11	7.2	16	388	224	36	8.5	3.0	2.0
26	37	32	14	9.9	7.3	14	344	332	33	9.0	3.2	1.8
27	49	31	14	9.6	7.3	14	313	348	30	9.6	3.0	1.6
28	62	30	14	9.3	7.3	13	290	313	50	10	2.4	1.8
29	91	28	14	9.2	------	14	271	259	105	14	2.2	2.1
30	103	27	14	8.7	------	16	263	210	94	16	1.9	3.0
31	115	------	14	8.6	------	18	------	171	------	14	1.9	------
TOTAL	1,011.2	2,951	513	374.3	202.5	305.6	17,536	5,473	1,936	702.0	143.5	77.1
MEAN	32.6	98.4	16.5	12.1	7.23	9.86	585	177	64.5	22.6	4.63	2.57
MAX	115	239	26	14	8.5	18	1,580	348	142	74	14	4.7
MIN	7.8	27	13	8.6	6.6	7.0	25	85	30	8.5	1.9	1.6
AC-FT	2,010	5,850	1,020	742	402	606	34,780	10,860	3,840	1,390	285	153

CAL YR 1970 TOTAL 90,360.10 MEAN 248 MAX 2,080 MIN .90 AC-FT 179,200
WTR YR 1971 TOTAL 31,225.20 MEAN 85.5 MAX 1,580 MIN 1.6 AC-FT 61,940

05106000 Sprague Creek near Sprague, Manitoba

(International gaging station)

LOCATION.--Lat 48°59'33", long 95°39'43", in NE¼ sec.34, T.164 N., R.39 W., Roseau County, on left bank 0.5 mile south of international boundary, 3.5 miles south of Sprague, Manitoba, 8 miles upstream from mouth, and 10.5 miles northeast of Roseau, Minn.

DRAINAGE AREA.--169 sq mi. Prior to October 1958, 151 sq mi; change due to construction of drainage ditch within basin.

PERIOD OF RECORD.--September 1928 to current year (winter records incomplete prior to 1941). Prior to September 1951, published as Mud Creek near Sprague.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 1,038.4 ft above mean sea level, adjustment of 1928 by Geodetic Survey of Canada. Prior to Mar. 15, 1929, nonrecording gage at same site and datum.

AVERAGE DISCHARGE.--32 years (1928-29, 1940-71), 62.0 cfs (44,920 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 344 cfs Apr. 19 (gage height, 7.85 ft); maximum gage height, 7.96 ft Apr. 8 (backwater from ice); minimum daily discharge, 1.4 cfs Feb. 16-26.
Period of record: Maximum discharge, 2,070 cfs Sept. 1, 1942 (gage height, 15.31 ft), from rating curve extended above 960 cfs; no flow at times in some years.

REMARKS.--Records good except those for winter periods, which are fair.

COOPERATION.--This station is maintained by the United States under agreement with Canada.

REVISIONS (WATER YEARS).--WSP 1055: 1944. WSP 1308: 1931(M).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.9	56	8.6	3.8	2.3	1.5	20	183	60	36	36	4.2
2	5.0	65	9.3	3.8	2.2	1.6	25	178	45	43	31	7.5
3	4.7	67	9.8	3.6	2.1	1.6	20	166	39	38	24	9.7
4	4.3	57	9.6	3.4	2.1	1.6	15	152	35	48	23	7.7
5	3.9	50	9.3	3.1	2.0	1.6	20	140	48	54	20	7.5
6	3.5	46	8.8	2.9	1.9	1.6	45	126	94	39	14	8.8
7	3.3	42	8.2	3.0	1.9	1.6	165	114	132	40	14	9.7
8	3.0	37	7.3	2.9	1.8	1.7	265	108	129	41	13	9.5
9	3.1	33	6.7	3.1	1.8	1.7	240	99	104	32	10	8.1
10	3.9	28	6.0	3.0	1.7	1.7	275	90	85	23	8.3	8.1
11	4.0	24	5.2	2.8	1.7	1.7	234	80	86	18	11	9.3
12	5.0	19	5.0	2.8	1.6	1.7	184	70	103	23	6.4	9.7
13	10	16	4.6	2.8	1.6	1.8	139	65	135	71	6.0	8.3
14	14	15	4.3	2.8	1.5	1.8	109	62	116	62	5.4	6.0
15	13	14	4.2	2.8	1.5	1.8	120	62	93	48	4.9	5.1
16	13	13	4.1	2.8	1.4	1.9	120	55	77	37	4.5	4.3
17	12	12	4.3	2.8	1.4	1.9	122	65	68	29	4.2	7.5
18	11	12	3.7	2.9	1.4	1.9	133	76	60	24	4.5	8.1
19	10	11	4.4	2.8	1.4	2.0	294	69	55	23	7.2	5.8
20	9.0	11	4.2	2.7	1.4	2.0	310	60	55	27	7.4	4.8
21	8.0	10	3.9	2.7	1.4	2.1	295	47	49	28	6.4	4.3
22	6.9	9.5	3.8	2.7	1.4	2.2	291	48	43	22	6.0	4.5
23	14	9.0	3.7	2.6	1.4	2.4	267	80	36	17	4.8	4.2
24	16	8.7	3.7	2.6	1.4	2.5	227	121	32	18	4.5	3.6
25	16	8.5	3.6	2.6	1.4	2.6	198	159	29	25	4.3	3.4
26	17	8.2	3.6	2.5	1.4	2.7	181	156	27	31	4.7	3.1
27	27	8.0	3.7	2.5	1.5	2.7	165	115	27	36	6.1	3.2
28	41	6.3	3.8	2.5	1.5	2.6	153	100	27	54	5.5	3.4
29	40	5.9	3.9	2.4	------	2.4	148	84	24	65	4.4	3.5
30	39	4.3	3.9	2.4	------	3.1	160	71	25	53	3.4	4.1
31	41	------	3.8	2.3	------	8.3	------	65	------	41	3.2	------
TOTAL	406.5	706.4	169.0	88.4	46.1	68.3	4,940	3,066	1,938	1,146	308.1	187.0
MEAN	13.1	23.5	5.45	2.85	1.65	2.20	165	98.9	64.6	37.0	9.94	6.23
MAX	41	67	9.8	3.8	2.3	8.3	310	183	135	71	36	9.7
MIN	3.0	4.3	3.6	2.3	1.4	1.5	15	47	24	17	3.2	3.1
AC-FT	806	1,400	335	175	91	135	9,800	6,080	3,840	2,270	611	371

CAL YR 1970 TOTAL 35,340.6 MEAN 96.8 MAX 1,150 MIN 1.3 AC-FT 70,100
WTR YR 1971 TOTAL 13,069.8 MEAN 35.8 MAX 310 MIN 1.4 AC-FT 25,920

05106500 Roseau River at Roseau Lake, Minn.

LOCATION.--Lat 48°54'22", long 95°49'55", in SW¼SW¼ sec.28, T.163 N., R.40 W., Roseau County, on downstream side of bridge near left bank at Roseau Lake, 3.5 miles upstream from Pine Creek, 3.8 miles downstream from Sprague Creek, and 7 miles northwest of Roseau.

PERIOD OF RECORD.--November 1939 to current year (incomplete).

GAGE.--Water-stage recorder. Datum of gage is 1,018.59 ft above mean sea level, adjustment of 1928 by Geodetic Survey of Canada. Prior to Aug. 26, 1970, nonrecording gage at same site and datum. Gage readings have been reduced to elevations above mean sea level.

EXTREMES.--Current year: Maximum elevation recorded, 1,031.50 ft Apr. 10; minimum recorded, 1,020.68 ft Sept. 28, 29.

Period of record: Maximum elevation observed, 1,036.86 ft May 13, 1950; minimum observed, 1,019.75 ft Aug. 16, 1941.

Flood of July 1919 reached an elevation of about 1,034 ft.

GAGE HEIGHT, IN FEET, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	21.45	23.97							24.19			20.81
2	21.39	24.50							23.76			20.89
3	21.39	24.91							23.39		21.56	20.99
4	21.37								23.05		21.49	21.04
5	21.34								22.99		21.41	21.09
6	21.30								23.27		21.34	
7	21.29						29.43		23.64		21.23	
8	21.28						30.92		23.65		21.20	
9	21.29						31.28		23.43		21.16	21.10
10	21.35						31.30		23.16		21.09	21.07
11	21.39						30.96		23.05		21.04	21.04
12	21.44						30.91				21.02	21.10
13	21.64						30.89		23.84		20.94	21.14
14	21.86						30.82				20.89	21.11
15	21.94						30.71				20.89	21.04
16	22.00						30.55				20.86	20.98
17	22.04						30.38		23.20		20.84	20.94
18	22.11						30.26		23.06		20.84	20.97
19	22.17						30.50		22.91		20.83	21.01
20	22.16						30.68		22.84		20.88	20.99
21	22.19								22.77		20.89	20.93
22	22.25								22.69		20.89	20.85
23	22.35								22.51		20.84	20.81
24	22.35								22.34		20.81	20.78
25	22.35								22.25		20.80	20.76
26	22.39							26.05	22.15		20.78	20.74
27	22.62							26.17	22.11		20.75	20.70
28	22.94							26.04			20.79	20.68
29	23.12				------			25.82	22.59		20.99	20.69
30	23.34				------			25.33			20.99	20.75
31	23.52	------			------		------	24.74	------		20.86	------
MEAN	21.99											
MAX	23.52											
MIN	21.28											

NOTE.--Add 1,000.00 ft to obtain elevation above mean sea level.

05107500 Roseau River at Ross, Minn.

LOCATION.--Lat 48°54'37", long 95°55'18", in SE¼ sec.27, T.163 N., R.41 W., Roseau County, on left bank 300 ft downstream from highway bridge, 0.2 mile north of Ross, and 2.3 miles downstream from Pine Creek.

DRAINAGE AREA.--1,220 sq mi, approximately.

PERIOD OF RECORD.--July 1928 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,018.44 ft above mean sea level, adjustment of 1928 by Geodetic Survey of Canada. Prior to Mar. 13, 1929, nonrecording gage at same site and datum.

AVERAGE DISCHARGE.--43 years, 269 cfs (194,900 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 1,520 cfs Apr. 14 (gage height, 11.36 ft); minimum, 6.2 cfs Sept. 28, 29 (gage height, 1.15 ft).
Period of record: Maximum discharge, 6,560 cfs May 12, 1950 (gage height, 18.25 ft); no flow Aug. 29, 30, 1961.
Maximum stage known, about 19 ft in 1896. Other outstanding floods reached the following stages (from information by local residents): flood of July 1919, 17.5 ft; flood of 1927, about 16 ft.

REMARKS.--Records good except those for winter periods, which are fair. High flow regulated by natural storage in Roseau Lake.

REVISIONS (WATER YEARS).--WSP 1055: 1945. WSP 1175: Drainage area. WSP 1308: 1936(M). WSP 1508: 1948-49(P).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	38	242	55	27	11	9.6	50	1,090	346	183	78	9.3
2	33	316	54	27	11	9.8	95	1,040	291	173	70	10
3	32	376	52	27	11	10	185	1,000	247	156	61	13
4	32	402	48	26	10	10	280	956	214	147	53	14
5	30	401	47	25	10	10	335	913	202	146	47	16
6	27	393	45	25	9.9	10	410	857	223	134	43	20
7	26	366	44	24	9.7	10	730	804	267	120	34	20
8	25	330	43	23	9.6	10	1,020	749	270	125	32	18
9	26	300	42	23	9.4	10	1,130	690	250	112	30	17
10	29	278	41	23	9.3	11	1,250	650	219	95	26	16
11	33	262	41	21	9.2	11	1,360	581	205	81	23	14
12	35	229	40	21	9.1	11	1,480	525	230	75	23	16
13	44	207	39	20	9.1	11	1,500	475	282	95	20	20
14	62	180	39	20	9.1	11	1,510	431	303	127	17	19
15	70	162	38	20	9.1	11	1,500	390	280	121	15	17
16	75	155	37	19	9.1	12	1,460	360	242	110	13	14
17	80	147	36	19	9.1	12	1,420	328	220	96	12	13
18	83	132	36	18	9.1	13	1,400	317	205	87	11	13
19	88	118	35	18	9.1	13	1,430	292	188	81	11	16
20	90	105	35	17	9.1	14	1,480	265	180	76	12	15
21	92	92	34	17	9.1	15	1,480	239	174	76	12	14
22	96	84	33	16	9.1	17	1,450	220	167	72	11	12
23	102	72	33	16	9.3	19	1,430	263	154	61	9.7	9.7
24	101	67	31	15	9.5	22	1,400	354	139	54	9.3	8.9
25	101	63	30	14	9.5	25	1,350	486	129	53	8.5	8.5
26	104	61	29	14	9.5	27	1,310	599	120	59	7.7	8.1
27	117	59	29	14	9.5	29	1,270	623	115	63	6.6	7.4
28	147	56	28	13	9.5	31	1,210	606	112	76	7.0	6.6
29	162	56	28	13	------	32	1,160	573	134	95	12	6.6
30	184	55	28	12	------	34	1,120	504	181	97	14	7.7
31	202	------	28	12	------	37	------	418	------	89	11	------
TOTAL	2,366	5,766	1,178	599	267.0	507.4	33,205	17,598	6,289	3,135	739.8	399.8
MEAN	76.3	192	38.0	19.3	9.54	16.4	1,107	568	210	101	23.9	13.3
MAX	202	402	55	27	11	37	1,510	1,090	346	183	78	20
MIN	25	55	28	12	9.1	9.6	50	220	112	53	6.6	6.6
AC-FT	4,690	11,440	2,340	1,190	530	1,010	65,860	34,910	12,470	6,220	1,470	793

CAL YR 1970 TOTAL 218,931.0 MEAN 600 MAX 3,390 MIN 7.0 AC-FT 434,200
WTR YR 1971 TOTAL 72,050.0 MEAN 197 MAX 1,510 MIN 6.6 AC-FT 142,900

05112000 Roseau River below State ditch 51, near Caribou, Minn.

(International gaging station)

LOCATION.--Lat 48°58'54", long 96°27'46", in SE¼SW¼ sec.34, T.164 N., R.45 W., Kittson County, on left bank 400 ft downstream from State ditch 51 (known locally as Caribou cutoff ditch) and 0.6 mile west of Caribou.

DRAINAGE AREA.--1,570 sq mi, approximately.

PERIOD OF RECORD.--April to October 1917, April 1920 to current year (some winter records incomplete). Published as "at Caribou", prior to April 1929; as "below Cutoff ditch, near Caribou" April 1929 to September 1936. Records published for both sites April 1929 to September 1930. Monthly discharge only for some periods, published in WSP 1308 and 1728.

GAGE.--Water-stage recorder. Datum of gage is 1,002.14 ft above mean sea level, adjustment of 1928, by Geodetic Survey of Canada. Prior to Apr. 1, 1929, nonrecording gage at site at Caribou 0.6 mile upstream at datum 0.95 ft lower.

AVERAGE DISCHARGE.--15 years (1920-30, 1932-33, 1936-43), 298 cfs (215,700 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 1,740 cfs Apr. 21 (gage height, 7.90 ft); maximum gage height, 8.27 ft Apr. 11 (backwater from ice); minimum discharge, 19 cfs Aug. 30 (gage height, 1.82 ft).
Period of record: Maximum discharge, 4,080 cfs May 19, 1950 (gage height, 11.81 ft); no flow Aug. 13, 1936.
Flood of 1916 is reported to have reached a stage of about 15.5 ft at former site.

REMARKS.--Records good. Occasionally, at high stages, there is some natural diversion of flow above station to headwaters of Two Rivers. Station not operated during winter period.

COOPERATION.--This station is maintained by the United States under agreement with Canada.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	58	264					45	1,610	512	222	115	26
2	56	279					50	1,580	428	235	102	28
3	46	347					60	1,540	365	229	88	26
4	45	396					75	1,500	315	216	78	23
5	45	433					140	1,450	288	200	67	24
6	46						220	1,390	277	192	61	27
7	42						400	1,330	288	186	56	26
8	41						600	1,270	315	167	48	27
9	38						820	1,200	324	165	44	27
10	38						1,000	1,110	310	156	42	28
11	42						1,200	1,000	288	127	36	27
12	46						1,320	883	282	113	36	26
13	51						1,440	778	295	113	36	23
14	54						1,450	680	335	116	36	25
15	66						1,450	610	356	145	34	29
16	75						1,480	554	347	154	32	29
17	82						1,500	512	319	136	34	28
18	85						1,530	484	288	116	32	25
19	86						1,640	448	267	102	31	23
20	92						1,730	411	250	92	32	25
21	88						1,730	372	233	88	32	27
22	85						1,730	340	222	88	32	28
23	91						1,720	340	216	85	32	28
24	94						1,720	377	200	78	32	26
25	99						1,700	456	181	70	34	25
26	102					30	1,690	538	171	70	36	25
27	105					30	1,680	618	169	72	31	26
28	127					32	1,660	659	164	79	25	25
29	154				------	35	1,640	659	158	89	22	29
30	182				------	40	1,640	643	175	113	21	34
31	216	------			------	42	------	591	------	120	22	------
TOTAL	2,477						35,060	25,933	8,338	4,134	1,359	795
MEAN	79.9						1,169	837	278	133	43.8	26.5
MAX	216						1,730	1,610	512	235	115	34
MIN	38						45	340	158	70	21	23
AC-FT	4,910						69,540	51,440	16,540	8,200	2,700	1,580

05124480 Kawishiwi River near Ely, Minn.

(Hydrologic bench-mark station)

LOCATION.--Lat 47°55'22", long 91°32'06", in SE¼ sec.24, T.63 N., R.10 W., Lake County, on left bank upstream from rapids, 2 miles upstream from South Kawishiwi River, 2.2 miles southwest of Fernberg Lookout Tower and 14 miles east of Ely.

DRAINAGE AREA.--253 sq mi.

PERIOD OF RECORD.--June 1966 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,450 ft (from topographic map).

AVERAGE DISCHARGE.--5 years, 257 cfs (13.79 inches per year).

EXTREMES.--Current year: Maximum daily discharge, 1,520 cfs May 1; minimum, 27 cfs Sept. 26, 27, 28 (gage height, 2.76 ft).
Period of record: Maximum discharge, 1,540 cfs Apr. 29, 1969 (gage height, 5.88 ft); minimum, 24 cfs Sept. 28, 29, 1966; minimum gage height, 2.70 ft Feb. 23-29, 1968.

REMARKS.--Records good except those for period of no gage-height record, which are fair. Records of chemical analyses and water temperatures for the current year are published in Part 2 of this report.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	47	349	571	182	123	92	74	1,520	590	536	139	57
2	46	397	565	176	120	91	76	1,500	577	513	134	54
3	48	438	542	176	122	90	77	1,450	565	491	128	51
4	48	464	513	176	118	88	77	1,380	565	480	122	51
5	47	486	486	176	120	86	76	1,290	565	453	118	51
6	46	508	470	174	116	84	76	1,200	553	428	111	47
7	46	530	448	163	113	81	76	1,110	542	407	108	46
8	68	553	428	161	110	79	78	1,020	530	397	103	45
9	97	620	407	161	105	76	79	950	510	378	102	45
10	110	709	392	158	107	76	85	900	480	354	107	46
11	110	768	378	156	108	76	107	850	460	331	105	46
12	118	815	363	150	111	74	130	800	435	318	96	44
13	118	842	354	146	108	74	137	760	440	308	94	42
14	120	863	331	141	107	73	137	710	450	291	92	40
15	120	869	322	141	107	76	146	670	445	275	86	40
16	122	869	308	141	103	77	184	640	430	266	84	40
17	123	869	296	139	103	76	255	610	435	251	84	39
18	123	863	287	139	103	76	331	600	460	236	84	39
19	123	842	275	135	100	74	448	590	486	222	82	37
20	123	822	270	137	100	74	620	610	530	213	79	36
21	123	808	240	135	100	74	782	630	548	200	77	36
22	123	788	225	135	99	73	911	640	565	194	74	34
23	125	768	225	132	99	73	1,050	620	565	182	72	32
24	128	748	225	130	97	73	1,140	610	577	172	66	31
25	130	728	222	130	97	72	1,220	600	577	161	66	30
26	130	696	213	130	97	70	1,300	596	565	156	65	28
27	141	664	210	127	96	72	1,370	596	559	156	64	27
28	167	640	197	125	94	76	1,440	608	536	161	62	34
29	192	608	194	125	------	76	1,470	614	530	156	63	37
30	222	583	192	127	------	76	1,500	608	530	150	63	39
31	296	------	186	123	------	76	------	602	------	143	59	------
TOTAL	3,580	20,507	10,335	4,547	2,983	2,404	15,452	25,864	15,600	8,979	2,789	1,224
MEAN	115	684	333	147	107	77.5	515	835	520	290	90.0	40.8
MAX	296	869	571	182	123	92	1,500	1,520	590	536	139	57
MIN	46	349	186	123	94	70	74	590	430	143	59	27
CFSM	.45	2.70	1.32	.58	.42	.31	2.04	3.30	2.06	1.15	.36	.16
IN.	.53	3.02	1.52	.67	.44	.35	2.27	3.81	2.29	1.32	.41	.18

CAL YR 1970 TOTAL 125,274 MEAN 343 MAX 1,460 MIN 42 CFSM 1.36 IN 18.42
WTR YR 1971 TOTAL 114,284 MEAN 313 MAX 1,520 MIN 27 CFSM 1.24 IN 16.80

NOTE.--No gage-height record May 1-25.

05127000 Kawishiwi River near Winton, Minn.

LOCATION.--Lat 47°56'05", long 91°45'50", in NE¼NW¼ sec.20, T.63 N., R.11 W., Lake County, at powerplant of Minnesota Power & Light Co., just upstream from Fall Lake, and 1.8 miles east of Winton.

DRAINAGE AREA.--1,200 sq mi, approximately.

PERIOD OF RECORD.--June 1905 to June 1907, October 1912 to September 1919 (fragmentary), September 1923 to current year. Monthly discharge only for some periods, published in WSP 1308.

AVERAGE DISCHARGE (UNADJUSTED).--52 years (1905-06, 1915-17, 1918-19, 1923-71), 1,012 cfs (11.45 inches per year).

EXTREMES.--Current year: Maximum daily discharge, 8,500 cfs Apr. 28; minimum daily, 161 cfs Feb. 14. Period of record: Maximum daily discharge, 16,000 cfs May 18, 1950; no flow at times.

REMARKS.--Records good except those above 2,000 cfs, which are fair. Daily discharge computed from powerplant records. Flow regulated by powerplant and by Camp Six, Bald Eagle, Gabbro, Little Gabbro, Birch, White Iron, South Farm, and Garden Lakes.

COOPERATION.--Records collected by Minnesota Power & Light Co., under general supervision of Geological Survey, in connection with a Federal Power Commission project.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	350	2,670	1,990	956	366	365	659	7,880	4,000	3,980	564	354
2	447	2,810	1,900	928	365	365	627	7,690	3,850	3,260	467	449
3	441	3,480	1,650	895	398	495	594	7,410	3,660	2,750	500	417
4	530	4,010	1,630	880	430	495	592	6,990	3,270	2,550	499	384
5	531	4,110	1,560	878	430	495	592	6,420	3,240	2,460	435	472
6	547	4,430	1,530	804	430	462	528	6,080	2,870	1,840	402	440
7	538	4,570	1,500	762	258	462	526	5,570	2,540	1,560	402	408
8	970	4,470	1,440	762	334	462	526	5,200	2,160	1,370	402	375
9	955	4,590	1,400	762	399	430	590	5,000	1,890	1,240	399	440
10	950	4,700	1,360	762	399	462	525	4,620	1,680	1,400	479	472
11	758	4,580	1,260	760	398	462	621	4,160	1,720	1,130	499	440
12	995	4,550	1,290	694	430	463	766	3,740	1,690	1,250	567	375
13	863	4,390	1,340	625	365	463	843	3,370	1,690	1,110	499	408
14	863	4,230	1,240	593	161	463	940	3,060	1,690	1,220	467	440
15	960	4,230	1,180	594	430	594	1,210	2,800	1,690	1,070	402	440
16	1,590	4,180	1,090	561	398	521	1,440	2,780	1,420	1,130	402	375
17	1,690	4,130	1,100	561	356	580	2,350	2,440	1,780	992	435	408
18	1,970	3,880	1,210	561	288	613	2,640	2,270	1,980	1,020	549	408
19	1,870	3,680	1,230	529	324	580	3,070	2,270	2,300	975	318	220
20	1,870	3,400	1,230	530	333	630	4,040	2,150	3,050	960	350	323
21	1,720	3,210	1,130	627	194	565	5,460	2,210	4,220	960	350	317
22	1,540	2,910	1,160	564	333	565	6,200	2,120	5,610	960	226	420
23	1,400	2,840	1,220	564	387	565	6,880	2,250	6,330	799	287	252
24	1,170	2,790	1,150	564	322	630	7,460	2,530	6,480	700	352	430
25	1,240	2,640	1,030	497	355	565	7,570	2,910	6,250	474	352	291
26	1,470	2,460	1,060	529	301	595	8,200	3,570	6,250	399	331	194
27	1,570	2,380	1,020	455	572	531	8,450	3,440	6,250	373	352	323
28	1,760	2,270	1,070	464	398	660	8,500	3,880	5,900	613	352	762
29	1,840	2,300	969	432	------	580	8,480	4,090	5,710	960	381	596
30	1,960	2,270	924	464	------	566	8,090	4,160	4,730	828	352	806
31	2,060	------	956	226	------	627	------	4,010	------	532	389	------
TOTAL	37,248	107,160	39,949	19,783	10,154	16,311	98,969	127,070	105,900	40,865	12,761	12,439
MEAN	1,202	3,572	1,285	638	363	526	3,299	4,099	3,530	1,318	412	415
MAX	2,060	4,700	1,990	956	572	660	8,500	7,880	6,480	3,980	567	806
MIN	350	2,270	924	226	161	365	525	2,120	1,420	373	226	194
(≠)	+162	-75	-94	-156	-54	-230	+683	-109	-71	+46	-23	-119
MEAN ≠	1,369	3,497	1,191	482	309	296	3,982	3,990	3,459	1,364	389	296
CFSM ≠	1.14	2.91	0.99	0.40	0.26	0.25	3.32	3.32	2.88	1.14	0.32	0.25
IN. ≠	1.31	3.25	1.14	0.46	0.27	0.28	3.70	3.83	3.22	1.31	0.37	0.27

CAL YR 1970 TOTAL 586,691.00 MEAN 1,607 MAX 6,780 MIN 0 MEAN ≠ 1,624 CFSM ≠ 1.35 IN. ≠ 18.37
WTR YR 1971 TOTAL 628,509.00 MEAN 1,722 MAX 8,500 MIN 161 MEAN ≠ 1,718 CFSM ≠ 1.43 IN. ≠ 19.43

≠ Changes in contents, equivalent in cubic feet per second, in Camp Six, Bald Eagle, Gabbro, Little Gabbro, Birch, White Iron, Farm, South Farm, and Garden Lakes.
≠ Adjusted for change in reservoir contents.

05127205 Burntside River near Ely, Minn.

LOCATION.--Lat 47°54'55", long 91°56'59", in NE¼NE¼ sec.26, T.63 N., R.13 W., St. Louis County, on left bank on downstream handrail of bridge on County Road 88, 2.5 miles upstream from mouth, 4 miles northwest of Ely and 5 miles downstream from outlet on Burntside Lake.

PERIOD OF RECORD.--May 1967 to current year.

GAGE.--Nonrecording gage read once daily. Altitude of gage is 1,340 ft (from topographic map).

EXTREMES.--Current year: Maximum discharge, 297 cfs Apr. 22 (gage height, 7.77 ft, from graph based on gage readings); minimum daily discharge, 5.2 cfs Sept. 26; minimum gage height, 5.03 ft Sept. 27.
Period of record: Maximum discharge, 455 cfs June 12, 1970 (gage height, 8.59 ft, from floodmark); minimum daily discharge, 0.8 cfs Oct. 6, 7, 1967.

REMARKS.--Records good except those for winter periods, which are fair.

COOPERATION.--Gage readings furnished by the Water Quality Office, Environmental Protection Agency.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	38	163	102	56	38	41	36	199	149	95	40	17
2	38	160	102	55	38	41	36	193	142	100	36	16
3	37	158	101	54	37	40	35	189	133	97	37	15
4	36	154	98	52	37	39	35	185	130	94	36	14
5	35	149	96	51	37	38	35	181	137	92	28	13
6	34	147	94	51	36	38	35	174	132	90	30	13
7	33	144	93	51	36	38	36	168	126	89	28	13
8	53	146	92	50	36	37	36	162	119	86	26	12
9	82	149	90	50	35	37	37	157	113	80	24	11
10	115	153	88	49	35	36	39	152	109	78	23	11
11	127	156	85	49	35	36	44	145	107	75	25	11
12	133	153	83	48	35	36	52	137	104	71	25	10
13	137	150	81	48	35	36	64	133	102	73	22	9.0
14	137	144	80	48	35	36	80	131	101	69	19	8.5
15	133	139	79	48	34	36	100	128	100	64	17	8.5
16	131	133	77	47	34	36	134	122	98	65	15	8.0
17	128	130	75	47	34	36	170	116	133	63	16	7.6
18	122	127	74	47	34	36	202	117	154	60	17	7.2
19	117	122	72	47	34	36	230	119	150	57	17	7.0
20	112	119	71	46	33	37	258	120	144	53	16	6.8
21	111	109	69	46	33	37	277	121	136	53	16	6.4
22	108	107	68	45	33	37	293	113	124	50	16	6.0
23	108	107	66	45	33	36	270	120	110	48	19	6.0
24	110	105	65	45	33	36	254	148	107	47	19	5.6
25	109	105	63	44	33	35	238	153	103	46	19	5.4
26	107	103	62	43	34	35	230	163	100	46	18	5.2
27	119	103	61	42	37	35	222	164	97	45	16	5.6
28	130	103	60	41	40	35	214	164	93	51	15	8.0
29	134	102	59	40	------	36	210	160	91	52	16	11
30	136	102	58	39	------	36	203	157	92	49	16	12
31	157	------	57	39	------	36	------	154	------	45	16	------
TOTAL	3,107	3,942	2,421	1,463	984	1,140	4,105	4,645	3,536	2,083	683	289.8
MEAN	100	131	78.1	47.2	35.1	36.8	137	150	118	67.2	22.0	9.66
MAX	157	163	102	56	40	41	293	199	154	100	40	17
MIN	33	102	57	39	33	35	35	113	91	45	15	5.2

CAL YR 1970 TOTAL 32,364.0 MEAN 88.7 MAX 448 MIN 12
WTR YR 1971 TOTAL 28,398.8 MEAN 77.8 MAX 293 MIN 5.2

05127210 Armstrong Creek near Ely, Minn.

LOCATION.--Lat 47°53'48", long 91°55'50", in SW¼NE¼ sec.36, T.63 N., R.13 W., St. Louis County, near right bank 50 ft upstream from culvert on County Road 88, 1.2 miles upstream from mouth and 2.5 miles southwest of Ely.

DRAINAGE AREA.--5.29 sq mi.

PERIOD OF RECORD.--May 1967 to current year.

GAGE.--Nonrecording gage read once daily and crest-stage gage. Altitude of gage is 1,365 ft (from topographic map). Prior to Oct. 1, 1969, at site 100 ft downstream at same datum.

EXTREMES.--Current year: Maximum discharge, 64 cfs Apr. 17 (gage height, 4.58 ft); maximum gage height, 4.97 ft Apr. 11 (from graph based on gage readings, backwater from ice); minimum daily discharge, 0.4 cfs Jan. 31, Feb. 1, 2, 3, Sept. 22.
Period of record: Maximum discharge, 131 cfs May 21, 1970 (gage height, 5.88 ft, from floodmark); no flow Feb. 28 to Mar. 6, 1968.

REMARKS.--Records good except those for winter periods, which are fair.

COOPERATION.--Gage readings furnished by Water Quality Office, Environmental Protection Agency.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.3	21	4.3	2.1	.40	.60	.90	11	4.8	2.5	.60	1.0
2	1.5	17	4.3	2.1	.40	.60	.80	9.9	4.3	3.9	.60	.80
3	1.8	15	4.2	2.0	.40	.60	.80	8.9	3.6	2.5	.60	.80
4	1.4	12	4.1	2.0	.50	.60	.70	8.7	3.3	1.2	.60	1.1
5	1.3	10	4.0	1.9	.50	.60	.70	8.7	4.2	1.5	.60	1.4
6	1.3	8.6	3.9	1.9	.60	.60	.70	7.9	4.2	1.0	.50	.90
7	1.4	7.5	3.8	1.7	.60	.60	.70	7.8	3.3	1.1	.50	.60
8	15	6.5	3.8	1.6	.60	.60	.70	7.2	3.0	1.3	.50	.60
9	27	9.6	3.7	1.5	.60	.60	.80	6.4	2.2	1.0	.50	.60
10	30	15	3.5	1.4	.60	.60	20	5.7	2.2	.90	.60	.80
11	28	15	3.4	1.3	.60	.60	45	5.2	4.3	.90	.60	.70
12	24	13	3.3	1.3	.60	.60	42	4.6	2.5	.90	.60	.70
13	19	10	3.2	1.2	.60	.70	49	4.6	1.9	.90	.50	.60
14	15	8.0	3.1	1.2	.60	.70	42	4.2	1.6	.80	.70	.50
15	12	6.4	2.9	1.1	.60	.70	36	4.0	1.3	.80	.60	.50
16	9.6	5.7	2.8	1.1	.60	.80	44	3.6	1.3	1.2	.60	.50
17	8.0	5.2	2.7	1.0	.60	.80	61	3.6	12	1.0	.60	.50
18	6.5	5.1	2.7	.90	.60	.80	57	3.9	18	.90	.90	.50
19	5.4	4.8	2.6	.90	.60	.80	51	4.3	15	.80	.70	.50
20	5.1	4.5	2.6	.80	.60	.80	51	8.3	10	.80	.60	.50
21	4.5	4.3	2.5	.80	.60	.80	43	8.9	7.0	.80	.60	.50
22	4.2	4.1	2.5	.80	.60	.80	33	10	5.1	.70	.50	.40
23	5.1	4.1	2.4	.70	.60	.80	26	14	4.0	.70	.60	.50
24	6.0	4.0	2.4	.70	.60	.80	19	21	2.9	1.0	.60	.60
25	5.9	4.0	2.4	.60	.60	.80	16	24	2.6	.80	.70	.50
26	7.0	4.0	2.3	.60	.60	.80	14	20	2.2	.70	.70	.70
27	12	4.0	2.3	.50	.60	.80	12	16	1.8	.60	.70	2.6
28	18	4.1	2.3	.50	.60	.80	12	12	1.6	1.2	.60	8.9
29	16	4.1	2.2	.50	------	.80	11	9.6	1.5	1.2	1.1	6.2
30	15	4.2	2.2	.50	------	.70	10	7.5	1.9	.70	.90	8.9
31	16	------	2.1	.40	------	.70	------	5.7	------	.70	.70	------
TOTAL	326.3	240.8	94.5	35.60	16.00	21.90	700.80	277.2	133.6	35.00	19.70	43.90
MEAN	10.5	8.03	3.05	1.15	.57	.71	23.4	8.94	4.45	1.13	.64	1.46
MAX	30	21	4.3	2.1	.60	.80	61	24	18	3.9	1.1	8.9
MIN	1.3	4.0	2.1	.40	.40	.60	.70	3.6	1.3	.60	.50	.40
CFSM	1.98	1.52	.58	.22	.11	.13	4.42	1.69	.84	.21	.12	.28
IN.	2.29	1.69	.66	.25	.11	.15	4.93	1.95	.94	.25	.14	.31

CAL YR 1970 TOTAL 2,733.00 MEAN 7.49 MAX 106 MIN .20 CFSM 1.42 IN 19.22
WTR YR 1971 TOTAL 1,945.30 MEAN 5.33 MAX 61 MIN .40 CFSM 1.01 IN 13.68

05127215 Longstorff Creek near Ely, Minn.

LOCATION.--Lat 47°53'33", long 91°54'55", in SE¼SW¼ sec.31, T.63 N., R.12 W., St. Louis County, left bank on downstream side of culvert of U.S. Highway 169, 0.7 mile upstream from mouth, 1.5 miles southwest of Ely and 2.5 miles downstream from outlet of Mitchell Lake.

DRAINAGE AREA.--8.84 sq mi.

PERIOD OF RECORD.--May 1967 to current year.

GAGE.--Nonrecording gage read once daily and crest-stage gage. Datum of gage is 1,360.67 ft above mean sea level, datum of 1929 (levels by Minnesota Highway Department).

EXTREMES.--Current year: Maximum discharge, 103 cfs Apr. 17 (gage height, 3.91 ft); minimum, 0.1 cfs Aug. 9, Sept. 23, 24, 25; minimum gage height, 0.52 ft Aug. 9.
Period of record: Maximum discharge, 230 cfs June 10, 1970 (gage height, 6.52 ft, from floodmark); no flow on many days in 1968 and May 7, 1969.

REMARKS.--Records good.

COOPERATION.--Gage readings furnished by Water Quality Office, Environmental Protection Agency.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.6	34	9.6	3.1	1.8	2.3	4.4	21	11	3.6	.80	1.6
2	1.8	32	9.5	3.1	1.8	2.3	4.3	20	10	2.6	.70	.80
3	2.2	28	9.5	3.0	1.8	2.4	4.0	17	9.3	2.1	.60	.60
4	1.9	27	9.3	3.0	2.0	2.4	3.9	16	8.9	2.4	.40	1.0
5	1.8	21	9.0	3.0	2.1	2.4	4.1	15	8.7	2.1	.40	1.2
6	1.8	18	8.7	2.9	2.1	2.5	4.3	15	15	1.9	.40	.70
7	1.9	15	8.3	2.9	2.2	2.5	4.6	14	12	1.9	.30	.40
8	15	16	7.8	2.8	2.3	2.5	5.7	12	8.5	2.0	.20	.30
9	36	20	7.2	2.8	2.2	2.5	8.0	10	6.3	1.8	.10	.30
10	48	30	6.8	2.8	2.2	2.5	11	8.5	5.8	1.4	.90	1.0
11	33	28	6.5	2.7	2.2	2.6	34	8.7	5.8	1.1	.90	.80
12	22	24	6.1	2.7	2.1	2.8	67	6.6	5.1	.90	.60	.40
13	19	21	5.7	2.6	2.0	3.0	70	6.6	4.5	1.4	.60	.20
14	17	18	5.4	2.6	2.0	3.5	54	5.6	4.0	.90	.40	.70
15	16	16	5.2	2.5	2.0	3.9	51	5.2	3.6	.80	.30	.50
16	15	15	5.0	2.5	2.0	3.7	69	4.8	4.3	1.0	.20	.40
17	14	14	4.8	2.4	2.1	3.6	100	4.6	13	1.3	.40	.40
18	14	14	4.7	2.4	2.0	3.5	93	4.6	16	1.1	1.8	.30
19	13	14	4.6	2.3	2.0	3.3	87	6.0	18	.90	1.1	.30
20	12	14	4.5	2.3	2.1	3.2	92	9.1	14	.70	.90	.20
21	11	13	4.4	2.2	2.2	3.2	82	10	11	.50	.70	.20
22	11	13	4.2	2.2	2.2	3.1	67	15	7.2	.50	.50	.20
23	34	12	3.9	2.2	2.1	3.1	54	24	4.9	.40	.30	.10
24	31	11	3.7	2.1	2.0	3.1	43	34	3.9	.70	.30	.10
25	21	11	3.6	2.1	2.0	3.2	38	36	3.6	.60	.80	.10
26	15	10	3.5	2.1	2.1	3.3	33	28	3.3	.60	.70	.20
27	22	10	3.4	2.0	2.2	3.5	28	23	2.8	.60	.50	.40
28	32	9.8	3.3	2.0	2.2	3.7	27	20	2.5	2.5	.40	4.2
29	33	9.6	3.2	1.8	------	3.9	23	17	2.6	1.9	2.0	3.6
30	26	9.6	3.2	1.8	------	4.0	21	14	2.8	.90	1.2	6.4
31	31	------	3.1	1.8	------	4.2	------	12	------	.80	.60	------
TOTAL	554.0	528.0	177.7	76.7	58.0	95.7	1,187.3	443.3	228.4	41.90	20.00	27.60
MEAN	17.9	17.6	5.73	2.47	2.07	3.09	39.6	14.3	7.61	1.35	.65	.92
MAX	48	34	9.6	3.1	2.3	4.2	100	36	18	3.6	2.0	6.4
MIN	1.6	9.6	3.1	1.8	1.8	2.3	3.9	4.6	2.5	.40	.10	.10

CAL YR 1970 TOTAL 4,746.10 MEAN 13.0 MAX 208 MIN .30
WTR YR 1971 TOTAL 3,438.60 MEAN 9.42 MAX 100 MIN .10

05127219 Shagawa Lake tributary at Ely, Minnesota

LOCATION.--Lat 47°54'24", long 91°52'23", in NE¼SW¼ sec.28, T.63 N., R.12 W., St. Louis County, on left bank, 200 ft upstream from mouth, 500 ft northwest of sewage plant in Ely.

DRAINAGE AREA.--0.71 sq mi.

PERIOD OF RECORD.--April to September, 1971.

GAGE.--Water-stage recorder and V-notch sharp crested weir. Prior to June 8, 1971, nonrecording gage at site 75 ft downstream at different datum.

EXTREMES.--Maximum discharge during period, April to September, 48 cfs June 17 (gage height, 2.96 ft); minimum, no flow at times.

REMARKS.--Record good.

COOPERATION.--Prior to June 8, 1971, gage readings furnished by Water Quality Office, Environmental Protection Agency.

DISCHARGE, IN CUBIC FEET PER SECOND, APRIL TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1							.10	.70	.10	.13	.03	.68
2							.10	.30	.10	.10	.03	.07
3							.10	.20	.10	.08	.03	.06
4							.20	.40	.10	.21	.02	.20
5							.20	.30	.10	.05	.02	.11
6							.50	.20	.10	.08	.02	.10
7							2.3	.20	.10	.34	.02	.06
8							4.0	.20	.09	.06	.03	.05
9							5.4	.20	.07	.10	.11	.20
10							12	.20	.35	.10	.60	1.2
11							20	.20	.13	.04	.05	.07
12							7.2	.20	.08	.85	.03	.05
13							4.6	.20	.06	.06	.09	.05
14							1.9	.20	.06	.29	.05	.28
15							2.0	.20	.07	.06	.04	.11
16							2.3	.20	.40	1.1	.09	.05
17							1.8	.20	7.6	.05	1.9	.11
18							1.2	.20	.90	.06	.17	.03
19							1.3	1.0	.20	.04	.08	.03
20							1.1	.30	.10	.03	.07	.03
21							.80	.20	.10	.03	.04	.03
22							.60	.20	.10	.04	.04	.02
23							.50	.30	.23	.05	.04	.03
24							.40	1.4	.10	.03	.50	.02
25							.40	.30	.08	.03	.14	.02
26							.40	.40	.06	.12	.05	.02
27							.40	.20	.06	.61	.05	.31
28							.70	.10	.07	1.1	.05	3.3
29					------		.40	.10	.31	.03	1.6	.24
30					------		1.3	.10	.43	.04	.25	4.6
31		------			------		------	.10	------	.03	.11	------
TOTAL							74.20	9.20	12.35	5.94	6.35	12.13
MEAN							2.47	.30	.41	.19	.20	.40
MAX							20	1.4	7.6	1.1	1.9	4.6
MIN							.10	.10	.06	.03	.02	.02
CFSM							3.48	.42	.58	.27	.28	.56
IN.							3.89	.48	.65	.31	.33	.64

05127220 Burgo Creek near Ely, Minn.

LOCATION.--Lat 47°55'32", long 91°51'40", in SW¼NW¼ sec.22, T.63 N., R.12 W., St. Louis County, near right bank 6 ft upstream from twin culverts on County Road 88, 0.5 mile upstream from mouth and 1.5 miles north of Ely.

DRAINAGE AREA.--3.04 sq mi.

PERIOD OF RECORD.--May 1967 to current year.

GAGE.--Nonrecording gage and crest-stage gage; gage read once daily. Altitude of gage is 1,340 ft (from topographic map).

EXTREMES.--Current year: Maximum discharge, 130 cfs Apr. 12 (gage height, 9.28 ft, backwater from ice); minimum, 0.1 cfs on many days in August and September.
Period of record: Maximum discharge, 732 cfs June 10, 1970 (gage height, 12.14 ft, from floodmark), from rating curve extended above 150 cfs on basis of flow through culvert and flow-over-road measurement of peak flow; no flow at times in 1967, 1968.

REMARKS.--Records good except those for winter period, which are fair.

COOPERATION.--Gage readings furnished by Water Quality Office, Environmental Protection Agency.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.9	19	2.6	.70	.30	.30	.30	8.2	3.7	1.1	.20	.20
2	1.8	17	2.6	.70	.30	.30	.30	7.5	2.3	.70	.10	.20
3	2.6	16	2.6	.70	.30	.30	.40	6.9	2.0	.50	.10	.20
4	3.2	14	2.5	.70	.30	.30	.50	6.2	1.6	.60	.10	.20
5	2.8	12	2.3	.70	.30	.30	.60	5.8	2.9	.50	.10	.20
6	2.6	10	2.1	.70	.30	.30	.70	5.0	3.4	.40	.10	.10
7	2.6	8.8	2.0	.60	.30	.30	1.0	4.6	2.0	.40	.10	.10
8	14	6.5	1.9	.60	.30	.30	1.3	4.3	1.4	.40	.10	.10
9	39	11	1.8	.60	.30	.30	1.8	4.0	1.0	.40	.10	.10
10	38	15	1.7	.60	.30	.30	12	3.6	.90	.40	.10	.10
11	26	14	1.7	.60	.30	.30	50	2.4	.90	.30	.10	.20
12	20	13	1.6	.60	.30	.30	77	1.4	.90	.30	.10	.20
13	17	11	1.6	.60	.30	.30	54	1.2	.90	.30	.10	.20
14	14	9.7	1.5	.60	.30	.30	43	2.9	.90	.30	.10	.20
15	12	8.5	1.5	.50	.30	.30	30	1.6	.80	.30	.10	.20
16	10	7.5	1.4	.50	.30	.30	39	1.0	2.2	.30	.10	.20
17	9.3	7.1	1.4	.50	.40	.30	57	.80	20	.40	.10	.10
18	10	6.6	1.3	.50	.40	.30	45	.80	28	.40	.10	.10
19	6.9	6.2	1.3	.50	.40	.30	38	.70	20	.30	.10	.10
20	6.6	5.9	1.3	.50	.30	.30	36	2.6	14	.30	.10	.10
21	6.4	5.6	1.2	.40	.30	.30	29	3.9	9.8	.20	.10	.10
22	6.4	5.3	1.1	.40	.30	.30	23	6.0	5.6	.20	.10	.10
23	6.0	4.6	1.0	.40	.30	.30	18	9.5	3.1	.20	.10	.10
24	7.5	4.0	1.0	.40	.30	.30	14	17	2.3	.30	.10	.10
25	8.2	3.4	.90	.40	.30	.30	13	19	1.8	.20	.10	.10
26	7.7	3.1	.90	.40	.30	.30	11	15	1.3	.20	.10	.20
27	13	2.8	.90	.40	.30	.30	10	11	.90	.20	.10	.10
28	17	2.7	.80	.40	.30	.30	9.3	11	.70	.20	.10	.20
29	20	2.7	.80	.40	------	.30	8.4	10	.60	.20	.30	.30
30	17	2.6	.80	.30	------	.30	8.0	7.5	.60	.20	.10	.50
31	21	------	.80	.30	------	.30	------	5.0	------	.20	.20	------
TOTAL	370.5	255.6	46.90	16.20	8.70	9.30	631.60	186.40	136.50	10.90	3.50	4.90
MEAN	12.0	8.52	1.51	.52	.31	.30	21.1	6.01	4.55	.35	.11	.16
MAX	39	19	2.6	.70	.40	.30	77	19	28	1.1	.30	.50
MIN	1.8	2.6	.80	.30	.30	.30	.30	.70	.60	.20	.10	.10
CFSM	3.95	2.80	.50	.17	.10	.10	6.94	1.98	1.50	.12	.04	.05
IN.	4.53	3.13	.57	.20	.11	.11	7.73	2.28	1.67	.13	.04	.06

CAL YR 1970 TOTAL 2,283.20 MEAN 6.26 MAX 153 MIN .10 CFSM 2.06 IN 27.94
WTR YR 1971 TOTAL 1,681.00 MEAN 4.61 MAX 77 MIN .10 CFSM 1.52 IN 20.57

05127225 Shagawa Lake at Ely, Minn.

LOCATION.--Lat 47°54'18", long 91°53'00", in NE¼NE¼ sec.33, T.63 N., R.12 W., St. Louis County, on south shore of Shagawa Lake, on east pier of dock at U.S. Forest Service Seaplane Base in Ely.

PERIOD OF RECORD.--April 1967 to current year. April 1962 to July 1966 (fragmentary) in files of Minnesota Department of Natural Resources, Division of Waters, Soils and Minerals.

GAGE.--Nonrecording gage read once daily. Datum of gage is 1,330.00 ft above mean sea level, datum of 1929 (levels by Minnesota Department of Conservation). Gage readings have been reduced to elevations above mean sea level.

EXTREMES.--Current year: Maximum elevation observed, 1,339.54 ft Apr. 23; minimum observed, 1,337.05 ft Sept. 27.

Period of record: Maximum elevation observed, 1,340.22 ft June 13, 1970; minimum observed, 1,336.91 ft Feb. 26, 1968.

Maximum elevation observed April 1962 to July 1966, 1,339.95 ft Apr. 27, 28, 1966, from Minnesota Department of Natural Resources, Division of Waters, Soils and Minerals.

COOPERATION.--Gage readings furnished by Water Quality Office, Environmental Protection Agency and U.S. Forest Service.

MONTHEND ELEVATIONS, IN FEET, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

Oct. 30	1338.64	Feb. 26	1337.59	June 30	1338.33
Nov. 30	1338.45	Mar. 31	1337.65	July 30	1337.68
Dec. 31	1338.01	Apr. 30	1339.23	Aug. 31	1337.33
Jan. 29	1337.69	May 28	1338.81	Sept.30	1337.26

NOTE.--Elevations other than those shown are available.

05127230 Shagawa River at Ely, Minn.

LOCATION.--Lat 47°55'09", long 91°50'08", in SW¼SW¼ sec.23, T.63 N., R.12 W., St. Louis County, on right bank, 300 ft downstream from outlet of Shagawa Lake, 150 ft north of the village limits of Ely, 0.8 mile upstream from County Road 88 and 3 miles upstream from Fall Lake.

PERIOD OF RECORD.--May 1967 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,335 ft (from topographic map). Prior to Aug. 2, 1967, non-recording gage at same site and datum.

EXTREMES.--Current year: Maximum discharge, 415 cfs Apr. 23 (gage height, 6.26 ft); minimum, 6.8 cfs Sept. 20, 21, 22, 26, 27 (gage height, 3.80 ft).
Period of record: Maximum discharge, 640 cfs June 12, 1970 (gage height, 6.89 ft); minimum, 6.2 cfs Mar. 4, 1968 (gage height, 3.74 ft).

REMARKS.--Records good.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	58	214	156	83	55	56	53	323	215	150	53	26
2	57	222	152	82	53	56	57	312	211	145	50	26
3	56	227	149	82	53	56	57	301	204	139	48	25
4	55	228	146	80	53	56	56	294	196	133	46	25
5	55	227	144	78	53	54	56	286	196	130	44	24
6	54	223	140	77	53	54	54	278	195	120	43	25
7	54	219	134	76	54	54	54	268	188	115	42	22
8	65	214	133	74	54	54	56	261	179	117	42	21
9	81	218	128	73	53	52	60	250	170	110	41	20
10	110	226	124	71	52	51	66	238	163	104	39	20
11	145	229	119	70	52	50	75	231	162	98	38	20
12	166	230	116	68	52	50	95	227	158	97	38	20
13	178	228	113	68	51	51	118	213	155	96	34	19
14	182	224	111	69	51	53	144	204	150	91	32	17
15	180	218	109	68	50	56	168	194	146	87	30	15
16	180	213	107	68	50	55	197	183	139	87	29	14
17	178	206	103	65	50	54	241	175	166	83	29	14
18	175	203	102	64	50	53	283	172	190	81	30	12
19	172	200	101	62	49	57	311	168	195	79	30	12
20	166	196	98	61	49	56	353	178	201	76	28	12
21	163	188	96	63	49	56	382	176	199	73	26	11
22	161	191	95	66	48	53	402	171	194	70	25	9.8
23	162	180	96	63	48	51	408	176	191	67	24	10
24	162	184	95	61	47	49	398	199	185	63	25	9.6
25	157	172	93	60	46	50	381	215	179	64	25	9.3
26	157	170	92	64	48	49	366	228	171	58	23	8.6
27	163	168	91	61	59	49	353	236	166	55	23	9.0
28	177	160	89	58	59	52	346	238	160	61	24	12
29	185	153	88	56	------	52	335	236	154	58	25	14
30	194	148	87	56	------	52	328	228	151	57	25	17
31	203	------	84	55	------	51	------	221	------	55	23	------
TOTAL	4,251	6,079	3,491	2,102	1,441	1,642	6,253	7,080	5,329	2,819	1,034	499.3
MEAN	137	203	113	67.8	51.5	53.0	208	228	178	90.9	33.4	16.6
MAX	203	230	156	83	59	57	408	323	215	150	53	26
MIN	54	148	84	55	46	49	53	168	139	55	23	8.6

CAL YR 1970 TOTAL 49,788.0 MEAN 136 MAX 635 MIN 25
WTR YR 1971 TOTAL 42,020.3 MEAN 115 MAX 408 MIN 8.6

05127500 Basswood River near Winton, Minn.

(International gaging station)

LOCATION.--Lat 48°04'55", long 91°39'10", in sec.30, T.65 N., R.10 W., Lake County, on island in Jackfish Bay of Basswood Lake, used to determine discharge at outlet (lat 48°06', long 91°39', in sec.19, T.65 N., R.10 W., on international boundary 14 miles northeast of Winton).

DRAINAGE AREA.--1,740 sq mi, approximately (above outlet of Basswood Lake).

PERIOD OF RECORD.--March to June 1924, September 1925 to March 1928, January 1930 to current year. Monthly discharge only for some periods, published in WSP 1308.

GAGE.--Water-stage recorder. Datum of gage is 1,296.80 ft above mean sea level, adjustment of 1928, by Geodetic Survey of Canada. Prior to Oct. 27, 1938, nonrecording gages at several sites in vicinity of gage, at datum 3.0 ft higher. Oct. 28, 1938, to Sept. 30, 1966, water-stage recorder at datum 3.0 ft higher.

AVERAGE DISCHARGE.--43 years (1925-27, 1930-71), 1,373 cfs (10.71 inches per year).

EXTREMES.--Current year: Maximum discharge, 7,260 cfs May 4 (gage height, 7.03 ft); minimum, 364 cfs Sept. 28 (gage height, 2.67 ft).
Period of record: Maximum discharge, 15,600 cfs May 24, 1950 (gage height, 9.94 ft, present datum); minimum, 73 cfs Dec. 5, 1948.

REMARKS.--Records excellent. Some regulation by powerplant on Kawishiwi River at Winton, Minn., and by many lakes located upstream from station.

COOPERATION.--This station is maintained by the United States under agreement with Canada.

REVISIONS (WATER YEARS).--WSP 955: Drainage area. WSP 1145: 1935, 1937.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	443	2,340	3,270	1,610	973	804	943	6,650	4,200	4,840	1,160	493
2	451	2,470	3,130	1,590	948	800	974	6,910	4,180	4,720	1,120	486
3	448	2,620	3,020	1,560	926	796	987	7,090	4,180	4,520	1,080	483
4	455	2,770	2,930	1,540	923	792	993	7,200	4,170	4,280	1,040	480
5	456	2,960	2,820	1,530	927	786	997	7,250	4,160	4,020	999	483
6	470	3,170	2,730	1,530	924	781	999	7,230	4,070	3,830	963	466
7	477	3,370	2,660	1,530	907	779	1,000	7,140	3,960	3,670	932	460
8	575	3,560	2,590	1,510	886	774	1,010	7,000	3,830	3,380	897	447
9	692	3,810	2,510	1,480	865	770	1,020	6,800	3,680	3,160	869	447
10	791	4,050	2,440	1,460	848	766	1,050	6,460	3,530	2,990	864	473
11	871	4,230	2,390	1,440	838	760	1,080	6,160	3,400	2,820	840	483
12	930	4,380	2,320	1,410	828	760	1,130	5,880	3,270	2,680	805	477
13	978	4,480	2,250	1,400	821	756	1,190	5,480	3,150	2,540	790	470
14	1,020	4,540	2,190	1,380	815	763	1,250	5,010	3,040	2,410	760	458
15	1,060	4,590	2,130	1,340	801	799	1,310	4,750	2,940	2,290	732	448
16	1,090	4,610	2,070	1,300	790	801	1,400	4,540	2,850	2,230	712	444
17	1,130	4,640	2,030	1,270	773	806	1,570	4,330	2,940	2,120	715	442
18	1,200	4,640	1,980	1,230	758	809	1,760	4,180	2,940	2,030	700	441
19	1,280	4,630	1,960	1,210	752	811	2,020	4,020	2,920	1,940	681	434
20	1,360	4,570	1,960	1,180	744	819	2,340	3,860	2,920	1,870	663	426
21	1,440	4,510	1,940	1,150	735	825	2,690	3,750	3,010	1,790	644	415
22	1,510	4,460	1,900	1,130	721	830	3,060	3,790	3,200	1,730	631	408
23	1,590	4,390	1,880	1,110	707	840	3,450	3,820	3,460	1,650	599	396
24	1,630	4,310	1,850	1,090	698	849	3,840	3,820	3,710	1,600	580	392
25	1,650	4,160	1,820	1,080	688	850	4,270	3,870	3,940	1,490	565	387
26	1,670	3,810	1,800	1,070	688	861	4,700	3,940	4,180	1,450	544	384
27	1,750	3,710	1,770	1,050	777	873	5,150	4,050	4,390	1,400	529	381
28	1,880	3,630	1,740	1,030	807	908	5,580	4,140	4,550	1,350	514	430
29	1,990	3,550	1,700	1,020	------	910	5,970	4,190	4,730	1,300	508	456
30	2,090	3,420	1,670	1,010	------	917	6,330	4,220	4,850	1,260	508	515
31	2,210	------	1,640	996	------	925	------	4,220	------	1,220	495	------
TOTAL	35,587	116,380	69,090	40,236	22,868	25,320	70,063	161,750	110,350	78,580	23,439	13,405
MEAN	1,148	3,879	2,229	1,298	817	817	2,335	5,218	3,678	2,535	756	447
MAX	2,210	4,640	3,270	1,610	973	925	6,330	7,250	4,850	4,840	1,160	515
MIN	443	2,340	1,640	996	688	756	943	3,750	2,850	1,220	495	381
CFSM	.66	2.23	1.28	.75	.47	.47	1.34	3.00	2.11	1.46	.43	.26
IN.	.76	2.49	1.48	.86	.49	.54	1.50	3.46	2.36	1.68	.50	.29

CAL YR 1970 TOTAL 762,862 MEAN 2,090 MAX 7,060 MIN 340 CFSM 1.20 IN 16.31
WTR YR 1971 TOTAL 767,068 MEAN 2,102 MAX 7,250 MIN 381 CFSM 1.21 IN 16.40

05128000 Namakan River at outlet of Lac la Croix, Ontario

(International gaging station)

LOCATION.--Lat 48°23'00", long 92°10'40", at Campbell's Camp, 2.5 miles west of outlet of Lac la Croix.

DRAINAGE AREA.--5,170 sq mi.

PERIOD OF RECORD.--September 1921 to January 1922, April 1922 to current year, in reports of Geological Survey. Monthly discharge only for some periods, published in WSP 1308. August 1921 to current year, in reports of Water Survey of Canada, Inland Waters Branch.

GAGE.--Water-stage recorder. Gage readings have been reduced to elevations above mean sea level, United States and Canada Boundary Survey datum. Prior to October 1933, nonrecording gages ar various sites on Lac la Croix. October 1933 to March 13, 1963, nonrecording gage at present site and datum.

AVERAGE DISCHARGE.--49 years (1922-71), 3,750 cfs (9.85 inches per year).

EXTREMES.--Current year: Maximum discharge, 12,800 cfs May 13 (elevation, 1,188.34 ft); minimum, 1,470 cfs Apr. 7 (elevation, 1,182.68 ft).
Period of record: Maximum discharge, 28,200 cfs May 31 to June 2, 1950 (elevation, 1,193.30 ft); minimum, 535 cfs at times in February, March and April 1924 (elevation, 1,181.50 ft).

REMARKS.--Records excellent.

COOPERATION.--This station is maintained by Canada under agreement with the United States.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2,140	5,150	8,930	4,950	3,820	2,910	2,710	9,580	11,600	8,950	4,510	2,220
2	2,100	5,420	8,850	4,890	3,770	2,890	2,790	10,100	11,700	8,950	4,410	2,210
3	2,060	5,630	8,760	4,830	3,730	2,860	2,820	10,500	11,700	8,930	4,280	2,220
4	2,140	5,780	8,690	4,770	3,680	2,860	2,860	10,900	11,800	8,900	4,150	2,220
5	2,110	6,040	8,540	4,720	3,620	2,840	2,890	11,300	12,000	8,810	4,050	2,170
6	2,100	6,230	8,480	4,660	3,570	2,810	2,910	11,700	12,000	8,780	3,910	2,100
7	2,050	6,410	8,410	4,640	3,530	2,790	2,920	12,000	12,000	8,810	3,810	2,080
8	2,170	6,590	8,290	4,620	3,480	2,770	2,950	12,300	12,000	8,590	3,710	2,000
9	2,340	6,820	8,150	4,590	3,440	2,750	2,960	12,500	11,900	8,470	3,570	2,000
10	2,410	7,050	8,040	4,550	3,410	2,740	3,000	12,700	11,800	8,380	3,470	1,980
11	2,610	7,230	7,880	4,530	3,370	2,720	3,060	12,700	11,700	8,290	3,390	1,950
12	2,770	7,440	7,810	4,530	3,340	2,710	3,120	12,700	11,600	8,080	3,260	1,900
13	2,910	7,620	7,670	4,510	3,310	2,700	3,230	12,700	11,400	7,900	3,230	1,870
14	3,050	7,790	7,530	4,500	3,270	2,700	3,330	12,700	11,300	7,780	3,130	1,800
15	3,180	7,950	7,370	4,480	3,240	2,700	3,470	12,400	11,100	7,580	3,030	1,750
16	3,280	8,080	7,230	4,460	3,210	2,700	3,650	12,300	10,900	7,460	2,950	1,740
17	3,390	8,290	7,120	4,440	3,170	2,670	3,930	12,300	10,800	7,230	2,920	1,710
18	3,490	8,430	7,000	4,410	3,140	2,670	4,260	12,200	10,600	7,050	2,860	1,700
19	3,570	8,570	6,870	4,390	3,110	2,650	4,590	12,200	10,400	6,820	2,810	1,670
20	3,630	8,660	6,720	4,350	3,070	2,630	5,050	12,100	10,300	6,640	2,750	1,620
21	3,680	8,810	6,570	4,320	3,040	2,610	5,480	12,000	10,100	6,370	2,680	1,590
22	3,740	8,850	6,410	4,280	3,010	2,600	5,900	11,900	9,890	6,190	2,650	1,580
23	3,790	8,930	6,260	4,190	2,970	2,580	6,320	11,800	9,690	5,950	2,600	1,530
24	3,860	9,070	6,110	4,100	2,930	2,570	6,700	11,700	9,510	5,800	2,490	1,530
25	3,930	9,120	5,950	4,100	2,910	2,560	7,120	11,600	9,310	5,500	2,440	1,520
26	4,000	9,120	5,800	4,080	2,880	2,570	7,490	11,500	9,170	5,380	2,390	1,490
27	4,140	9,120	5,650	4,040	2,920	2,580	7,900	11,500	9,020	5,250	2,350	1,470
28	4,300	9,090	5,490	4,000	2,950	2,600	8,270	11,500	8,850	5,090	2,280	1,490
29	4,510	9,050	5,340	3,950	------	2,610	8,660	11,500	8,810	4,990	2,270	1,520
30	4,680	8,970	5,190	3,910	------	2,640	9,120	11,500	8,930	4,850	2,250	1,610
31	4,930	------	5,030	3,860	------	2,650	------	11,600	------	4,680	2,210	------
TOTAL	99,060	231,310	222,140	136,650	91,890	83,640	139,460	365,980	321,880	222,450	96,810	54,240
MEAN	3,195	7,710	7,166	4,408	3,282	2,698	4,649	11,810	10,730	7,176	3,123	1,808
MAX	4,930	9,120	8,930	4,950	3,820	2,910	9,120	12,700	12,000	8,950	4,510	2,220
MIN	2,050	5,150	5,030	3,860	2,880	2,560	2,710	9,580	8,810	4,680	2,210	1,470
CFSM	.62	1.49	1.39	.85	.63	.52	.90	2.28	2.08	1.39	.60	.35
IN.	.71	1.66	1.60	.98	.66	.60	1.00	2.63	2.32	1.60	.70	.39

CAL YR 1970 TOTAL 2,101,870 MEAN 5,759 MAX 16,300 MIN 1,580 CFSM 1.11 IN 15.12
WTR YR 1971 TOTAL 2,065,510 MEAN 5,659 MAX 12,700 MIN 1,470 CFSM 1.09 IN 14.86

05128200 Vermilion Lake near Soudan, Minn.

LOCATION.--Lat 47°49'52", long 92°16'20", in SW¼SE¼ sec.20, T.62 N., R.15 W., St. Louis County, on south shore of Vermilion Lake, at McKinley Park, 2 miles northwest of Soudan.

PERIOD OF RECORD.--October 1913 to July 1915, July 1941 to November 1942, June 1946 to current year (fragmentary during 1947).

GAGE.--Water-stage recorder. Datum of gage is 1,355.10 ft above mean sea level, datum of 1929. October 1913 to July 1915, nonrecording gage 2 miles southwest of present gage at Tower, at datum about 0.5 ft lower. July 1941 to November 1942, and June 1946 to June 1951, nonrecording gage approximately 13 miles northwest at Vermilion Dam near Tower, at same datum. All gage readings have been reduced to elevations above mean sea level, datum of 1929.

EXTREMES.--Current year: Maximum elevation, 1,358.83 ft May 1; maximum daily, 1,358.82 ft May 1; minimum, 1,356.84 ft Oct. 6.

Period of record: Maximum elevation observed, 1,359.52 ft May 16, 1950; minimum observed, 1,356.02 ft Jan. 29, 1942.

Elevation on June 6, 1913, was 1,359.94 ft (determined from reference point set by local observers).

MONTHEND ELEVATION, IN FEET, OCTOBER 1970 TO SEPTEMBER 1971

Oct. 31	1,357.76	Feb. 28	1,357.37	June 30	1,358.27
Nov. 30	1,357.84	Mar. 31	1,357.25	July 31	1,357.47
Dec. 31	1,357.56	Apr. 30	1,358.80	Aug. 31	1,357.06
Jan. 31	1,357.34	May 31	1,358.46	Sept.30	1,357.06

NOTE.--Elevations other than those shown above are available.

05129000 Vermilion River below Vermilion Lake, near Tower, Minn.

LOCATION.--Lat 47°57'41", long 92°28'33", in SE¼SW¼ sec.2, T.63 N., R.17 W., St. Louis County, on left bank 200 ft downstream from dam at outlet of Vermilion Lake, 4.4 miles upstream from Twomile Creek, and 14.2 miles northwest of Tower.

DRAINAGE AREA.--483 sq mi.

PERIOD OF RECORD.--May 1911 to September 1917, June 1928 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,347.36 ft above mean sea level, datum of 1929. June 26, 1928, to July 8, 1931, nonrecording gage at same site, at datum 3.05 ft higher. May 17, 1911, to Sept. 30, 1917, July 9, 1931, to Apr. 11, 1939, nonrecording gages, and Apr. 12, 1939, to Sept. 30, 1967, water-stage recorder at same site, at datum 3.00 ft higher.

AVERAGE DISCHARGE.--49 years, 315 cfs (8.86 inches per year).

EXTREMES.--Current year: Maximum discharge, 1,350 cfs Apr. 30 (gage height, 6.41 ft); minimum, 29 cfs Oct. 3 (gage height, 2.90 ft).
Period of record: Maximum discharge, 2,710 cfs May 23, 1950 (gage height, 7.68 ft, present datum); no flow Oct. 25-29, 1955, caused by temporary storage behind new concrete dam at outlet of Vermilion Lake.

REMARKS.--Records good.

REVISIONS (WATER YEARS).--WSP 1508: 1913.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	75	475	510	348	240	235	205	1,290	1,000	842	250	172
2	57	484	509	344	234	227	214	1,280	977	834	240	165
3	44	489	498	337	231	227	214	1,290	960	811	237	167
4	63	491	495	332	238	224	210	1,270	950	772	232	175
5	64	506	486	332	238	219	210	1,250	959	724	224	181
6	68	502	480	333	240	214	205	1,240	908	714	215	165
7	51	511	482	328	237	212	205	1,190	868	721	211	159
8	77	512	475	321	233	210	205	1,190	860	665	208	139
9	133	528	462	311	230	208	208	1,160	845	639	202	144
10	164	557	454	303	226	205	214	1,120	830	624	196	149
11	197	557	448	303	222	201	225	1,050	806	612	198	149
12	220	567	444	300	219	203	243	1,040	797	593	185	149
13	229	563	443	299	219	198	273	1,010	768	513	190	145
14	242	562	431	304	217	201	310	1,010	754	514	186	124
15	255	565	432	299	212	205	350	949	746	484	186	119
16	274	552	424	293	212	205	414	930	733	479	176	113
17	283	566	411	292	208	201	509	930	845	468	175	109
18	293	555	403	285	203	198	629	885	857	456	178	104
19	311	553	403	281	198	194	735	877	871	438	170	103
20	311	527	403	280	196	194	838	882	870	427	167	93
21	315	526	395	273	194	188	942	888	896	405	165	82
22	322	505	381	269	190	188	1,040	880	890	387	160	82
23	328	530	382	264	188	184	1,120	898	892	362	163	75
24	335	556	388	258	188	184	1,180	952	903	370	148	76
25	353	560	385	254	184	182	1,230	970	887	325	140	81
26	343	546	385	255	184	184	1,270	1,020	893	303	138	78
27	402	535	381	251	233	188	1,280	1,050	874	315	135	73
28	407	535	372	246	238	201	1,290	1,060	842	296	133	95
29	438	519	368	246	------	198	1,310	1,050	832	292	135	107
30	443	506	358	248	------	196	1,310	1,030	837	282	147	134
31	464	------	358	243	------	194	------	1,030	------	276	147	------
TOTAL	7,561	15,940	13,246	9,032	6,052	6,268	18,588	32,671	25,950	15,943	5,637	3,707
MEAN	244	531	427	291	216	202	620	1,054	865	514	182	124
MAX	464	567	510	348	240	235	1,310	1,290	1,000	842	250	181
MIN	44	475	358	243	184	182	205	877	733	276	133	73
CFSM	.51	1.10	.88	.60	.45	.42	1.28	2.18	1.79	1.06	.38	.26
IN.	.58	1.23	1.02	.70	.47	.48	1.43	2.52	2.00	1.23	.43	.29

CAL YR 1970 TOTAL 163,663 MEAN 448 MAX 1,730 MIN 44 CFSM .93 IN 12.61
WTR YR 1971 TOTAL 160,595 MEAN 440 MAX 1,310 MIN 44 CFSM .91 IN 12.37

05129400 Rainy Lake near Fort Frances, Ontario

(International gaging station)

LOCATION.--Lat 48°38'30", long 93°20'00", at Five Mile dock, approximately 5 miles northeast of town of Fort Frances.

PERIOD OF RECORD.--January 1910 to September 1917 and October 1934 to current year in reports of Geological Survey. August 1911 to September 1971 in reports of Water Survey of Canada, Inland Waters Branch. Prior to October 1949, published as "at Ranier, Minn.", and as "at Fort Frances, Ontario" October 1949 to September 1964.

GAGE.--Water-stage recorder. Datum of gage is at mean sea level (United States and Canadian Bpundary Survey) January 1910 to December 1949, nonrecording gage 3 miles northeast at Ranier, Minn., at same datum. January 1950 to October 1964, water-stage recorder on Government dock at Pither's Point at Fort Frances and supplementary gage in town pumping station, 0.5 mile south, used during winter months, at same datum.

EXTREMES.--Current year: Maximum elevation, 1,108.44 ft Oct. 22; minimum, 1,104.96 ft Apr. 10.
Period of record: Maximum elevation observed, 1,112.97 ft July 5, 1950; minimum observed, 1,101.26 ft Apr. 17, 1923, Apr. 2, 1930.

COOPERATION.--This station is maintained by Canada under agreement with the United States.

MONTHEND ELEVATION, IN FEET, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

Oct. 31	8.19	Feb. 28	5.71	June 30	7.82
Nov. 30	7.47	Mar. 31	5.10	July 31	7.73
Dec. 31	6.87	Apr. 30	6.32	Aug. 31	7.39
Jan. 31	6.25	May 31	7.48	Sept.30	7.36

NOTE.--Add 1,100 ft to obtain elevation above mean sea level. Elevations other than those shown are available.

05130500 Sturgeon River near Chisholm, Minn.

LOCATION.--Lat 47°40'25", long 92°54'00", in NE¼NW¼ sec.20, T.60 N., R.20 W., St. Louis County, on left bank 1,000 ft upstream from highway bridge, 0.6 mile downstream from East Branch Sturgeon River, and 11.5 miles north of Chisholm.

DRAINAGE AREA.--187 sq mi.

PERIOD OF RECORD.--August 1942 to current year. Monthly discharge only for August 1942 published in WSP 1308.

GAGE.--Water-stage recorder. Datum of gage is 1,306.7 ft above mean sea level, datum of 1929. Prior to Aug. 24, 1944, nonrecording gage at site 1,000 ft downstream at different datum.

AVERAGE DISCHARGE.--29 years, 123 cfs (8.93 inches per year).

EXTREMES.--Current year: Maximum discharge, 2,140 cfs Apr. 18 (gage height, 5.48 ft); minimum, 14 cfs Oct. 5, 6 (gage height, 0.28 ft).
Period of record: Maximum discharge, 3,630 cfs May 7, 1950 (gage height, 6.41 ft), from rating curve extended above 1,600 cfs on basis of slope-area measurement of peak flow; minimum daily, 6.0 cfs Feb. 18-27, 1944; minimum gage height, 0.08 ft Jan. 28 to Feb. 1, 1963.

REMARKS.--Records good except those for winter periods, which are fair.

REVISIONS (WATER YEARS).--WSP 1438: 1946.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	18	202	70	34	22	19	34	425	277	169	39	33
2	18	205	73	34	22	19	33	406	245	159	37	29
3	18	205	77	33	21	20	33	384	222	146	36	27
4	18	205	80	33	20	21	33	367	201	136	35	31
5	16	205	82	32	20	22	34	346	184	129	34	31
6	17	205	78	32	20	22	35	327	166	127	33	30
7	19	200	75	32	20	22	36	309	151	115	32	29
8	27	180	73	31	20	23	39	290	144	110	31	28
9	76	170	70	31	20	23	65	271	133	104	31	27
10	109	181	68	31	20	23	120	255	124	92	35	33
11	109	197	66	30	20	23	210	237	141	85	34	32
12	123	210	64	30	19	23	320	229	147	80	33	30
13	125	201	63	29	19	24	500	215	154	79	32	29
14	129	179	61	29	19	25	680	206	147	76	33	28
15	124	162	58	28	19	26	920	192	132	81	31	27
16	116	147	56	28	19	27	1,220	182	114	76	30	26
17	108	132	52	28	19	28	1,760	175	211	71	29	25
18	97	120	49	28	19	29	2,110	167	359	69	31	24
19	90	107	47	28	19	30	2,020	173	475	66	29	23
20	83	95	45	28	18	31	1,740	223	1,130	62	28	23
21	76	84	44	27	18	32	1,490	291	1,050	58	27	23
22	72	75	43	27	18	32	1,310	327	870	54	26	22
23	71	80	42	27	19	33	1,120	381	680	51	25	21
24	73	85	41	27	19	35	930	470	519	48	24	23
25	76	86	40	27	19	35	784	528	398	45	25	20
26	79	85	39	26	21	35	673	587	310	43	24	19
27	114	78	38	26	22	35	587	606	249	44	25	21
28	149	72	37	25	20	36	524	555	210	48	23	34
29	174	68	36	24	------	36	480	473	186	46	22	36
30	188	67	36	23	------	35	449	389	175	41	31	49
31	193	------	35	23	------	34	------	322	------	40	30	------
TOTAL	2,705	4,288	1,738	891	551	858	20,289	10,308	9,506	2,553	936	833
MEAN	87.3	143	56.1	28.7	19.7	27.7	676	333	317	82.4	30.2	27.8
MAX	193	210	82	34	22	36	2,110	606	1,130	169	39	49
MIN	16	67	35	23	18	19	33	167	114	40	22	19
CFSM	.47	.76	.30	.15	.11	.15	3.62	1.78	1.70	.44	.16	.15
IN.	.54	.85	.35	.18	.11	.17	4.04	2.05	1.89	.51	.19	.17

CAL YR 1970 TOTAL 51,476 MEAN 141 MAX 1,470 MIN 15 CFSM .75 IN 10.24
WTR YR 1971 TOTAL 55,456 MEAN 152 MAX 2,110 MIN 16 CFSM .81 IN 11.03

PEAK DISCHARGE (BASE, 500 CFS)

DATE	TIME	G. H.	DISCHARGE	DATE	TIME	G. H.	DISCHARGE
4-18	1330	5.48	2,140	6-20	0330	4.04	1,140
5-26	1800	3.05	609				

05131000 Dark River near Chisholm, Minn.

LOCATION.--Lat 47°41'27", long 92°49'15", in SW¼SW¼ sec.12, T.60 N., R.20 W., St. Louis County, on right bank 50 ft downstream from remains of abandoned highway bridge, 3.5 miles upstream from mouth, and 12.2 miles northeast of Chisholm.

DRAINAGE AREA.--50.6 sq mi.

PERIOD OF RECORD.--August 1942 to September 1961, October 1965 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,316.8 ft above mean sea level, datum of 1929 (surveyed by Topographic Division). Prior to Aug. 24, 1944, nonrecording gage at site 50 ft upstream at same datum.

AVERAGE DISCHARGE.--25 years, 37.4 cfs (10.04 inches per year).

EXTREMES.--Current year: Maximum discharge, 620 cfs Apr. 18 (gage height, 5.81 ft); minimum, 10 cfs Oct. 5 (gage height, 1.58 ft); minimum gage height, 1.52 ft Sept. 26.
Period of record: Maximum discharge, 1,170 cfs May 7, 1950 (gage height, 7.10 ft); minimum, 0.3 cfs Aug. 3, 1956; minimum gage height, 0.87 ft Mar. 22, 23, 1949, Aug. 16, 17, 1961.

REMARKS.--Records good.

COOPERATION.--Records for 1971 water year computed by U.S. Steel Corporation and reviewed by Geological Survey.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	11	74	41	23	14	17	23	116	85	64	15	18
2	11	77	46	22	13	18	23	106	73	57	14	16
3	11	76	44	22	12	16	24	95	64	51	14	15
4	11	74	44	22	12	16	24	92	58	46	14	18
5	10	71	43	22	12	15	24	83	52	41	14	18
6	11	67	41	22	12	15	24	73	46	38	13	18
7	11	61	41	22	12	15	25	66	42	36	13	17
8	22	57	39	21	12	15	29	60	38	34	13	16
9	46	59	36	21	12	16	37	56	36	30	13	15
10	55	60	34	21	12	16	51	52	33	28	16	21
11	58	59	34	21	12	16	82	47	42	26	16	22
12	62	61	33	21	11	17	108	43	40	24	16	21
13	63	61	29	21	11	17	136	40	42	24	16	20
14	61	57	28	21	11	17	191	37	41	23	18	19
15	59	52	27	21	11	18	264	34	37	23	17	18
16	56	47	27	22	11	19	369	31	33	22	15	17
17	51	44	26	22	11	18	548	30	80	21	15	16
18	48	41	26	22	11	18	611	29	100	21	22	16
19	45	39	26	22	11	18	561	32	124	21	19	15
20	41	37	26	21	11	19	477	58	338	20	19	15
21	38	36	25	21	13	19	400	67	346	19	19	14
22	37	35	24	21	11	19	353	69	333	18	18	14
23	38	34	25	21	11	19	306	88	268	17	17	14
24	37	34	25	20	11	20	259	129	206	16	16	14
25	37	35	24	20	11	20	217	136	163	15	15	13
26	37	32	24	19	12	20	185	152	130	14	15	13
27	49	31	24	18	16	21	161	156	107	14	14	15
28	56	31	24	18	18	21	148	146	92	17	13	22
29	59	32	23	17	------	22	136	129	79	16	13	22
30	63	34	23	16	------	23	126	113	72	15	14	29
31	69	------	23	15	------	23	------	98	------	16	15	------
TOTAL	1,263	1,508	955	638	337	563	5,922	2,463	3,200	827	481	521
MEAN	40.7	50.3	30.8	20.6	12.0	18.2	197	79.5	107	26.7	15.5	17.4
MAX	69	77	46	23	18	23	611	156	346	64	22	29
MIN	10	31	23	15	11	15	23	29	33	14	13	13
CFSM	.80	.99	.61	.41	.24	.36	3.89	1.57	2.11	.53	.31	.34
IN.	.93	1.11	.70	.47	.25	.41	4.35	1.81	2.35	.61	.35	.38

CAL YR 1970 TOTAL 15,784.3 MEAN 43.2 MAX 390 MIN 8.5 CFSM .85 IN 11.60
WTR YR 1971 TOTAL 18,678.0 MEAN 51.2 MAX 611 MIN 10 CFSM 1.01 IN 13.73

05131500 Little Fork River at Littlefork, Minn.

LOCATION.--Lat 48°23'55", long 93°33'56", in NW¼ sec.9, T.68 N., R.25 W., Koochiching County, on left bank 100 ft downstream from highway bridge at town of Littlefork, 0.3 mile downstream from bridge on State Highway 217, 1.5 miles upstream from Beaver Creek, and 18 miles upstream from mouth.

DRAINAGE AREA.--1,730 sq mi, approximately.

PERIOD OF RECORD.--June to November 1909, April to November 1910, April 1911 to June 1917, September 1917, October 1917 to March 1919 (gage heights only), June 1928 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,073.06 ft above mean sea level, datum of 1929. June 23, 1909, to Mar. 4, 1917, nonrecording gage at same site and datum. Mar. 5 to Sept. 30, 1917, and June 22, 1928, to July 20, 1937, nonrecording gage, at site 100 ft upstream at same datum. Nonrecording gage 1.2 miles upstream at datum 9.0 ft higher (used as supplementary gage during periods of backwater from Rainy River).

AVERAGE DISCHARGE.--48 years (1911-16, 1928-71), 1,030 cfs (8.09 inches per year).

EXTREMES.--Current year: Maximum discharge, 15,000 cfs Apr. 20 (gage height, 28.49 ft, backwater from ice); maximum gage height, 28.78 ft Apr. 20 (backwater from ice); minimum discharge, 111 cfs Aug. 29, 30 (gage height, 5.41 ft).
Period of record: Maximum discharge, 25,000 cfs Apr. 18, 1916, May 11, 1950 (gage height, 37.00 ft); minimum daily, 15 cfs Feb. 9-22, 1963.

REMARKS.--Records good except those for winter periods, which are fair. Records of chemical analyses and suspended-sediment loads for the current year are published in Part 2 of this report.

REVISIONS (WATER YEARS).--WSP 955: Drainage area. WSP 1508: 1913, 1916, 1928-32, 1934.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	200	3,360	1,000	285	167	128	180	3,700	3,200	1,290	241	120
2	187	3,660	980	280	166	127	190	3,510	2,720	1,350	238	133
3	180	3,710	960	270	164	128	195	3,320	2,340	1,280	223	156
4	175	3,530	950	260	160	128	200	3,160	2,030	1,160	216	195
5	167	3,380	930	255	159	130	205	3,050	1,810	1,010	212	247
6	160	3,270	920	248	158	131	212	2,950	1,670	884	205	248
7	156	3,170	910	240	155	133	230	2,780	1,530	803	195	238
8	162	2,950	890	235	151	134	340	2,570	1,370	799	186	238
9	232	2,470	870	230	149	134	450	2,370	1,250	771	181	236
10	838	1,930	830	227	148	135	900	2,190	1,140	707	180	237
11	1,880	1,840	790	224	147	137	2,000	2,020	1,080	648	171	224
12	2,740	1,770	780	222	145	138	3,500	1,860	1,050	648	172	205
13	3,360	1,700	750	218	143	139	5,200	1,720	1,090	646	159	202
14	3,950	1,440	720	213	141	142	6,000	1,580	1,090	589	146	201
15	3,600	1,360	680	209	139	148	7,000	1,480	1,040	519	145	218
16	3,070	1,270	640	208	138	151	9,000	1,380	940	487	144	266
17	2,810	1,240	610	205	136	153	11,500	1,280	879	453	141	261
18	2,430	1,200	580	200	134	155	13,000	1,230	1,470	433	137	236
19	2,150	1,180	550	198	132	156	14,400	1,200	3,730	411	136	214
20	2,030	1,150	520	194	132	157	14,800	1,280	4,250	389	133	203
21	1,720	1,130	490	190	132	158	14,600	1,790	5,240	365	131	191
22	1,560	1,110	460	188	131	158	12,700	2,550	5,620	346	130	182
23	1,420	1,100	430	185	131	158	10,500	2,970	5,340	322	130	175
24	1,340	1,090	400	184	130	159	8,530	5,290	4,600	304	125	169
25	1,250	1,080	380	180	129	158	7,120	8,250	3,740	285	126	162
26	1,220	1,070	370	180	129	157	6,040	8,990	3,030	275	124	157
27	1,440	1,060	350	178	128	157	5,210	7,980	2,490	260	120	151
28	1,960	1,050	340	175	128	158	4,650	6,700	2,010	260	116	156
29	2,990	1,030	320	172	------	159	4,240	5,550	1,620	254	113	166
30	3,180	1,010	310	170	------	161	3,930	4,630	1,370	245	111	216
31	3,260	------	300	168	------	167	------	3,840	------	238	116	------
TOTAL	51,817	56,310	20,010	6,591	4,002	4,534	167,022	103,170	70,739	18,431	4,903	6,003
MEAN	1,672	1,877	645	213	143	146	5,567	3,328	2,358	595	158	200
MAX	3,950	3,710	1,000	285	167	167	14,800	8,990	5,620	1,350	241	266
MIN	156	1,010	300	168	128	127	180	1,200	879	238	111	120
CFSM	.97	1.09	.37	.12	.08	.08	3.22	1.92	1.36	.34	.09	.12
IN.	1.11	1.21	.43	.14	.09	.10	3.59	2.22	1.52	.40	.11	.13

CAL YR 1970 TOTAL 592,441 MEAN 1,623 MAX 17,100 MIN 88 CFSM .94 IN 12.74
WTR YR 1971 TOTAL 513,532 MEAN 1,407 MAX 14,800 MIN 111 CFSM .81 IN 11.04

NOTE.--Backwater from Rainy River Oct. 15 to Nov. 14.

05132000 Big Fork River at Big Falls, Minn.

LOCATION.--Lat 48°11'45", long 93°48'25", in sec.35, T.155 N., R.25 W., Koochiching County, on left bank at village of Big Falls, 700 ft downstream from falls, 0.3 mile downstream from bridge on U.S. Highway 71, and 4.8 miles upstream from Sturgeon River.

DRAINAGE AREA.--1,460 sq mi, approximately.

PERIOD OF RECORD.--August to November 1909, April to November 1910, April 1911 to September 1912 (gage heights and discharge measurements only), June 1928 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,144.71 ft above mean sea level, datum of 1929. Prior to June 10, 1911, nonrecording gage at railroad bridge about 0.4 mile upstream at different datum. June 10, 1911, to Sept. 30, 1912 and June 22, 1928 to Dec. 17, 1937; nonrecording gage at site 200 ft upstream at same datum.

AVERAGE DISCHARGE.--43 years (1928-1971), 686 cfs (6.38 inches per year).

EXTREMES.--Current year: Maximum discharge, 7,100 cfs Apr. 17 (gage height, 11.09 ft, backwater from ice); maximum gage height, 11.71 ft Apr. 16 (backwater from ice); minimum discharge, 142 cfs Aug. 28, 29, 30, 31 (gage height, 3.02 ft).
Period of record: Maximum discharge, 14,800 cfs May 8, 9, 1950; maximum gage height, 17.08 ft May 8, 1950; minimum discharge recorded, 7 cfs Aug. 7, 1939.

REMARKS.--Records good except those for winter periods, which are fair. Powerplant located a quarter of a mile upstream, which caused some diurnal fluctuation at low flows in previous years, was dismantled in 1970. Records of chemical analyses for the current year are published in Part 2 of this report.

REVISIONS (WATER YEARS).--WSP 1308: 1935(M).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	269	1,770	510	300	215	150	170	2,540	1,840	783	265	185
2	256	1,850	515	290	212	150	195	2,450	1,620	710	255	204
3	254	1,830	515	285	212	148	220	2,330	1,440	658	244	205
4	247	1,730	510	280	210	148	210	2,240	1,300	603	235	233
5	243	1,600	510	275	208	146	200	2,200	1,180	558	229	253
6	242	1,450	505	270	205	146	195	2,090	1,090	518	226	253
7	244	1,330	500	265	200	146	195	1,970	980	503	217	255
8	263	1,220	495	260	198	144	200	1,860	912	522	207	249
9	354	1,140	490	255	193	144	250	1,750	836	483	201	234
10	594	1,090	480	250	190	143	500	1,680	754	438	202	232
11	711	1,050	475	245	188	143	1,350	1,600	708	399	202	235
12	791	995	470	242	185	143	3,200	1,520	672	393	195	233
13	1,050	891	465	240	182	143	4,150	1,440	669	421	188	224
14	1,320	734	460	238	180	143	4,820	1,340	664	415	184	214
15	1,290	620	450	235	180	144	4,650	1,270	614	380	181	208
16	1,230	580	440	232	178	146	6,250	1,210	554	371	176	207
17	1,160	570	430	230	175	148	6,830	1,140	568	356	172	204
18	1,090	560	425	230	175	150	6,970	1,140	1,100	331	171	204
19	1,020	550	420	228	172	150	6,270	1,100	1,830	329	167	204
20	958	530	410	225	170	148	5,810	1,190	2,760	328	164	201
21	900	510	405	225	170	146	5,450	1,330	4,010	326	164	203
22	849	500	400	225	168	145	5,000	1,430	3,560	326	160	202
23	823	490	390	222	165	145	4,430	1,660	2,980	325	158	196
24	799	480	380	220	162	144	3,910	3,000	2,420	309	158	195
25	785	475	370	220	162	144	3,480	4,570	1,940	270	160	193
26	795	475	360	220	160	146	3,150	4,860	1,560	279	153	191
27	965	480	345	220	156	148	2,890	4,490	1,330	289	149	193
28	1,350	485	330	218	152	150	2,740	3,850	1,130	290	145	202
29	1,520	490	320	218	------	152	2,660	3,160	975	294	144	218
30	1,560	500	315	215	------	155	2,600	2,590	878	290	147	248
31	1,690	------	310	215	------	160	------	2,150	------	277	146	------
TOTAL	25,622	26,975	13,400	7,493	5,123	4,558	88,945	67,150	42,874	12,774	5,765	6,478
MEAN	827	899	432	242	183	147	2,965	2,166	1,429	412	186	216
MAX	1,690	1,850	515	300	215	160	6,970	4,860	4,010	783	265	255
MIN	242	475	310	215	152	143	170	1,100	554	270	144	185
CFSM	.57	.62	.30	.17	.13	.10	2.03	1.48	.98	.28	.13	.15
IN.	.65	.69	.34	.19	.13	.12	2.27	1.71	1.09	.33	.15	.17

CAL YR 1970 TOTAL 387,791 MEAN 1,062 MAX 10,000 MIN 132 CFSM .73 IN 9.88
WTR YR 1971 TOTAL 307,157 MEAN 842 MAX 6,970 MIN 143 CFSM .58 IN 7.83

05133500 Rainy River at Manitou Rapids, Minn.

(International gaging station)

LOCATION.--Lat 48°38'04", long 93°54'47", in sec.36, T.160 N., R.26 W., Koochiching County, on left bank at Manitou Rapids, 3.5 miles east of Mantiou Post Office and 4 miles west of Indus.

DRAINAGE AREA.--19,400 sq mi, approximately.

PERIOD OF RECORD.--July 1928 to current year. Monthly discharge only for some periods, published in WSP 1308. October 1911 to October 1924 (gage heights only) at site near Birchdale in files of Corps of Engineers. Published as "near Birchdale" 1932-34.

GAGE.--Water-stage recorder. Datum of gage is 1,062.48 ft above mean sea level, datum of 1929. Prior to Nov. 10, 1934, nonrecording gage at site near Birchdale 7 miles downstream at different datum.

AVERAGE DISCHARGE.--43 years, 12,730 cfs (8.91 inches per year).

EXTREMES.--Current year: Maximum discharge, 42,300 cfs Apr. 20 (gage height, 14.92 ft); maximum gage height, 15.41 ft Dec. 7 (backwater from ice); minimum discharge, 4,130 cfs Aug. 28, 29 (gage height, 2.00 ft).
Period of record: Maximum discharge, 71,600 cfs May 12, 1950 (gage height, 21.04 ft); minimum daily, 928 cfs Dec. 26, 1929.

REMARKS.--Records excellent except those for winter periods, which are fair. Diurnal fluctuation caused by powerplant at International Falls. Some regulation at low and medium flows by Rainy and Namakan Lakes.

COOPERATION.--This station is maintained by the United States under agreement with Canada.

REVISIONS (WATER YEARS).--WSP 1055: 1944.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8,510	31,700	24,700	18,600	12,300	10,400	11,200	28,800	31,500	19,600	12,100	5,540
2	7,650	32,000	24,800	18,500	12,200	10,400	11,200	28,500	30,300	19,200	12,000	4,990
3	8,010	32,200	24,400	18,500	12,300	10,400	11,800	28,000	29,400	18,900	12,000	5,450
4	8,570	32,300	25,300	18,400	12,300	10,500	12,500	27,100	28,700	18,800	11,800	5,620
5	8,170	33,000	25,500	18,300	12,200	10,400	12,200	26,700	28,200	18,800	11,400	5,910
6	8,230	32,100	25,400	16,900	12,300	10,500	11,800	26,100	27,900	18,800	10,800	5,750
7	8,350	30,200	25,600	16,600	12,200	10,500	11,400	24,300	27,700	18,400	10,200	5,740
8	7,980	29,200	15,200	16,500	12,200	10,500	11,800	23,600	27,500	17,000	9,660	5,200
9	7,930	28,500	12,800	16,400	12,200	10,500	12,700	23,100	27,200	16,500	8,790	5,590
10	8,070	28,000	12,100	15,700	12,200	10,400	13,900	22,600	26,900	15,200	7,210	5,530
11	8,430	27,600	12,200	15,700	12,200	10,500	16,400	22,300	26,700	14,300	6,370	5,820
12	10,100	27,600	17,100	16,300	12,200	10,500	19,700	21,900	26,600	14,100	5,910	5,560
13	12,900	27,300	25,000	16,300	12,200	10,600	22,300	21,500	26,500	14,100	5,930	5,440
14	15,100	26,600	24,700	15,100	12,200	10,500	24,400	19,600	26,600	14,200	6,070	5,630
15	16,700	26,000	24,700	14,500	12,200	10,500	25,800	18,400	26,200	12,900	6,090	5,800
16	16,900	25,600	24,600	14,500	12,200	10,400	27,200	18,100	23,400	12,200	6,580	5,250
17	16,500	24,200	22,000	14,600	12,200	10,600	33,300	17,700	21,800	12,300	6,460	5,290
18	16,100	23,700	23,500	14,400	12,100	10,500	37,900	17,500	21,400	12,400	6,280	5,390
19	15,800	23,600	24,000	14,300	12,100	10,500	38,200	17,400	21,900	12,300	6,310	5,100
20	15,500	23,200	24,100	14,400	12,200	10,500	41,300	17,500	23,800	12,300	5,870	4,950
21	18,500	22,200	23,900	14,400	12,100	10,500	41,900	17,900	25,600	12,200	5,800	4,900
22	20,300	21,400	23,700	13,500	12,200	10,500	40,300	18,600	27,700	12,200	5,710	4,970
23	22,100	20,700	23,800	13,400	12,300	10,600	39,900	19,600	28,200	12,100	5,650	5,160
24	22,700	19,700	24,200	14,000	12,100	10,500	38,100	21,900	27,500	12,200	5,840	5,220
25	22,700	19,800	22,800	14,100	10,600	10,500	35,700	27,600	26,200	12,000	5,710	5,050
26	22,600	20,300	22,000	14,300	10,800	10,600	33,500	36,300	24,900	12,100	5,650	5,000
27	23,100	20,300	21,900	14,200	10,500	10,700	31,700	39,100	23,800	12,000	5,470	5,040
28	25,200	22,200	19,300	14,100	10,500	10,700	30,200	38,200	22,900	12,000	5,170	5,520
29	28,800	22,200	18,700	12,800	------	10,700	29,300	37,000	21,200	12,400	5,030	5,320
30	30,300	22,000	18,700	12,500	------	10,700	29,000	35,200	20,200	12,500	5,180	5,330
31	31,300	------	18,700	12,300	------	10,900	------	33,200	------	12,200	5,480	------
TOTAL	493,100	775,400	675,400	474,100	335,300	326,500	756,600	775,300	778,400	446,200	228,520	161,060
MEAN	15,910	25,850	21,790	15,290	11,980	10,530	25,220	25,010	25,950	14,390	7,372	5,369
MAX	31,300	33,000	25,600	18,600	12,300	10,900	41,900	39,100	31,500	19,600	12,100	5,910
MIN	7,650	19,700	12,100	12,300	10,500	10,400	11,200	17,400	20,200	12,000	5,030	4,900
CFSM	.82	1.33	1.12	.79	.62	.54	1.30	1.29	1.34	.74	.38	.28
IN.	.95	1.49	1.30	.91	.64	.63	1.45	1.49	1.49	.86	.44	.31

CAL YR 1970 TOTAL 6,956,290 MEAN 19,060 MAX 56,700 MIN 7,190 CFSM .98 IN 13.34
WTR YR 1971 TOTAL 6,225,880 MEAN 17,060 MAX 41,900 MIN 4,900 CFSM .88 IN 11.94

05134200 Rapid River near Baudette, Minn.

LOCATION.--Lat 48°32'10", long 94°33'45", in NE¼ sec.1, T.158 N., R.31 W., Lake of the Woods County, on left bank 20 ft upstream from bridge on State Highway 72, 1.2 miles downstream from North Branch Rapid River, and 12 miles south of Baudette.

DRAINAGE AREA.--543 sq mi.

PERIOD OF RECORD.--October 1956 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,093.92 ft above mean sea level, datum of 1929 (Minnesota Highway Department bench mark).

AVERAGE DISCHARGE.--15 years, 338 cfs (8.45 inches per year).

EXTREMES.--Current year: Maximum discharge, 2,280 cfs Apr. 11 (gage height, 11.20 ft, backwater from ice); maximum gage height, 11.54 ft Apr. 12 (backwater from ice jam); minimum discharge, 7.6 cfs Oct. 7, 8, Aug. 31.

Period of record: Maximum discharge, 5,500 cfs Apr. 14, 1969 (gage height, 17.86 ft); minimum, 0.1 cfs Aug. 13, 1961 (gage height, 1.18 ft).

Flood of May 11, 1950, reached a stage of 21.1 ft, from information by local residents and Minnesota Highway Department (discharge, about 7,000 cfs).

REMARKS.--Records good except those for winter periods, which are fair.

REVISIONS (WATER YEARS).--WSP 1913: 1962, 1965(M). WSP 2113: 1966.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	14	418	71	23	9.8	11	22	809	425	370	125	9.1
2	10	490	70	23	9.8	10	22	777	371	339	113	9.1
3	9.5	490	70	22	9.6	10	21	732	311	295	98	10
4	9.8	470	68	22	9.5	10	21	735	268	265	84	12
5	9.2	445	66	21	9.5	10	22	753	240	246	72	24
6	8.9	428	63	20	9.4	10	24	700	248	222	62	43
7	7.8	405	60	20	9.3	11	50	648	287	193	57	60
8	7.8	383	58	19	9.3	11	330	603	250	179	51	74
9	9.7	368	56	19	9.2	11	650	560	218	167	45	77
10	13	350	54	18	9.2	11	1,400	518	191	142	37	71
11	13	328	52	18	9.2	11	2,160	483	176	119	32	64
12	20	292	50	17	9.2	12	2,110	450	254	104	29	56
13	27	238	49	16	9.2	13	1,470	418	495	97	26	48
14	59	210	48	16	9.3	13	1,100	383	479	104	19	38
15	88	185	46	15	9.4	14	985	345	396	110	15	31
16	93	175	44	15	9.6	15	969	313	387	119	14	27
17	88	170	42	14	9.8	15	969	287	596	119	15	23
18	99	165	40	13	9.8	16	1,000	272	591	114	15	21
19	90	158	38	13	9.7	16	1,440	257	523	121	14	19
20	84	145	36	12	9.6	15	1,670	257	714	135	11	17
21	75	135	34	12	9.5	15	1,550	255	940	135	10	16
22	72	120	33	12	9.5	14	1,380	236	849	125	9.7	15
23	72	105	32	11	9.5	14	1,260	315	717	110	8.4	14
24	76	98	30	11	9.4	13	1,140	741	621	99	9.4	15
25	79	92	29	11	9.4	13	1,030	1,160	555	88	9.4	13
26	81	85	28	11	10	13	946	1,170	508	85	9.1	12
27	118	80	27	11	11	14	876	1,040	470	85	8.8	13
28	165	76	26	10	11	14	841	884	440	109	8.7	13
29	186	74	25	10	------	15	815	725	415	151	8.4	15
30	188	72	24	10	------	17	799	590	392	159	8.1	27
31	269	------	24	10	------	20	------	492	------	144	7.8	------
TOTAL	2,141.7	7,250	1,393	475	268.7	407	27,072	17,908	13,327	4,850	1,031.8	886.2
MEAN	69.1	242	44.9	15.3	9.60	13.1	902	578	444	156	33.3	29.5
MAX	269	490	71	23	11	20	2,160	1,170	940	370	125	77
MIN	7.8	72	24	10	9.2	10	21	236	176	85	7.8	9.1
CFSM	.13	.45	.08	.03	.02	.02	1.66	1.06	.82	.29	.06	.05
IN.	.15	.50	.10	.03	.02	.03	1.85	1.23	.91	.33	.07	.06

CAL YR 1970 TOTAL 155,861.1 MEAN 427 MAX 3,410 MIN 5.0 CFSM .79 IN 10.68
WTR YR 1971 TOTAL 77,010.4 MEAN 211 MAX 2,160 MIN 7.8 CFSM .39 IN 5.28

05139500 Warroad River near Warroad, Minn.

LOCATION.--Lat 48°52'00", long 95°21'20", in SE¼NE¼ sec.12, T.162 N., R.37 W., Roseau County, on downstream hand-rail of bridge near center of span, 0.5 mile upstream from Bulldog Run and 2.5 miles south of Warroad.

DRAINAGE AREA.--110 sq mi, approximately.

PERIOD OF RECORD.--March 1946 to current year. Monthly discharge only for some periods, published in WSP 1308.

GAGE.--Nonrecording gage read daily, and crest-stage gage. Datum of gage is 1,070.74 ft above mean sea level, datum of 1929 (levels by Stanley Johnson, consulting engineer and instructor at University of North Dakota).

AVERAGE DISCHARGE.--25 years, 44.7 cfs (5.52 inches per year).

EXTREMES.--Current year: Maximum discharge, 499 cfs Apr. 12 (gage height, 6.95 ft); minimum, 0.1 cfs on several days in August and September; minimum gage height observed, 1.55 ft Aug. 30.
Period of record: Maximum discharge, 1,780 cfs Apr. 15, 1965 (gage height, 9.95 ft); no flow at times.

REMARKS.--Records good except those for winter periods, which are fair.

REVISIONS (WATER YEARS).--WSP 1308: 1949(M). WSP 1508: 1947(M).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.5	73	10	6.2	2.1	1.5	4.7	133	46	17	17	.10
2	4.2	78	10	6.1	2.0	1.5	4.7	119	38	16	12	.20
3	7.1	93	9.6	6.1	1.9	1.4	5.0	119	36	14	8.0	.20
4	5.4	115	9.3	6.0	1.8	1.4	5.5	121	31	14	4.2	.20
5	5.6	104	9.0	6.0	1.7	1.4	9.0	119	28	13	3.5	.30
6	5.4	92	8.8	5.9	1.6	1.5	20	107	24	9.6	2.8	.40
7	5.9	89	8.6	5.9	1.6	1.5	115	96	24	8.2	2.6	.60
8	5.6	85	8.4	5.8	1.5	1.6	250	95	21	6.9	2.2	.40
9	6.4	77	8.3	5.7	1.4	1.6	220	94	20	6.1	1.8	.30
10	6.9	70	8.2	5.6	1.4	1.6	300	89	20	4.7	1.8	.20
11	6.9	62	8.0	5.4	1.3	1.7	412	81	19	3.8	2.0	.20
12	8.8	52	8.0	5.3	1.3	1.7	466	76	23	3.5	1.8	.20
13	14	40	7.8	5.2	1.3	1.8	402	69	23	2.9	1.5	.20
14	19	35	7.6	5.1	1.3	1.8	383	64	18	3.2	1.4	.20
15	25	33	7.5	5.0	1.3	1.9	325	58	19	3.6	1.5	.20
16	22	31	7.5	4.8	1.3	1.9	304	53	19	3.8	1.3	.20
17	19	30	7.4	4.7	1.3	2.0	289	52	18	3.8	1.0	.20
18	20	28	7.2	4.6	1.3	2.3	254	50	19	4.1	.90	.20
19	18	27	7.1	4.5	1.4	2.6	247	52	19	4.2	.60	.20
20	16	24	7.1	4.3	1.4	2.9	250	53	20	4.9	.40	.10
21	16	21	7.0	4.1	1.4	3.0	257	58	19	4.7	.50	.10
22	19	18	7.0	4.0	1.4	3.1	268	61	17	5.6	.40	.20
23	21	16	6.8	3.8	1.4	3.2	252	64	16	6.6	.30	.10
24	22	14	6.8	3.6	1.4	3.3	200	77	13	6.9	.30	.10
25	23	13	6.6	3.4	1.5	3.3	186	105	12	8.0	.30	.10
26	27	12	6.6	3.3	1.6	3.5	162	104	9.3	8.8	.30	.10
27	35	11	6.6	3.1	1.6	3.6	148	107	9.0	9.9	.10	.10
28	42	11	6.4	2.8	1.6	4.0	142	116	13	13	.20	.10
29	48	11	6.4	2.6	------	4.3	137	101	21	15	.10	.10
30	65	10	6.2	2.4	------	4.6	134	94	17	17	.10	.10
31	69	------	6.2	2.3	------	4.7	------	64	------	16	.10	------
TOTAL	611.7	1,375	238.0	143.6	42.1	76.2	6,151.9	2,651	631.3	258.8	71.00	5.90
MEAN	19.7	45.8	7.68	4.63	1.50	2.46	205	85.5	21.0	8.35	2.29	.20
MAX	69	115	10	6.2	2.1	4.7	466	133	46	17	17	.60
MIN	3.5	10	6.2	2.3	1.3	1.4	4.7	50	9.0	2.9	.10	.10
CFSM	.18	.42	.07	.04	.01	.02	1.86	.78	.19	.08	.02	.002
IN.	.21	.47	.08	.05	.01	.03	2.08	.90	.21	.09	.02	.001

CAL YR 1970 TOTAL 27,247.00 MEAN 74.6 MAX 1,000 MIN .30 CFSM .68 IN 9.21
WTR YR 1971 TOTAL 12,256.50 MEAN 33.6 MAX 466 MIN .10 CFSM .31 IN 4.14

05140000 Bulldog Run near Warroad, Minn.

LOCATION.--Lat 48°51'30", long 95°20'20", in SE¼ sec.7, T.162 N., R.36 W., Roseau County, near right bank 5 ft downstream from culvert on county highway, 0.8 mile upstream from mouth and 3 miles south of Warroad.

DRAINAGE AREA.--14.2 sq mi.

PERIOD OF RECORD.--March 1946 to November 1951, June 1966 to current year.

GAGE.--Nonrecording gage read once daily, and crest-stage gage. Altitude of gage is 1,090 ft (from topographic map).

AVERAGE DISCHARGE.--10 years (1946-51, 1967-71), 3.84 cfs (3.67 inches per year).

EXTREMES.--Current year: Maximum discharge, 160 cfs Apr. 8 (gage height, 6.00 ft, from graph based on gage readings); maximum gage height, 6.09 ft Apr. 7 (backwater from ice); no flow for many days.
Period of record: Maximum discharge, 420 cfs June 10, 1947 (gage height, 6.91 ft); maximum gage height, 7.04 ft Apr. 9, 1969 (from floodmark, backwater from ice); no flow for many days in most years.

REMARKS.--Records good.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0	.60				0	.60	2.5	.90	1.0	.30	
2	0	.50				0	1.0	2.4	.90	.50	.20	
3	0	.30				0	1.2	2.1	.80	.60	0	
4	0	.20				0	2.0	1.8	.80	.60	0	
5	0	.10				0	4.5	1.6	.80	.60	0	
6	0	.10				0	9.0	1.4	.80	.60	0	
7	0	0				0	45	1.2	.80	.60	0	
8	0	0				0	137	.60	.80	.60	0	
9	0	0				0	90	.60	.70	.80	0	
10	0	0				0	38	.30	.90	.80	0	
11	0	0				0	25	.20	.90	.80	0	
12	0	0				0	21	.10	.80	.80	0	
13	0	0				0	13	0	.60	.70	0	
14	0	0				0	8.5	0	.60	.70	0	
15	0	0				0	6.4	0	.60	.60	0	
16	0	0				0	5.8	0	.60	.60	0	
17	0	0				0	4.7	0	.50	.60	0	
18	0	0				0	3.5	0	.50	.60	0	
19	0	0				0	5.7	0	.50	.60	0	
20	0	0				0	6.7	0	.50	.60	0	
21	0	0				.10	6.7	0	.30	.60	0	
22	.10	0				.50	5.7	0	.30	.60	0	
23	.10	0				.40	5.2	.90	.20	.60	0	
24	.10	0				.20	4.4	3.5	.10	.30	0	
25	.10	0				.10	3.1	3.5	.10	.30	0	
26	.10	0				.10	2.9	3.3	0	.30	0	
27	.10	0				.10	2.6	3.0	.10	.30	0	
28	.20	0				.10	2.4	2.9	.30	.30	0	
29	.40	0			------	.20	2.2	2.7	2.4	.30	0	
30	.50	0			------	.30	2.4	1.7	1.7	.30	0	
31	.70	------			------	.60	------	1.4	------	.30	0	------
TOTAL	2.40	1.80	0	0	0	2.70	466.20	37.70	19.80	17.50	.50	0
MEAN	.077	.060	0	0	0	.087	15.5	1.22	.66	.56	.016	0
MAX	.70	.60	0	0	0	.60	137	3.5	2.4	1.0	.30	0
MIN	0	0	0	0	0	0	.60	0	0	.30	0	0
CFSM	.005	.004	0	0	0	.006	1.09	.09	.05	.04	.001	0
IN.	.006	.004	0	0	0	.007	1.22	.10	.05	.05	.001	0

CAL YR 1970 TOTAL 2,692.40 MEAN 7.38 MAX 166 MIN 0 CFSM .52 IN 7.05
WTR YR 1971 TOTAL 548.60 MEAN 1.50 MAX 137 MIN 0 CFSM .11 IN 1.44

05140500 East Branch Warroad River near Warroad, Minn.

LOCATION.--Lat 48°51'30", long 95°18'40", in SE¼SE¼ sec.8, T.162 N., R.36 W., Roseau County, near right bank on piling at upstream side of highway bridge, 2 miles upstream from mouth and 3 miles south of Warroad.

DRAINAGE AREA.--102 sq mi.

PERIOD OF RECORD.--March 1946 to September 1954, June 1966 to current year (fragmentary prior to April 1947). Monthly discharge only for some periods, published in WSP 1308.

GAGE.--Nonrecording gage read once daily and crest-stage gage. Altitude of gage is 1,080 ft (from topographic map).

AVERAGE DISCHARGE.--12 years (1947-54, 1967-71), 23.9 cfs (3.18 inches per year).

EXTREMES.--Current year: Maximum discharge, 227 cfs Apr. 12 (gage height, 7.50 ft, from graph based on gage readings); no flow Aug. 18 to Sept. 6.
Period of record: Maximum discharge, 1,340 cfs June 11, 1947 (gage height, 9.36 ft, from floodmark); no flow at times in most years.

REMARKS.--Records fair.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.6	48	7.1	3.5	2.2	2.3	23	52	26	11	9.0	0
2	1.7	60	6.9	3.5	2.2	2.3	25	47	24	8.2	7.2	0
3	1.7	69	6.8	3.4	2.2	2.3	26	51	19	8.2	3.1	0
4	1.7	56	6.6	3.4	2.1	2.4	26	46	18	7.0	2.0	0
5	1.9	49	6.3	3.3	2.1	2.4	29	43	17	6.5	2.4	0
6	2.2	43	6.0	3.3	2.1	2.4	42	35	19	3.8	2.4	0
7	2.8	39	5.8	3.2	2.0	2.4	55	52	17	3.8	2.0	.10
8	2.4	37	5.6	3.2	2.0	2.4	80	33	17	3.5	1.7	.30
9	2.1	33	5.5	3.1	2.0	2.5	100	33	20	3.2	1.7	.30
10	3.2	29	5.4	3.1	2.0	2.5	115	35	21	3.7	1.4	.30
11	6.6	26	5.3	3.1	2.0	2.5	168	48	21	1.7	1.4	.10
12	7.2	23	5.2	3.0	2.0	2.6	211	38	20	4.9	1.4	.20
13	10	21	5.1	3.0	2.0	2.7	183	22	20	12	1.2	.20
14	9.5	19	5.0	2.9	2.0	3.0	154	13	17	13	1.0	.20
15	9.0	18	4.9	2.9	2.0	3.4	133	14	15	13	.40	.40
16	9.2	17	4.8	2.8	2.0	3.7	106	18	15	12	.10	.50
17	9.2	16	4.7	2.8	2.0	4.0	117	22	23	12	.10	.50
18	12	15	4.6	2.8	2.0	4.1	108	22	20	9.7	0	.60
19	11	15	4.5	2.7	2.1	4.2	112	21	19	3.3	0	.60
20	11	14	4.4	2.7	2.1	4.2	130	21	19	3.3	0	.50
21	11	12	4.4	2.6	2.1	4.1	144	20	19	3.2	0	.20
22	11	11	4.3	2.6	2.1	4.0	130	17	16	4.5	0	.10
23	14	10	4.2	2.5	2.2	3.9	104	18	9.9	1.4	0	.10
24	13	9.5	4.1	2.5	2.2	3.8	83	39	8.5	1.4	0	.10
25	13	9.0	4.0	2.5	2.2	3.7	73	74	7.8	1.4	0	.10
26	15	8.5	3.9	2.4	2.2	3.6	67	52	8.0	1.4	0	.20
27	21	8.2	3.8	2.4	2.2	3.6	55	83	11	2.3	0	.90
28	25	7.8	3.8	2.4	2.3	4.0	52	73	14	4.5	0	.90
29	26	7.5	3.7	2.3	------	4.8	51	44	13	7.5	0	.80
30	34	7.2	3.7	2.3	------	6.5	52	44	10	14	0	2.2
31	39	------	3.6	2.3	------	18	------	30	------	15	0	------
TOTAL	338.0	727.7	154.0	88.5	56.6	118.3	2,754	1,200	504.2	200.4	38.50	10.40
MEAN	10.9	24.6	4.97	2.85	2.09	3.82	91.8	38.7	16.8	6.46	1.24	.35
MAX	39	69	7.1	3.5	2.3	18	211	52	26	15	9.0	2.2
MIN	1.6	7.2	3.6	2.3	2.0	2.3	23	13	7.8	1.4	0	0
CFSM	.11	.24	.05	.03	.02	.04	.90	.38	.16	.06	.01	.003
IN.	.12	.27	.06	.03	.02	.04	1.00	.44	.18	.07	.01	.003

CAL YR 1970 TOTAL 14,622.30 MEAN 40.1 MAX 510 MIN 0 CFSM .39 IN 5.33
WTR YR 1971 TOTAL 6,202.60 MEAN 17.0 MAX 211 MIN 0 CFSM .17 IN 2.26

MISSISSIPPI RIVER MAIN STEM

05201000 Winnibigoshish Lake near Deer River, Minn.

LOCATION.--Lat 47°25'42", long 94°03'00", in sec.25, T.146 N., R.27 W., Itasca County, at dam on Mississippi River, 1 mile northwest of Little Winnibigoshish Lake, 14 miles northwest of town of Deer River, and at mile 1,248 upstream from Ohio River.

DRAINAGE AREA.--1,442 sq mi.

PERIOD OF RECORD.--April 1884 to current year. Prior to October 1941 monthend contents only, published in WSP 1308. Published as Winnibigoshish Reservoir near Deer River October 1941 to September 1956.

GAGE.--Water-stage recorder. Datum of gage is 1,289.47 ft above mean sea level, adjustment of 1912. Prior to July 8, 1949, nonrecording gage at same site and datum.

EXTREMES.--Current year: Maximum contents, 590,700 acre-ft July 13 (gage height, 10.36 ft); minimum, 413,800 acre-ft Apr. 7 (gage height, 7.68 ft).
Period of record: Maximum contents observed, 996,500 acre-ft July 30, 1905 (gage height, 14.45 ft); minimum observed, 33,680 acre-ft below zero of capacity table Oct. 20, 1931 (gage height, -0.69 ft).

REMARKS.--Reservoir is formed by Winnibigoshish Lake and several other natural lakes controlled by a concrete and timber dam, completed in 1884; storage began in 1884. Capacity between gage heights 6.00 ft and 14.2 ft (maximum allowable range) is 653,570 acre-ft of which 416,270 acre-ft is controlled storage between gage heights 6.00 ft and 12.0 ft (normal operating range). Contents shown herein are contents above gage height 0.00 ft. Water is used to benefit navigation on Mississippi River below Minneapolis.

COOPERATION.--Records furnished by Corps of Engineers in terms of cfs-days and converted to acre-feet by Geological Survey.

REVISIONS (WATER YEARS).--WSP 1308: 1905(M).

MONTH END GAGE HEIGHT AND CONTENTS, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

Date	Gage height (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept.30	8.99	498,700	-
Oct. 31	9.27	517,100	+18,400
Nov. 30	9.43	527,600	+10,500
Dec. 31	9.36	523,000	-4,600
CAL YR 1970	-	-	-54,400
Jan. 31	8.94	495,500	-27,500
Feb. 28	8.49	465,900	-29,600
Mar. 31	7.83	422,900	-43,000
Apr. 30	8.65	476,400	+53,500
May 31	9.45	529,000	+52,600
June 30	10.10	572,400	+43,400
July 31	10.06	569,700	-2,700
Aug. 31	9.76	549,200	-20,500
Sept.30	9.59	538,100	-11,100
WTR YR 1971	-	-	+39,400

05201500 Mississippi River at Winnibigoshish Dam near Deer River, Minn.

LOCATION.--Lat 47°25'42", long 94°03'00", in SW¼ sec.25, T.146 N., R.27 W., Itasca County, at dam 1 mile northwest of Little Winnibigoshish Lake, 14 miles northwest of town of Deer River, and at mile 1,248 upstream from Ohio River.

DRAINAGE AREA.--1,442 sq mi.

PERIOD OF RECORD.--May 1884 to current year. Monthly discharge only for some periods, published in WSP 1308.

GAGE.--Water-stage recorder on headwater and nonrecording gage on tailwater. Tailwater gage read twice daily. Datum of gage is 1,289.47 ft above mean sea level, adjustment of 1912. Prior to July 8, 1949, nonrecording headwater gage at same site and datum.

AVERAGE DISCHARGE (UNADJUSTED).--87 years, 509 cfs (4.79 inches per year).

EXTREMES.--Current year: Maximum daily discharge, 1,200 cfs Mar. 11-15; minimum daily, 101 cfs Apr. 12-13. Period of record: Maximum daily discharge, 4,370 cfs Aug. 6, 1905; no flow at times in several years.

REMARKS.--Daily discharge is computed on the basis of modified weir formula and corrected to conform with discharge measurements, the head being determined from readings of headwater and tailwater gages. Flow completely regulated by Winnibigoshish Lake (see preceding page).

COOPERATION.--Daily discharge computed by Corps of Engineers; five discharge measurements made and records reviewed by Geological Survey.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	115	115	715	840	990	1,130	1,180	105	108	110	210	105
2	115	115	710	840	985	1,130	1,180	105	108	110	210	105
3	115	230	710	840	985	1,120	1,180	105	108	110	210	105
4	115	445	705	845	985	1,120	1,180	105	108	110	210	105
5	115	440	775	1,050	985	1,120	1,180	106	108	110	210	105
6	115	440	770	1,040	990	1,120	1,170	106	108	110	210	105
7	115	540	845	1,040	990	1,120	1,170	106	108	110	210	105
8	115	540	840	1,030	990	1,120	964	106	108	110	210	105
9	115	540	835	1,030	990	1,190	753	106	108	110	210	105
10	115	515	835	1,020	990	1,180	530	106	108	110	105	105
11	115	635	835	1,030	990	1,200	276	107	108	110	105	105
12	115	635	835	1,020	995	1,200	101	107	108	110	105	105
13	115	630	835	1,020	1,000	1,200	101	107	108	110	105	105
14	115	630	835	1,020	1,000	1,200	102	107	109	217	105	105
15	115	625	835	1,020	1,000	1,200	105	107	109	212	105	105
16	115	625	835	1,020	1,000	1,190	103	107	109	212	105	105
17	115	625	835	1,020	1,000	1,190	103	107	110	212	105	105
18	115	625	840	1,020	1,010	1,190	103	107	110	212	105	105
19	115	625	840	1,020	1,010	1,190	103	107	110	212	105	105
20	115	625	840	1,020	1,010	1,190	103	108	110	212	105	105
21	115	725	845	1,020	1,010	1,190	103	108	110	212	105	208
22	115	730	845	1,020	1,010	1,190	103	108	110	212	105	312
23	115	715	845	1,020	1,010	1,190	103	108	110	212	105	412
24	115	710	845	1,020	1,010	1,190	104	108	110	212	105	510
25	115	700	845	1,020	1,010	1,190	104	108	110	212	105	510
26	115	500	845	1,020	1,080	1,180	104	108	110	212	105	505
27	115	505	845	1,020	1,140	1,180	104	108	110	212	105	500
28	115	510	845	1,010	1,140	1,180	104	108	110	212	105	500
29	115	515	840	1,000	------	1,180	105	108	110	212	105	500
30	115	515	840	1,000	------	1,180	105	108	110	210	105	500
31	115	------	840	1,000	------	1,180	------	108	------	210	105	------
TOTAL	3,565	16,325	25,385	30,935	28,305	36,330	12,726	3,315	3,271	5,247	4,200	6,557
MEAN	115	544	819	998	1,011	1,172	424	107	109	169	135	219
MAX	115	730	845	1,050	1,140	1,200	1,180	108	110	217	210	510
MIN	115	115	705	840	985	1,120	101	105	108	110	105	105
CFSM	.08	.38	.57	.69	.70	.81	.29	.07	.08	.12	.09	.15
IN.	.09	.42	.65	.80	.73	.94	.33	.09	.08	.14	.11	.17

CAL YR 1970 TOTAL 235,356 MEAN 645 MAX 1,290 MIN 115 CFSM .45 IN 6.07
WTR YR 1971 TOTAL 176,161 MEAN 483 MAX 1,200 MIN 101 CFSM .34 IN 4.54

05206000 Leech Lake at Federal Dam, Minn.

LOCATION.--Lat 47°12'23", long 94°18'31", in lot 2, sec.14, T.143 N., R.29 W., Cass County, at head of Leech Lake River on Waboose Bay, 5 miles southwest of town of Federal Dam.

DRAINAGE AREA.--1,163 sq mi.

PERIOD OF RECORD.--April 1884 to current year. Monthend contents only for some periods, published in WSP 1308. Prior to October 1956, published as "Leech Lake Reservoir."

GAGE.--Water-stage recorder. Datum of gage is 1,293.23 ft above mean sea level, adjustment of 1912. Prior to Dec. 31, 1884, nonrecording gage 0.5 mile north of outlet to Leech Lake River at datum 5.76 ft lower. Dec. 31, 1884, to May 24, 1931, nonrecording gage 0.5 mile north of outlet to Leech Lake River at present datum.

EXTREMES.--Current year: Maximum contents, 283,600 acre-ft July 13 (gage height, 2.00 ft); minimum, 128,900 acre-ft Oct. 7 (gage height, 0.70 ft).
Period of record: Maximum contents observed, 734,300 acre-ft June 30, 1916 (gage height, 5.18 ft); minimum observed, 72,830 acre-ft below zero of capacity table Sept. 30, Nov. 19, 1934, Jan. 9, 1935 (gage height, -1.18 ft).

REMARKS.--Reservoir is formed by Leech Lake and several other natural Lakes controlled by concrete and timber dam; storage began in 1884; original timber structure completed in 1884, replaced by present dam in 1902. Capacity between gage heights 0.00 ft and 5.24 ft (maximum allowable range) is 689,780 acre-ft, of which 356,570 acre-ft is controlled storage between gage heights 0.00 and 3.00 ft (normal operating range). Contents shown herein are contents above gage height -0.50 ft. Water is used to benefit navigation on Mississippi River below Minneapolis.

COOPERATION.--Records furnished by Corps of Engineers in terms of cfs-days and converted to acre-feet by Geological Survey.

MONTHEND GAGE HEIGHT AND CONTENTS, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

Date	Gage height (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept.30	0.78	137,600	-
Oct. 31	1.10	172,400	+34,800
Nov. 30	1.16	178,900	+6,500
Dec. 31	1.06	168,000	-10,900
CAL YR 1970	-	-	-18,500
Jan. 31	.90	150,600	-17,400
Feb. 28	.85	145,200	-5,400
Mar. 31	.80	139,800	-5,400
Apr. 30	1.46	215,400	+75,600
May 31	1.75	252,100	+36,700
June 30	1.88	268,600	+16,500
July 31	1.83	262,200	-6,400
Aug. 31	1.64	238,200	-24,000
Sept.30	1.40	207,900	-30,300
WTR YR 1971	-	-	+70,300

05206500 Leech Lake River at Federal Dam, Minn.

LOCATION.--Lat 47°14'45", long 94°13'12", in sec.29, T.144 N., R.28 W., Cass County, on right bank at dam on Leech Lake River at town of Federal Dam, 2 miles downstream from natural outlet of Leech Lake.

DRAINAGE AREA.--1,163 sq mi.

PERIOD OF RECORD.--May 1884 to current year. Monthly discharge only for some periods, published in WSP 1308.

GAGE.--Water-stage recorder, headwater gage, and nonrecording tailwater gage. Datum of gage is 1,293.23 ft above mean sea level, adjustment of 1912. Prior to July 3, 1948, nonrecording headwater gage at same datum. May 27 to Nov. 30, 1929, nonrecording gage at site 600 ft downstream at different datum.

AVERAGE DISCHARGE.--87 years, 348 cfs, unadjusted (4.06 inches per year).

EXTREMES.--Current year: Maximum daily discharge, 675 cfs Feb. 24; minimum daily 93 cfs Oct. 4-9, 11.
Period of record: Maximum daily discharge, 2,520 cfs June 7, 1957 (result of dam failure); no flow at times.

REMARKS.--Discharge computed on basis of modified weir formula, the head being obtained from readings on tailwater gage and mean gage height from recording headwater gage. Flow completely regulated by Leech Lake (see preceding page).

COOPERATION.--Computations of daily discharge furnished by Corps of Engineers; five discharge measurements made and records reviewed by Geological Survey.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	95	98	475	509	540	483	649	102	105	105	105	102
2	97	97	475	509	535	524	630	102	105	105	105	103
3	97	194	475	509	540	538	630	102	105	105	104	102
4	93	294	475	505	555	553	630	103	105	105	104	103
5	93	294	555	505	560	555	633	103	105	105	104	104
6	93	294	543	509	560	556	632	103	105	105	104	104
7	93	294	548	545	563	556	632	104	105	105	104	104
8	93	294	550	535	557	555	432	104	105	105	104	104
9	93	294	548	535	563	554	237	104	105	105	104	103
10	96	294	543	535	565	554	94	104	105	105	104	103
11	93	388	543	530	563	554	95	104	105	105	104	104
12	95	388	540	525	560	553	96	104	105	105	104	104
13	95	388	540	525	565	553	96	104	105	105	104	104
14	96	388	540	520	585	553	96	104	105	105	104	104
15	96	388	536	512	590	555	96	104	105	105	104	104
16	95	388	528	575	612	555	96	104	105	105	104	104
17	95	388	528	565	640	555	98	104	105	105	104	103
18	95	388	524	565	650	555	97	104	105	105	104	103
19	95	485	524	565	650	555	98	104	105	105	104	103
20	95	485	524	565	660	555	100	104	105	105	104	103
21	95	480	524	575	665	555	99	104	105	105	104	200
22	95	475	524	575	662	555	100	104	105	105	104	300
23	95	470	509	575	666	635	100	104	105	105	103	396
24	95	400	502	575	675	630	100	104	105	105	103	490
25	95	425	509	575	555	630	100	104	105	105	103	490
26	95	380	509	560	557	630	100	104	105	105	103	485
27	97	380	509	560	528	630	100	104	105	105	103	490
28	97	380	509	560	439	655	100	104	105	105	103	490
29	97	380	509	560	------	645	102	104	105	105	103	492
30	97	380	509	550	------	632	102	104	105	105	102	490
31	97	------	509	540	------	631	------	104	------	105	101	------
TOTAL	2,948	10,671	16,136	16,848	16,360	17,799	7,170	3,215	3,150	3,255	3,214	6,391
MEAN	95.1	356	521	543	584	574	239	104	105	105	104	213
MAX	97	485	555	575	675	655	649	104	105	105	105	492
MIN	93	97	475	505	439	483	94	102	105	105	101	102
CFSM	.08	.31	.45	.47	.50	.49	.21	.09	.09	.09	.09	.18
IN.	.09	.34	.52	.54	.52	.57	.23	.10	.10	.10	.10	.20

CAL YR 1970 TOTAL 135,141 MEAN 370 MAX 879 MIN 52 CFSM .32 IN 4.32
WTR YR 1971 TOTAL 107,157 MEAN 294 MAX 675 MIN 93 CFSM .25 IN 3.43

05210500 Pokegama Lake near Grand Rapids, Minn.

LOCATION.--Lat 47°10'00", long 93°33'20", in NW¼ sec.17, T.54 N., R.25 W., Itasca County, at narrows on U.S. Highway 169, 4 miles south of Grand Rapids.

DRAINAGE AREA.--3,265 sq mi.

PERIOD OF RECORD.--April 1884 to current year. Prior to October 1941 monthend contents only, published in WSP 1308. Published as Pokegama Reservoir near Grand Rapids October 1941 to September 1956.

GAGE.--Water-stage recorder. Datum of gage is 1,264.89 ft above mean sea level, adjustment of 1912. Prior to May 30, 1949, nonrecording gage at Pooles Arm of Pokegama Lake 5 miles northwest at same datum.

EXTREMES.--Current year: Maximum contents, 65,120 acre-ft May 12 (gage height, 9.56 ft); minimum, 22,180 acre-ft Mar. 23 (gage height, 6.31 ft).
Period of record: Maximum contents, 121,400 acre-ft May 8, 1897 (gage height, 13.50 ft); minimum observed, 4,520 acre-ft below zero of capacity table Sept. 30, 1934 (gage height, 4.12 ft).

REMARKS.--Reservoir is formed by Pokegama Lake and several other natural lakes controlled by concrete dam; storage began in 1884; original timber dam completed in 1884, replaced by present structure in 1888-89. Capacity between gage heights 6.00 ft and 12.0 ft (maximum allowable range) is 81,720 acre-ft, of which 53,150 acre-ft is controlled storage between gage heights 6.00 ft and 10.00 ft (normal operating range). Contents shown herein are contents above gage height 4.50 ft. Water is used to benefit navigation on Mississippi River below Minneapolis.

COOPERATION.--Records furnished by Corps of Engineers in terms of cfs-days and converted to acre-feet by Geological Survey.

REVISIONS (WATER YEARS).--WSP 1914: 1897(M).

MONTHEND GAGE HEIGHT AND CONTENTS, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

	Gage height (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept.30	7.77	40,820	+4,980
Oct. 31	8.15	45,800	+4,980
Nov. 30	7.55	37,940	-7,860
Dec. 31	7.15	32,850	-5,090
CAL YR 1970	-	-	-5,750
Jan. 31	6.68	26,880	-5,970
Feb. 28	6.47	24,220	-2,660
Mar. 31	6.52	24,850	+630
Apr. 30	9.21	60,120	+35,270
May 31	9.27	60,970	+850
June 30	9.30	61,410	+440
July 31	8.93	56,170	-5,240
Aug. 31	8.90	55,780	-390
Sept.30	9.14	59,130	+3,350
WTR Yr 1971	-	-	+18,310

05211000 Mississippi River at Grand Rapids, Minn.

LOCATION.--Lat 47°13'56", long 93°31'48", in SW¼NW¼ sec.21, T.55 N., R.25 W., Itasca County, in super-calendar room of Blandin Paper Mill in Grand Rapids, 400 ft upstream from bridge on U.S. Highway 169, 2.5 miles upstream from Prairie River, and at mile 1,182 upstream from Ohio River.

DRAINAGE AREA.--3,370 sq mi, approximately.

PERIOD OF RECORD.--October 1883 to current year. Monthly discharge only for some periods, published in WSP 1308. Published as "at Pokegama Dam near Grand Rapids" 1942-44.

GAGE.--Water-stage recorder. Datum of gage is 1,242.00 ft above mean sea level, adjustment of 1912. See WSP 1914 for history of changes prior to Jan. 17, 1951.

AVERAGE DISCHARGE.--88 years, 1,139 cfs.

EXTREMES.--Current year: Maximum discharge, 3,710 cfs Apr. 20 (gage height, 10.59 ft, backwater from Prairie River); minimum daily, 190 cfs Aug. 15, 16.
Period of record: Maximum discharge, 12,500 cfs Sept. 3, 1948 (gage height, 15.2 ft, from floodmark), caused by dam failure at gage, from rating curve extended above 4,500 cfs by logarithmic plotting; maximum daily, 5,250 cfs Sept. 5, 8, 1905; no flow at times in several years.

REMARKS.--Records good except those for winter periods, which are fair. Flow completely regulated by Pokegama Lake (see preceding page). Backwater from Prairie River occurs at times in most years.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	269	295	970	1,480	1,550	1,820	2,240	1,140	1,040	895	333	223
2	267	339	970	1,470	1,570	1,840	2,240	1,120	850	750	343	239
3	267	603	960	1,460	1,600	1,850	2,240	1,070	780	783	305	249
4	254	699	990	1,450	1,620	1,860	2,010	910	750	722	327	242
5	245	688	1,210	1,440	1,620	1,870	2,090	840	730	734	325	231
6	265	688	1,320	1,440	1,620	1,880	2,200	830	730	695	315	228
7	280	699	1,280	1,430	1,610	1,880	2,230	790	670	628	310	239
8	282	707	1,350	1,420	1,610	1,880	2,350	810	536	578	300	233
9	285	710	1,340	1,410	1,600	1,930	2,610	800	452	540	290	234
10	282	703	1,320	1,400	1,600	1,880	2,800	820	300	578	260	237
11	278	890	1,310	1,400	1,720	1,870	3,000	830	288	540	230	236
12	276	930	1,310	1,400	1,800	1,850	3,100	810	286	533	205	235
13	273	925	1,300	1,390	1,810	1,840	3,240	920	309	466	200	239
14	276	925	1,300	1,460	1,820	1,850	3,260	980	323	460	195	233
15	278	920	1,300	1,820	1,890	1,850	3,100	960	325	386	190	244
16	282	920	1,300	1,800	1,880	1,860	3,010	920	352	349	190	247
17	282	920	1,320	1,780	1,880	1,930	3,070	880	498	368	203	247
18	278	915	1,360	1,760	1,880	2,040	3,170	720	634	379	206	251
19	278	1,020	1,380	1,730	1,870	2,080	3,360	730	783	362	219	256
20	280	1,150	1,400	1,700	1,870	2,050	3,590	760	1,020	359	210	241
21	280	1,420	1,410	1,710	1,870	2,080	3,200	740	1,350	390	236	247
22	282	1,400	1,410	1,720	1,850	2,090	2,100	700	1,300	477	255	249
23	282	1,380	1,440	1,700	1,840	2,110	1,760	700	1,100	470	232	251
24	288	1,340	1,540	1,680	1,830	2,120	1,470	710	703	446	230	249
25	290	1,270	1,540	1,670	1,820	2,150	1,350	770	746	449	245	247
26	282	1,200	1,530	1,650	1,820	2,160	1,140	940	710	484	242	245
27	292	1,120	1,530	1,630	1,820	2,170	1,100	1,050	758	424	233	327
28	285	1,000	1,520	1,610	1,810	2,190	1,100	1,070	771	414	223	634
29	273	980	1,510	1,600	------	2,220	1,110	1,060	734	386	229	762
30	282	980	1,500	1,580	------	2,180	1,130	1,040	758	327	247	1,090
31	295	------	1,490	1,570	------	2,200	------	1,020	------	330	235	------
TOTAL	8,608	27,736	41,410	48,760	49,080	61,580	70,370	27,440	20,586	15,702	7,763	9,085
MEAN	278	925	1,336	1,573	1,753	1,986	2,346	885	686	507	250	303
MAX	295	1,420	1,540	1,820	1,890	2,220	3,590	1,140	1,350	895	343	1,090
MIN	245	295	960	1,390	1,550	1,820	1,100	700	286	327	190	223

CAL YR 1970 TOTAL 502,246 MEAN 1,376 MAX 1,540 MIN 245
WTR YR 1971 TOTAL 388,120 MEAN 1,063 MAX 3,590 MIN 190

05212700 Prairie River near Taconite, Minn.

LOCATION.--Lat 47°23'20", long 93°22'50", in NW¼SW¼ sec.27, T.57 N., R.24 W., Itasca County, on left bank 125 ft upstream from highway bridge, 1.5 miles downstream from outlet of Lawrence Lake and 5 miles north of Taconite.

DRAINAGE AREA.--360 sq mi, approximately.

PERIOD OF RECORD.--April 1967 to current year.

GAGE.--Water-stage recorder. Prior to Aug. 31, 1967, nonrecording gage at site 125 ft downstream at same datum.

EXTREMES.--Current year: Maximum discharge, 2,570 cfs Apr. 21 (gage height, 11.00 ft); minimum, 7.0 cfs Oct. 5 (gage height, 1.75 ft).
Period of record: Maximum discharge, 3,260 cfs Apr. 17, 1969 (gage height, 11.81 ft); minimum, 7.0 cfs Oct. 5, 1970 (gage height, 1.75 ft).

REMARKS.--Records good except those for winter periods, which are fair.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	16	169	145	87	74	81	110	966	542	643	86	35
2	15	189	140	86	73	80	110	915	523	569	84	35
3	15	206	134	85	73	80	113	860	492	502	80	35
4	10	220	131	84	73	80	112	814	447	458	76	37
5	8.0	236	128	84	72	81	110	763	399	410	69	38
6	9.0	251	125	83	72	83	107	708	353	362	67	40
7	13	259	122	82	72	84	105	654	311	324	64	41
8	25	265	119	82	71	84	102	601	270	287	60	43
9	39	276	117	81	71	84	119	551	237	256	56	43
10	49	281	114	81	71	84	155	508	211	229	57	52
11	52	282	113	80	71	84	260	466	202	204	55	54
12	63	279	111	80	72	85	403	419	186	186	53	55
13	72	273	109	79	72	86	583	382	170	176	52	54
14	77	263	106	79	73	88	730	341	155	162	53	55
15	80	250	105	79	74	89	845	309	143	155	52	54
16	85	240	103	78	76	91	1,070	280	134	151	51	53
17	90	235	101	78	78	94	1,420	254	200	143	50	53
18	94	229	100	78	80	96	1,820	234	251	147	56	52
19	96	220	98	78	81	99	2,100	220	271	145	56	50
20	98	211	97	77	80	101	2,430	234	417	139	56	50
21	100	199	96	77	80	105	2,550	242	519	134	51	50
22	100	184	95	77	79	109	2,440	246	591	128	50	49
23	103	182	94	76	80	112	2,220	266	648	123	49	47
24	104	188	93	76	82	117	1,970	325	717	115	47	45
25	104	188	92	76	84	120	1,710	392	778	107	46	42
26	106	183	91	76	84	123	1,490	435	814	105	45	40
27	121	176	90	75	84	127	1,320	468	824	103	42	40
28	125	166	89	75	83	125	1,200	492	807	99	41	52
29	128	157	88	75	------	121	1,100	515	767	96	39	57
30	138	151	88	74	------	115	1,020	534	719	92	38	56
31	152	------	88	74	------	112	------	542	------	88	36	------
TOTAL	2,287.0	6,608	3,322	2,452	2,135	3,020	29,824	14,936	13,098	6,838	1,717	1,407
MEAN	73.8	220	107	79.1	76.3	97.4	994	482	437	221	55.4	46.9
MAX	152	282	145	87	84	127	2,550	966	824	643	86	57
MIN	8.0	151	88	74	71	80	102	220	134	88	36	35
CFSM	.21	.61	.30	.22	.21	.27	2.76	1.34	1.21	.61	.15	.13
IN.	.24	.68	.34	.25	.22	.31	3.08	1.54	1.35	.71	.18	.15

CAL YR 1970 TOTAL 82,388.0 MEAN 226 MAX 1,970 MIN 8.0 CFSM .63 IN 8.51
WTR YR 1971 TOTAL 87,644.0 MEAN 240 MAX 2,550 MIN 8.0 CFSM .67 IN 9.06

05216860 Swan River near Calumet, Minn.

LOCATION.--Lat 47°17'20", long 93°13'54", in SW¼ sec.35, T.56 N., R.23 W., Itasca County, on left bank 1.0 mile downstream from Snowball Creek, 2.1 miles downstream from bridge on U.S. Highway 65 at outlet of Swan Lake and 3.1 miles southeast of Calumet.

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

GAGE.--Water-stage recorder. Datum of gage is 1,331.19 ft above mean sea level, datum of 1929. Prior to June 5, 1964, reference point at same site and datum.

AVERAGE DISCHARGE.--7 years, 63.8 cfs.

EXTREMES.--Current year: Maximum discharge, 710 cfs Apr. 18 (gage height, 5.84 ft); minimum, 0.7 cfs Oct. 3, 6 (gage height, 4.23 ft).
Period of record: Maximum discharge, 773 cfs Apr. 15, 1969 (gage height, 5.83 ft); minimum, 0.7 cfs Oct. 3, 6, 1970 (gage height, 4.23 ft).

REMARKS.--Records good. Flow affected by natural storage in Swan Lake.

COOPERATION.--Additional discharge measurements and gage readings furnished by M. A. Hanna Mining Company.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.3	79	46	36	26	33	38	173	145	157	27	18
2	2.6	86	45	35	28	33	38	157	127	143	26	18
3	1.8	88	49	33	30	32	38	140	116	122	26	19
4	2.8	83	57	34	31	32	38	130	109	116	24	24
5	2.7	84	55	34	30	32	38	128	93	106	24	27
6	2.6	84	53	33	29	32	38	126	84	99	21	24
7	2.9	82	54	33	29	33	38	118	79	92	20	26
8	6.8	79	52	32	28	33	41	116	72	78	19	21
9	18	90	50	32	26	34	47	108	61	75	17	22
10	29	94	49	31	25	35	62	99	60	70	21	27
11	41	98	47	31	25	34	101	93	69	62	21	29
12	49	100	46	31	25	34	182	82	68	57	18	28
13	54	102	46	30	24	33	274	78	66	51	24	28
14	56	100	45	29	24	36	373	74	63	51	24	24
15	57	94	43	29	24	39	428	65	60	48	21	23
16	56	86	42	29	24	38	496	65	53	47	19	23
17	55	82	41	28	24	36	619	62	142	42	20	22
18	55	76	41	28	23	35	687	61	233	50	27	21
19	51	73	40	28	24	34	659	69	294	46	34	19
20	49	67	40	28	25	33	656	79	364	45	37	16
21	48	67	39	27	24	32	622	88	383	43	35	14
22	47	60	40	27	24	32	540	97	369	41	38	14
23	45	61	41	27	24	31	469	117	336	37	38	12
24	45	57	40	27	24	31	404	143	306	33	33	13
25	47	55	38	27	26	31	354	165	270	26	34	12
26	46	51	40	27	26	31	309	185	246	27	31	12
27	57	48	41	27	30	31	275	195	225	29	26	12
28	59	46	41	27	34	33	236	190	202	33	23	17
29	64	44	39	26	------	34	213	178	189	33	22	17
30	69	44	38	25	------	34	189	172	170	33	24	32
31	72	------	37	24	------	35	------	163	------	30	22	------
TOTAL	1,194.5	2,260	1,375	915	736	1,036	8,502	3,716	5,054	1,922	796	614
MEAN	38.5	75.3	44.4	29.5	26.3	33.4	283	120	168	62.0	25.7	20.5
MAX	72	102	57	36	34	39	687	195	383	157	38	32
MIN	1.8	44	37	24	23	31	38	61	53	26	17	12

CAL YR 1970 TOTAL 18,973.9 MEAN 52.0 MAX 502 MIN 1.8
WTR YR 1971 TOTAL 28,120.5 MEAN 77.0 MAX 687 MIN 1.8

05218500 Sandy Lake at Libby, Minn.

LOCATION.--Lat 46°47'20, long 93°19'10", in sec.25, T.50 N., R.24 W., Aitkin County, on dam on Sandy River at Libby, 1.2 miles above mouth, and 14 miles north of McGregor.

DRAINAGE AREA.--421 sq mi.

PERIOD OF RECORD.--July to December 1893, October to December 1894, July 1895 to current year. Monthend contents only for some periods, published in WSP 1308. Published as Sandy Lake Reservoir at Libby October 1941 to September 1956.

GAGE.--Water-stage recorder. Datum of gage is 1,207.71 ft above mean sea level, adjustment of 1912. Prior to Sept. 23, 1949, nonrecording gage at same site and datum.

EXTREMES.--Current year: Maximum contents, 98,140 acre-ft Apr. 26 (gage height, 13.22 ft); minimum, 26,280 acre-ft Mar. 30 (gage height, 5.98 ft).
Period of record: Maximum contents, 167,200 acre-ft May 19, 1950 (gage height, 17.51 ft); minimum observed, 5,950 acre-ft below zero of capacity table Jan. 20, 1921 (gage height, 0.65 ft).

REMARKS.--Reservoir is formed by Sandy, Flowage, Snake, and Aitkin Lakes controlled by concrete dam. Storage began in 1893; original timber crib dam completed in 1895, replaced by present structure in 1911. Capacity between gage heights 7.00 ft and 14.00 ft (minimum allowable limit to top of structure) is 73,330 acre-ft, of which 37,550 acre-ft is controlled storage between gage heights 7.00 ft and 11.00 ft (normal operating range). Contents shown herein are contents above gage height 1.72 ft. Water is used to benefit navigation on Mississippi River below Minneapolis.

COOPERATION.--Records furnished by Corps of Engineers in terms of cfs-days and converted to acre-feet by Geological Survey.

MONTHEND GAGE HEIGHT AND CONTENTS, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

Date	Gage height (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept.30	8.25	45,660	-
Oct. 31	8.86	51,210	+5,550
Nov. 30	8.90	51,570	+360
Dec. 31	7.74	41,180	-10,390
CAL YR 1970	-	-	-430
Jan. 31	6.52	31,120	-10,060
Feb. 28	6.47	30,720	-400
Mar. 31	5.90	26,360	-4,360
Apr. 30	12.87	93,800	+67,440
May 31	9.12	53,650	-40,150
June 30	9.06	53,080	-570
July 31	9.07	53,180	+100
Aug. 31	8.82	50,840	-2,340
Sept.30	8.59	48,710	-2,130
WTR YR 1971	-	-	+3,050

05219000 Sandy River at Sandy Lake Dam, at Libby, Minn.

LOCATION.--Lat 46°47'20", long 93°19'10", in sec.25, T.50 N., R.24 W., Aitkin County, on dam on Sandy River at Libby, 1.2 miles above mouth, and 14 miles north of McGregor.

DRAINAGE AREA.--421 sq mi.

PERIOD OF RECORD.--July 1893 to March 1894, July 1894, November 1894 to March 1895, August 1895 to current year. Monthly discharge only for some periods, published in WSP 1308. Published as "below Sandy Lake Reservoir" 1893-1916.

GAGE.--Water-stage recorders on headwater and tailwater. Datum of gages is 1,207.71 ft above mean sea level, adjustment of 1912. Prior to June 20, 1949, nonrecording gages at same site and datum.

AVERAGE DISCHARGE (UNADJUSTED).--76 years (1895-1971), 208 cfs (6.71 inches per year).

EXTREMES.--Current year: Maximum daily discharge, 2,120 cfs May 7, 9; no flow Apr. 10-13.
Period of record: Maximum daily discharge, 3,740 cfs July 12, 1897; no flow at times.

REMARKS.--Discharge computed on basis of head over dam, using modified weir formula, head being obtained from headwater and tailwater recorder records. Flow completely regulated by Sandy Lake (see preceding page).

COOPERATION.--Two discharge measurements made and records reviewed by Geological Survey. Computations of daily discharge furnished by Corps of Engineers.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10	10	218	220	170	30	78	1,780	470	111	92	29
2	10	10	218	218	168	30	78	1,870	485	111	92	29
3	10	95	264	216	170	30	90	1,940	490	115	92	29
4	10	92	266	216	166	30	170	1,980	309	115	92	29
5	10	90	430	216	164	28	142	2,010	321	117	92	29
6	10	87	424	216	162	28	142	2,080	327	120	92	29
7	10	163	413	214	160	28	142	2,120	333	120	43	29
8	10	160	409	216	160	28	96	2,110	336	123	48	29
9	10	160	392	214	42	104	96	2,120	345	126	47	29
10	10	155	391	214	42	100	0	2,080	354	43	47	29
11	10	190	384	214	42	100	0	1,990	357	44	47	29
12	10	234	319	210	41	98	0	1,520	360	45	48	29
13	10	408	305	205	42	180	0	1,230	360	45	48	29
14	10	554	309	206	40	160	60	1,020	365	10	48	29
15	10	565	311	204	39	152	308	1,040	363	10	48	29
16	10	536	309	200	38	200	440	1,010	366	10	48	29
17	10	565	310	194	36	205	415	510	579	10	48	29
18	10	565	305	190	36	199	439	530	740	10	48	29
19	10	560	305	190	34	233	489	330	740	10	48	29
20	10	557	302	188	34	170	522	342	438	178	48	29
21	10	556	299	192	32	158	586	336	435	176	46	29
22	10	548	299	192	32	123	601	330	417	178	46	29
23	10	542	296	184	32	97	820	535	186	178	46	94
24	10	339	294	184	32	97	1,140	545	189	178	46	92
25	10	361	292	182	32	94	1,200	840	192	176	46	92
26	10	224	294	180	32	94	1,300	950	198	178	46	92
27	10	218	284	178	33	100	1,310	925	204	86	48	92
28	10	214	284	178	36	98	1,560	920	108	89	29	92
29	10	214	220	176	------	93	1,640	920	111	89	29	92
30	10	218	224	174	------	93	1,800	920	105	90	29	90
31	10	------	212	170	------	93	------	925	------	90	29	------
TOTAL	310	9,190	9,582	6,151	2,047	3,273	15,664	37,758	10,583	2,981	1,656	1,374
MEAN	10.0	306	309	198	73.1	106	522	1,218	353	96.2	53.4	45.8
MAX	10	565	430	220	170	233	1,800	2,120	740	178	92	94
MIN	10	10	212	170	32	28	0	330	105	10	29	29
CFSM	.02	.73	.73	.47	.17	.25	1.24	2.89	.84	.23	.13	.11
IN.	.03	.81	.85	.54	.18	.29	1.38	3.34	.94	.26	.15	.12

CAL YR 1970 TOTAL 67,886 MEAN 186 MAX 1,460 MIN 10 CFSM .44 IN 6.00
WTR YR 1971 TOTAL 100,569 MEAN 276 MAX 2,120 MIN 0 CFSM .66 IN 8.89

05220500 Mississippi River below Sandy River, near Libby, Minn.

LOCATION.--Lat 46°47'23", long 93°19'43", in SE¼NE¼ sec.25, T.50 N., R.24 W., Aitkin County, on right bank 600 ft downstream from Sandy River, 0.8 mile northwest of Libby, and at mile 1,106 upstream from Ohio River.

DRAINAGE AREA.--5,060 sq mi, approximately.

PERIOD OF RECORD.--April 1930 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,204.55 ft above mean sea level, adjustment of 1912. Prior to July 28, 1931, nonrecording gage at site 600 ft upstream at datum 3.16 ft higher.

AVERAGE DISCHARGE.--41 years, 1,949 cfs (5.23 inches per year).

EXTREMES.--Current year: Maximum discharge, 8,300 cfs Apr. 24 (gage height, 15.70 ft); minimum daily, 360 cfs Oct. 2.
Period of record: Maximum discharge, 16,000 cfs May 17, 1950 (gage height, 20.02 ft); minimum, 83 cfs Nov. 16, 1936 (gage height, 1.44 ft).

REMARKS.--Records good except those for winter periods, which are fair. Flow regulated by powerplants and Winnibigoshish, Leech, Pokegama, and Sandy Lakes (see p. 102, 104, 106, 110).

REVISIONS (WATER YEARS).--WSP 1914: 1958.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	365	790	2,060	1,980	1,900	1,970	2,450	6,820	3,030	2,490	802	516
2	360	848	2,040	1,970	1,890	1,950	2,500	6,500	2,930	2,460	769	512
3	375	949	2,020	1,970	1,880	1,930	2,560	6,170	2,840	2,400	759	486
4	392	1,040	2,010	1,970	1,880	1,910	2,640	5,900	2,580	2,260	754	486
5	399	1,220	2,000	1,960	1,870	1,890	2,750	5,600	2,440	2,160	730	495
6	390	1,310	2,050	1,960	1,870	1,860	2,870	5,250	2,270	2,060	729	495
7	380	1,390	2,110	1,950	1,880	1,840	3,000	4,920	2,150	1,960	704	474
8	430	1,420	2,200	1,950	1,890	1,810	3,200	4,610	2,040	1,770	644	457
9	480	1,480	2,280	1,940	1,900	1,850	3,460	4,370	1,850	1,620	599	470
10	540	1,590	2,310	1,940	1,910	1,870	3,770	4,240	1,650	1,490	599	478
11	580	1,740	2,320	1,940	1,920	1,880	4,200	4,130	1,570	1,320	572	478
12	610	1,890	2,300	1,950	1,940	1,910	4,710	3,850	1,600	1,190	535	486
13	622	2,120	2,260	1,950	1,970	1,950	5,010	3,370	1,600	1,160	564	482
14	632	2,230	2,230	1,950	2,000	2,010	5,270	3,120	1,550	1,120	598	478
15	626	2,200	2,200	1,950	2,020	2,070	5,670	3,060	1,460	1,020	581	470
16	614	2,190	2,160	2,000	2,030	2,150	6,100	2,950	1,390	977	546	461
17	622	2,190	2,140	2,070	2,040	2,180	6,590	2,520	1,840	869	531	482
18	660	2,190	2,120	2,110	2,050	2,220	7,040	2,370	2,810	894	559	491
19	663	2,180	2,110	2,110	2,050	2,260	7,360	2,090	2,650	1,010	611	495
20	644	2,200	2,090	2,100	2,050	2,270	7,630	2,010	2,670	1,110	647	499
21	625	2,170	2,070	2,100	2,040	2,290	7,850	2,230	2,900	1,050	690	505
22	647	2,060	2,050	2,090	2,030	2,280	8,030	2,440	3,110	1,000	686	498
23	626	1,880	2,030	2,080	2,020	2,270	8,190	2,540	3,120	1,010	678	538
24	623	1,800	2,020	2,060	2,010	2,260	8,290	2,670	3,120	1,060	664	538
25	620	1,840	2,010	2,040	2,000	2,260	8,230	3,190	3,000	1,060	620	538
26	632	1,900	2,010	2,030	2,000	2,270	8,090	3,520	2,810	1,020	572	529
27	667	2,050	2,000	2,010	1,990	2,280	7,900	3,600	2,650	954	564	529
28	693	2,130	2,000	1,990	1,980	2,290	7,670	3,610	2,470	981	546	546
29	738	2,100	1,990	1,970	------	2,310	7,390	3,570	2,460	943	529	629
30	749	2,080	1,990	1,940	------	2,370	7,100	3,510	2,510	908	512	860
31	740	------	1,980	1,920	------	2,400	------	3,390	------	869	503	------
TOTAL	17,744	53,177	65,160	61,950	55,010	65,060	167,520	118,120	71,070	42,195	19,397	15,401
MEAN	572	1,773	2,102	1,998	1,965	2,099	5,584	3,810	2,369	1,361	626	513
MAX	749	2,230	2,320	2,110	2,050	2,400	8,290	6,820	3,120	2,490	802	860
MIN	360	790	1,980	1,920	1,870	1,810	2,450	2,010	1,390	869	503	457
CFSM	.11	.35	.42	.39	.39	.41	1.10	.75	.47	.27	.12	.10
IN.	.13	.39	.48	.46	.40	.48	1.23	.87	.52	.31	.14	.11

CAL YR 1970 TOTAL 761,775 MEAN 2,087 MAX 6,130 MIN 360 CFSM .41 IN 5.60
WTR YR 1971 TOTAL 751,804 MEAN 2,060 MAX 8,290 MIN 360 CFSM .41 IN 5.53

05227500 Mississippi River at Aitkin, Minn.

LOCATION.--Lat 46°32'26", long 93°42'26", in W½ sec.24, T.47 N., R.27 W., Aitkin County, on right bank at upstream side of highway bridge at north edge of Aitkin, 1 mile downstream from Mud River and at mile 1,055.9 upstream from Ohio River.

DRAINAGE AREA.--6,140 sq mi, approximately.

PERIOD OF RECORD.--March 1945 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,182.41 ft above mean sea level, datum of 1929 (levels by Corps of Engineers). Mar. 1, 1945, to Mar. 14, 1961, nonrecording gage, and Mar. 15, 1961, to Sept. 30, 1967, water-stage recorder at same site at datum 3.0 ft higher. Diversion channel: nonrecording gage. Datum of gage is 1,182.02 ft above mean sea level, datum of 1929. Apr. 9, 1955, to Apr. 10, 1956, nonrecording gage at site 4 miles downstream at different datum. Apr. 11, 1956, to Sept. 30, 1967, nonrecording gage at same site at datum 3.0 ft higher.

AVERAGE DISCHARGE.--26 years, 2,860 cfs (6.33 inches per year).

EXTREMES.--Current year: Maximum daily discharge, 12,200 cfs Apr. 23; minimum, 376 cfs Oct. 2, 3. River gage: Maximum discharge, 6,450 cfs Apr. 23 (gage height, 15.91 ft); minimum, 376 cfs Oct. 2, 3 (gage height, 1.35 ft). Diversion gage: Maximum discharge, 5,730 cfs Apr. 23 (gage height, 16.10 ft, from graph based on gage readings); no flow on many days.

Period of record: Maximum discharge, 20,000 cfs May 20, 1950 (gage height, 22.49 ft, present datum); minimum, 151 cfs Sept. 1, 1961 (gage height, 0.60 ft).

REMARKS.--Records good except those for winter periods, which are fair. Slight regulation by powerplants and by Winnibigoshish, Leech, Pokegama, and Sandy Lakes (see p. 102, 104, 106, 110). Water diverted at medium and high stages into Aitkin diversion channel 6.5 miles above station, bypasses station and returns to river 15.5 miles below station. Diversion began Apr. 2, 1955. These records include flow in diversion channel.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	386	972	2,400	2,230	2,010	2,040	2,820	10,600	4,910	3,050	1,130	689
2	381	1,010	2,380	2,220	1,990	2,030	2,840	10,200	4,420	2,990	1,060	677
3	384	1,080	2,370	2,220	1,980	2,030	2,840	9,680	4,210	2,920	1,010	677
4	385	1,180	2,340	2,210	1,970	2,010	2,880	9,240	4,060	2,920	973	672
5	387	1,290	2,340	2,200	1,950	1,990	2,910	8,740	3,760	2,690	948	660
6	387	1,520	2,320	2,170	1,930	1,990	2,970	8,290	3,470	2,540	914	659
7	384	1,680	2,300	2,160	1,920	2,000	3,150	7,640	3,180	2,420	887	652
8	417	1,780	2,360	2,150	1,920	2,020	3,550	7,170	2,970	2,300	845	645
9	466	1,900	2,440	2,140	1,910	2,030	4,250	6,560	2,800	2,070	806	624
10	521	1,960	2,480	2,140	1,900	2,040	5,150	6,040	2,600	1,960	774	638
11	576	2,110	2,540	2,130	1,900	2,060	6,400	5,730	2,450	1,810	741	644
12	641	2,260	2,620	2,110	1,890	2,080	7,900	5,520	2,360	1,650	713	649
13	696	2,440	2,650	2,110	1,900	2,130	9,190	5,120	2,360	1,510	695	649
14	723	2,640	2,640	2,100	1,920	2,180	10,000	4,590	2,350	1,430	698	649
15	725	2,710	2,610	2,080	1,940	2,220	9,940	4,270	2,260	1,390	707	636
16	720	2,800	2,580	2,070	1,990	2,280	10,300	3,990	2,150	1,320	715	622
17	715	2,880	2,550	2,110	2,020	2,330	10,900	3,760	2,010	1,240	706	605
18	711	2,900	2,540	2,160	2,040	2,380	11,300	3,400	2,250	1,210	690	607
19	731	2,880	2,520	2,200	2,070	2,420	11,600	3,240	3,050	1,220	689	608
20	751	2,800	2,490	2,210	2,080	2,460	11,800	3,120	3,270	1,290	718	613
21	753	2,720	2,470	2,200	2,090	2,500	12,000	3,140	3,320	1,400	775	624
22	738	2,560	2,450	2,190	2,080	2,530	12,100	3,260	3,460	1,400	831	628
23	754	2,320	2,430	2,170	2,070	2,570	12,200	3,530	3,680	1,330	854	622
24	765	2,190	2,420	2,160	2,060	2,620	12,100	3,800	3,750	1,290	855	629
25	750	2,110	2,400	2,160	2,050	2,650	12,100	4,180	3,810	1,310	845	639
26	757	2,180	2,380	2,150	2,040	2,690	11,900	4,740	3,790	1,340	808	642
27	802	2,280	2,360	2,120	2,040	2,720	11,700	5,090	3,630	1,340	761	646
28	824	2,380	2,330	2,100	2,040	2,730	11,500	5,280	3,330	1,310	734	659
29	850	2,430	2,300	2,080	------	2,760	11,300	5,320	3,230	1,300	714	665
30	910	2,420	2,270	2,060	------	2,780	11,000	5,270	3,110	1,260	699	708
31	967	------	2,250	2,040	------	2,800	------	5,130	------	1,190	709	------
TOTAL	19,957	64,382	75,530	66,550	55,700	72,070	250,590	175,640	96,000	54,400	25,004	19,337
MEAN	644	2,146	2,436	2,147	1,989	2,325	8,353	5,666	3,200	1,755	807	645
MAX	967	2,900	2,650	2,230	2,090	2,800	12,200	10,600	4,910	3,050	1,130	708
MIN	381	972	2,250	2,040	1,890	1,990	2,820	3,120	2,010	1,190	689	605
CFSM	.10	.35	.40	.35	.32	.38	1.36	.92	.52	.29	.13	.11
IN.	.12	.39	.46	.40	.34	.44	1.52	1.06	.58	.33	.15	.12

CAL YR 1970 TOTAL 937,517 MEAN 2,569 MAX 9,110 MIN 381 CFSM .42 IN 5.68
WTR YR 1971 TOTAL 975,160 MEAN 2,672 MAX 12,200 MIN 381 CFSM .44 IN 5.91

05230500 Pine River Reservoir at Cross Lake, Minn.

LOCATION.--Lat 46°40'09", long 94°06'44", in SW¼NW¼ sec.21, T.137 N., R.27 W., Crow Wing County, at dam on Pine River, at outlet of Cross Lake at village of Cross Lake.

DRAINAGE AREA.--562 sq mi.

PERIOD OF RECORD.--March 1886 to current year. Monthend contents only for some periods published in WSP 1308.

GAGE.--Water-stage recorder. Datum of gage is 1,216.32 ft above mean sea level, datum of 1929 (levels by Corps of Engineers). Prior to May 3, 1949, nonrecording gage at same site and datum.

EXTREMES.--Current year: Maximum contents, 98,480 acre-ft May 25 (gage height, 13.01 ft); minimum, 60,990 acre-ft Apr. 8 (gage height, 10.17 ft).
Period of record: Maximum contents observed, 173,600 acre-ft July 10, 1916 (gage height, 18.24 ft); minimum observed, 1,310 acre-ft below zero of capacity table Aug. 20, 1918 (gage height, 1.35 ft).

REMARKS.--Reservoir is formed by Trout, Whitefish, Rush, and Cross Lakes and several other natural Lakes controlled by timber crib dams; storage began in 1886; dam completed in 1886. Capacity between gage heights 10.00 ft and 18.5 ft (maximum allowable range) is 118,710 acre-ft of which 53,280 acre-ft is controlled storage between gage heights 10.00 ft and 14.00 ft (normal operating range). Contents shown herein are contents above a gage height of 2.35 ft. Water is used to benefit navigation on Mississippi River below Minneapolis.

COOPERATION.--Records furnished by Corps of Engineers in terms of cfs-days and converted to acre-feet by Geological Survey.

MONTHEND GAGE HEIGHT AND CONTENTS, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

Date	Gage height (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept.30	11.96	84,340	-
Oct. 31	12.61	93,070	+8,730
Nov. 30	12.50	91,560	-1,510
Dec. 31	12.09	86,060	-5,500
CAL YR 1970	-	-	+1,840
Jan. 31	11.55	78,900	-7,160
Feb. 28	11.20	74,320	-4,580
Mar. 31	10.37	63,550	-10,770
Apr. 30	12.50	91,560	+28,010
May 31	12.87	96,580	+5,020
June 30	12.85	96,300	-280
July 31	12.78	95,350	-950
Aug. 31	12.77	95,230	-120
Sept.30	12.73	94,670	-560
WTR YR 1971	-	-	+10,330

05231000 Pine River at Cross Lake Dam, at Cross Lake, Minn.

LOCATION.--Lat 46°40'09", long 94°06'44", in SW¼NW¼ sec.21, T.137 N., R.27 W., Crow Wing County, at dam at outlet of Cross Lake at Village of Cross Lake.

DRAINAGE AREA.--562 sq mi.

PERIOD OF RECORD.--April 1886 to current year. Monthly discharge only for some periods, published in WSP 1308. Published as "below Pine River Reservoir" 1895-1916, 1929, and as "at Pine River Dam, at Cross Lake" 1941-56.

GAGE.--Water-stage recorder, headwater gage, and nonrecording tailwater gage, read twice daily. Datum of gages is 1,216.32 ft above mean sea level, datum of 1929. Mar. 26, 1886, to May 31, 1929, nonrecording gages on headwater and tailwater at same sites and datum. June 1 to Nov. 30, 1929, nonrecording gage in tailwater at datum 1.60 ft lower. Dec. 1, 1929, to May 2, 1949, nonrecording gage on headwater and Dec. 1, 1929, to August 1949, nonrecording gage on tailwater at present sites and datum.

AVERAGE DISCHARGE (unadjusted).--85 years, 212 cfs (5.12 inches per year).

EXTREMES.--Current year: Maximum daily discharge, 490 cfs Nov. 22; minimum daily, 32 cfs Oct. 12-23, Oct. 28 to Nov. 2.
Period of record: Maximum daily discharge, 2,250 cfs in June 1896 (does not include flow bypassing dam through crevasse); no flow at times.

REMARKS.--Discharge computed principally on basis of modified weir formula, the head being obtained from twice-daily readings on tailwater gage and from headwater recorder. Flow completely regulated by Pine River Reservoir (see preceding page).

COOPERATION.--Computations of daily discharge furnished by Corps of Engineers; two discharge measurements made and records reviewed by Geological Survey.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	35	32	180	280	280	190	460	105	350	190	110	46
2	35	32	180	280	270	190	460	105	355	190	110	46
3	35	48	180	280	280	190	460	105	327	157	102	47
4	35	140	205	280	280	190	460	142	275	155	63	47
5	35	140	280	280	270	190	460	195	275	155	55	47
6	35	150	280	280	270	190	460	199	270	155	40	48
7	35	195	285	280	270	190	460	290	275	155	40	48
8	35	195	285	280	270	190	423	285	275	155	40	49
9	35	195	285	280	280	220	280	285	248	155	40	49
10	35	203	285	280	280	280	285	285	165	155	40	49
11	35	240	285	270	280	280	285	315	110	155	40	49
12	32	244	285	270	280	296	285	360	110	155	40	49
13	32	335	285	270	280	335	285	360	110	155	41	48
14	32	335	285	280	280	335	285	360	110	155	48	48
15	32	335	285	280	280	335	278	360	110	155	48	49
16	32	335	285	280	280	377	120	355	110	155	48	49
17	32	335	285	280	280	480	120	240	110	155	48	49
18	32	335	285	280	280	480	110	235	110	115	48	49
19	32	330	285	280	280	475	110	235	177	212	54	49
20	32	361	285	280	280	475	110	235	195	300	65	49
21	32	440	285	270	280	475	110	235	195	305	65	49
22	32	490	285	270	280	470	110	235	190	300	65	49
23	32	472	280	270	280	470	110	235	190	295	65	49
24	33	180	280	270	258	470	105	243	190	300	40	49
25	33	180	285	270	190	470	105	360	190	295	40	43
26	33	180	285	270	190	460	105	360	190	290	46	43
27	33	180	280	270	190	460	105	360	190	200	46	43
28	32	180	280	270	190	455	105	360	190	198	46	43
29	32	180	280	280	------	455	105	355	190	192	46	43
30	32	180	280	280	------	455	105	355	190	140	46	185
31	32	------	280	280	------	455	------	355	------	110	46	------
TOTAL	1,029	7,177	8,395	8,570	7,408	10,983	7,261	8,504	5,972	5,959	1,671	1,560
MEAN	33.2	239	271	276	265	354	242	274	199	192	53.9	52.0
MAX	35	490	285	280	280	480	460	360	355	305	110	185
MIN	32	32	180	270	190	190	105	105	110	110	40	43
CFSM	.06	.43	.48	.49	.47	.63	.43	.49	.35	.34	.10	.09
IN.	.07	.48	.56	.57	.49	.73	.48	.56	.40	.39	.11	.10

CAL YR 1970 TOTAL 65,405 MEAN 179 MAX 535 MIN 32 CFSM .32 IN 4.33
WTR YR 1971 TOTAL 74,489 MEAN 204 MAX 490 MIN 32 CFSM .36 IN 4.93

05244000 Crow Wing River at Nimrod, Minn.

LOCATION.--Lat 46°38'25", long 94°52'44", in SE¼NW¼ sec.32, T.137 N., R.33 W., Wadena County, on right bank 200 ft upstream from highway bridge, 0.2 mile north of Nimrod, and 0.7 mile upstream from Cat River.

DRAINAGE AREA.--1,010 sq mi, approximately.

PERIOD OF RECORD.--April 1910 to September 1914, July 1930 to current year (winter records incomplete prior to 1940).

GAGE.--Water-stage recorder. Datum of gage is 1,313.27 ft above mean sea level, datum of 1929 (levels by Wadena County Highway Department from Minnesota Highway Department bench mark). Apr. 15, 1910, to Sept. 30, 1914, nonrecording gage at same site, at datum 2.2 ft lower. July 28, 1930, to Nov. 4, 1949, nonrecording gages at same site and datum.

AVERAGE DISCHARGE.--32 years (1939-71), 474 cfs (6.37 inches per year).

EXTREMES.--Current year: Maximum discharge, 1,800 cfs Apr. 10 (gage height, 6.86 ft, backwater from ice); minimum, 212 cfs Nov. 22 (gage height, 2.57 ft, result of freezeup).
Period of record: Maximum discharge, 2,890 cfs Apr. 13, 1965 (gage height, 7.57 ft, backwater from ice); maximum gage height, 7.64 ft Apr. 20, 1950, backwater from ice; minimum discharge observed, 45 cfs Aug. 7, 1936.

REMARKS.--Records good except those for period of no gage height record and those for winter periods, which are fair. Flow affected by natural storage in many lakes.

REVISIONS (WATER YEARS).--WSP 1508: 1910-11, 1913-14, 1937, 1942(M), 1944(M).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	328	502	420	243	225	320	490	907	516	520	488	346
2	319	507	425	241	225	319	495	870	515	500	474	333
3	324	502	430	238	226	319	475	844	521	480	463	313
4	324	492	425	236	228	323	470	823	510	465	439	370
5	321	483	415	234	230	326	470	813	499	470	423	394
6	312	476	410	232	230	330	485	793	486	480	416	439
7	327	469	395	230	232	336	530	768	467	475	394	487
8	356	476	385	229	232	343	780	744	455	455	371	522
9	381	533	380	228	235	350	980	721	440	430	366	544
10	393	557	372	226	238	359	1,450	699	430	415	385	558
11	401	570	367	224	240	369	1,090	677	450	400	374	549
12	413	563	361	222	245	380	1,120	649	475	402	371	530
13	434	550	354	220	246	392	1,130	628	510	415	394	515
14	435	538	348	219	250	400	1,090	609	500	435	415	501
15	429	520	344	218	259	404	1,040	585	480	463	416	495
16	424	502	336	219	269	410	1,010	558	460	425	401	476
17	418	492	331	220	282	413	967	539	450	409	394	440
18	413	481	326	220	293	418	943	525	460	448	395	427
19	406	478	320	221	299	425	980	513	475	550	389	425
20	396	471	314	222	302	427	992	541	470	569	372	425
21	388	470	308	224	304	428	933	539	460	552	365	422
22	394	403	300	225	308	428	867	522	445	547	371	418
23	396	348	293	224	310	428	838	502	430	538	374	394
24	391	470	286	223	314	426	821	530	455	525	396	362
25	398	480	279	223	320	415	808	563	465	511	389	352
26	416	448	272	222	321	410	802	567	470	523	359	353
27	460	430	266	222	322	412	801	562	460	530	333	362
28	475	420	261	222	321	420	857	544	445	528	315	364
29	467	415	256	224	------	430	884	516	440	524	309	368
30	465	420	252	224	------	453	919	519	450	509	310	379
31	487	------	248	225	------	484	------	521	------	505	340	------
TOTAL	12,291	14,466	10,479	7,000	7,506	12,097	25,517	19,691	14,089	14,998	12,001	12,863
MEAN	396	482	338	226	268	390	851	635	470	484	387	429
MAX	487	570	430	243	322	484	1,450	907	521	569	488	558
MIN	312	348	248	218	225	319	470	502	430	400	309	313
CFSM	.39	.48	.33	.22	.27	.39	.84	.63	.47	.48	.38	.42
IN.	.45	.53	.39	.26	.28	.45	.94	.73	.52	.55	.44	.47

CAL YR 1970 TOTAL 171,344 MEAN 469 MAX 1,740 MIN 227 CFSM .46 IN 6.31
WTR YR 1971 TOTAL 162,998 MEAN 447 MAX 1,450 MIN 218 CFSM .44 IN 6.00

NOTE.--No gage-height record June 8 to July 11.

05246500 Gull Lake near Brainerd, Minn.

LOCATION.--Lat 46°24'40", long 94°21'26", in N½ sec.20, T.134 N., R.29 W., Cass County, in pool of dam on Gull River, 800 ft south of outlet of Gull Lake, a quarter of a mile upstream from Gull Lake Dam, and 8 miles northwest of Brainerd.

DRAINAGE AREA.--287 sq mi.

PERIOD OF RECORD.--August 1911 to current year. Prior to October 1941 monthend contents only, published in WSP 1308. Published as Gull Lake Reservoir October 1941 to September 1956.

GAGE.--Water-stage recorder. Datum of gage is 1,188.14 ft above mean sea level, adjustment of 1912. Prior to Aug. 10, 1949, nonrecording gage 800 ft north of present site at same datum.

EXTREMES.--Current year: Maximum contents, 59,980 acre-ft May 24 (gage height, 6.17 ft); minimum, 42,670 acre-ft Mar. 31 (gage height, 4.81 ft).
Period of record: Maximum contents, 74,800 acre-ft June 30, 1914 (gage height, 7.30 ft); minimum observed, 22,250 acre-ft Mar. 20, 1924 (gage height, 3.00 ft).

REMARKS.--Reservoir is formed by Gull Lake and several other natural lakes controlled by concrete dam completed in 1913; storage began in 1912. Capacity between gage heights 5.00 ft and 7.00 ft (maximum allowable range and normal operating range) is 26,020 acre-ft. Contents shown herein are contents above gage height 1.00 ft. Water is used to benefit navigation on Mississippi River below Minneapolis.

COOPERATION.--Records furnished by Corps of Engineers, in terms of cfs-days and converted to acre-feet by Geological Survey.

MONTHEND GAGE HEIGHT AND CONTENTS, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

Date	Gage height (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept.30	5.49	51,150	-
Oct. 31	6.07	58,670	+7,520
Nov. 30	5.89	56,330	-2,340
Dec. 31	5.63	52,960	-3,370
CAL YR 1970	-	-	+5,550
Jan. 31	5.45	50,640	-2,320
Feb. 28	5.39	49,870	-770
Mar. 31	4.81	42,670	-7,200
Apr. 30	5.99	57,620	+14,950
May 31	6.12	59,330	+1,710
June 30	6.11	59,910	-140
July 31	6.05	58,410	-780
Aug. 31	5.97	57,360	-1,050
Sept.30	5.78	54,900	-2,460
WTR YR 1971	-	-	+3,750

05247000 Gull River at Gull Lake Dam, near Brainerd, Minn.

LOCATION.--Lat 46°24'40", long 94°21'12", in sec.20, T.134 N., R.29 W., Cass County, in headwater and tailwater of dam at outlet of Gull Lake, 8 miles northwest of Brainerd.

DRAINAGE AREA.--287 sq mi.

PERIOD OF RECORD.--August 1911 to current year. Monthly discharge only for some periods, published in WSP 1308. Published as "at Gull Lake Reservoir" 1929.

GAGE.--Water-stage recorder on headwater and nonrecording gage on tailwater. Datum of gages is 1,188.14 ft above mean sea level, adjustment of 1912. August 1911 to May 23, 1929, and Dec. 1, 1929, to Aug. 1, 1949, both gages were nonrecording gages at same site and datum. May 24 to Nov. 30, 1929, nonrecording gage 500 ft downstream at different datum.

AVERAGE DISCHARGE (UNADJUSTED).--60 years, 104 cfs (4.92 inches per year).

EXTREMES.--Current year: Maximum daily discharge, 411 cfs May 1; minimum daily, 10 cfs Oct. 1-26.
Period of record: Maximum daily discharge, 1,120 cfs May 15, 1938; no flow at times.

REMARKS.--Discharge computed at dam on basis of modified weir formulas, the head being obtained from twice-daily readings on tailwater gage and from headwater recorder. Flow completely regulated by Gull Lake (see preceding page).

COOPERATION.--Computations of daily discharge furnished by Corps of Engineers; two discharge measurements made and records reviewed by Geological Survey.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10	26	154	117	93	144	175	411	116	124	43	39
2	10	40	153	115	93	142	175	407	115	88	43	39
3	10	70	154	114	95	141	170	284	114	43	42	38
4	10	73	158	112	96	140	167	175	114	109	43	39
5	10	70	158	111	96	140	164	107	114	108	42	40
6	10	71	155	108	96	138	164	108	112	86	42	41
7	10	73	153	108	93	138	162	112	114	95	41	40
8	10	70	148	107	91	135	167	114	111	107	41	40
9	10	105	148	107	91	194	172	112	108	85	40	39
10	10	205	145	104	91	186	194	114	54	84	41	40
11	10	244	144	104	92	183	223	189	55	63	40	40
12	10	280	142	103	91	181	250	185	60	44	39	39
13	10	355	141	104	88	180	277	108	115	45	43	38
14	10	275	140	103	88	178	298	108	112	43	44	38
15	10	270	138	103	86	178	313	109	111	44	43	37
16	10	265	138	101	86	228	250	109	112	44	43	36
17	10	260	132	101	86	227	188	53	88	43	43	35
18	10	255	132	100	86	275	135	55	89	45	43	34
19	10	252	132	100	85	272	147	82	90	115	43	32
20	10	250	129	97	109	264	227	272	91	175	43	31
21	10	245	128	97	108	259	308	188	89	168	42	32
22	10	250	126	97	107	255	310	188	88	168	42	31
23	10	200	126	97	105	248	313	188	85	107	42	82
24	10	155	126	97	125	181	313	194	75	83	42	80
25	10	158	123	97	125	185	312	270	89	45	42	77
26	10	159	126	97	135	181	310	266	85	43	41	76
27	15	159	123	96	151	180	312	185	65	43	40	75
28	20	158	122	96	147	185	405	114	65	44	39	102
29	20	156	119	96	------	180	403	115	68	44	39	103
30	20	154	119	96	------	173	405	115	148	39	39	102
31	24	------	118	95	------	172	------	116	------	44	40	------
TOTAL	359	5,303	4,250	3,180	2,835	5,863	7,409	5,153	2,852	2,418	1,290	1,515
MEAN	11.6	177	137	103	101	189	247	166	95.1	78.0	41.6	50.5
MAX	24	355	158	117	151	275	405	411	148	175	44	103
MIN	10	26	118	95	85	135	135	53	54	39	39	31
CFSM	.04	.62	.48	.36	.35	.66	.86	.58	.33	.27	.14	.18
IN.	.05	.69	.55	.41	.37	.76	.96	.67	.37	.31	.17	.20

CAL YR 1970 TOTAL 36,731 MEAN 101 MAX 714 MIN 10 CFSM .35 IN 4.76
WTR YR 1971 TOTAL 42,427 MEAN 116 MAX 411 MIN 10 CFSM .40 IN 5.50

05267000 Mississippi River near Royalton, Minn.

LOCATION.--Lat 45°51'40", long 94°21'30", in lot 2, sec.20, T.39 N., R.32 W., Morrison County, at plant of Minnesota Power & Light Co., 4 miles northwest of Royalton, 4.5 miles downstream from Swan River, and at mile 956 upstream from Ohio River.

DRAINAGE AREA.--11,600 sq mi, approximately.

PERIOD OF RECORD.--March 1924 to current year.

AVERAGE DISCHARGE.--47 years, 4,177 cfs (4.89 inches per year).

EXTREMES.--Current year: Maximum daily discharge, 20,500 cfs Apr. 14; minimum daily, 872 cfs Oct. 4.
Period of record: Maximum daily discharge, 37,700 cfs Apr. 16, 1965; minimum daily, 254 cfs Nov. 25, 1936.

REMARKS.--Records good. Discharge computed on basis of powerplant records. Flow partly regulated by powerplants and Winnibigoshish, Leech, Pokegama, Sandy, and Gull Lakes and by Pine River Reservoir (see p. 102, 104, 106, 110, 114, 117).

COOPERATION.--Records collected by Minnesota Power & Light Co. under general supervision of Geological Survey, in connection with a Federal Power Commission project.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1,020	2,230	4,210	3,150	2,760	2,840	6,160	17,700	8,650	5,400	2,650	1,810
2	1,030	2,410	3,400	3,130	2,820	2,800	6,300	17,400	7,560	5,650	2,100	1,770
3	1,020	2,400	3,700	3,050	2,760	2,760	6,160	16,400	7,730	5,260	2,500	1,670
4	872	2,450	2,820	3,020	2,760	2,760	6,780	15,600	7,210	4,920	2,130	1,960
5	905	2,180	2,780	2,970	2,740	2,890	7,040	15,100	6,890	4,940	2,050	1,710
6	973	2,540	2,660	2,920	2,730	2,920	7,780	14,000	6,590	4,710	2,120	2,000
7	1,730	2,750	3,260	2,990	2,700	2,960	9,520	13,100	6,250	4,710	1,860	2,190
8	1,290	3,290	3,460	2,960	2,730	2,960	11,900	12,100	5,480	4,510	1,660	2,040
9	1,520	3,580	3,450	2,880	2,720	2,890	14,100	11,100	5,000	4,210	1,730	1,920
10	1,360	4,110	3,430	2,850	2,740	3,120	16,900	10,700	4,960	4,000	1,860	2,150
11	1,840	4,300	3,570	2,900	2,690	3,160	17,700	10,000	4,810	3,800	1,640	1,910
12	1,790	4,560	3,510	2,880	2,460	3,170	18,000	9,250	4,520	3,620	1,480	1,910
13	1,530	4,640	3,660	2,840	2,680	3,240	15,500	8,620	4,230	3,540	1,600	1,870
14	1,420	4,620	3,630	2,870	2,720	3,430	20,500	8,140	4,220	3,270	2,110	1,920
15	1,410	4,430	3,470	2,800	2,670	3,540	20,300	6,930	4,570	2,910	1,990	1,590
16	1,620	5,480	3,320	2,820	2,660	3,870	19,800	6,520	4,710	3,030	1,680	1,560
17	1,640	5,180	3,420	2,930	2,720	3,540	18,700	6,590	4,100	2,960	1,660	1,590
18	1,440	5,210	3,390	2,820	2,800	3,890	18,600	6,460	3,520	2,960	1,700	1,680
19	1,400	5,210	3,300	2,780	2,850	4,060	18,100	6,440	3,920	2,950	1,660	1,540
20	1,700	5,210	3,270	2,900	2,790	4,170	18,400	6,350	4,920	2,950	1,700	1,610
21	1,430	5,000	3,230	2,850	2,810	4,230	18,200	6,330	5,210	2,950	1,900	1,530
22	1,520	4,360	3,010	2,940	2,880	4,230	18,600	6,590	5,210	2,780	1,770	1,600
23	1,710	2,680	3,090	2,900	3,000	4,190	18,300	6,590	5,330	3,130	1,770	1,610
24	1,740	2,440	3,230	2,920	2,850	4,350	18,700	6,880	5,680	3,220	1,560	1,540
25	1,780	2,230	2,980	2,870	3,020	4,430	18,600	7,220	5,680	2,990	1,870	1,570
26	1,820	2,460	3,130	2,900	3,080	4,430	18,300	7,960	5,680	2,450	1,830	1,560
27	1,960	2,530	3,190	2,850	2,810	4,430	17,600	8,210	5,480	2,670	1,760	1,880
28	2,010	3,280	3,010	2,860	2,980	4,470	17,100	8,590	5,540	3,010	1,600	1,630
29	2,220	3,590	3,200	2,840	------	4,590	17,800	8,490	5,680	2,950	1,460	1,720
30	2,120	3,520	3,150	2,780	------	4,710	17,800	8,830	5,680	2,780	1,800	1,760
31	2,140	------	3,030	2,890	------	5,570	------	8,880	------	2,780	1,760	------
TOTAL	47,960	108,870	101,960	90,060	77,930	114,600	459,240	303,070	165,010	112,010	56,960	52,800
MEAN	1,547	3,629	3,289	2,905	2,783	3,697	15,310	9,776	5,500	3,613	1,837	1,760
MAX	2,220	5,480	4,210	3,150	3,080	5,570	20,500	17,700	8,650	5,650	2,650	2,190
MIN	872	2,180	2,660	2,780	2,460	2,760	6,160	6,330	3,520	2,450	1,460	1,530
CFSM	.13	.31	.28	.25	.24	.32	1.32	.84	.47	.31	.16	.15
IN.	.15	.35	.33	.29	.25	.37	1.47	.97	.53	.36	.18	.17

CAL YR 1970 TOTAL 1,619,122 MEAN 4,436 MAX 5,480 MIN 18 CFSM .38 IN 5.19
WTR YR 1971 TOTAL 1,690,470 MEAN 4,631 MAX 20,500 MIN 872 CFSM .40 IN 5.42

05270500 Sauk River near St. Cloud, Minn.

LOCATION.--Lat 45°33'35", long 94°14'00", in SE¼SW¼ sec.8, T.124 N., R.28 W., Stearns County, on right bank 0.5 mile northwest of Waite Park, 3 miles west of St. Cloud, and 5 miles upstream from mouth.

DRAINAGE AREA.--925 sq mi.

PERIOD OF RECORD.--July 1909 to December 1912, April to December 1913, May to November 1929, March 1930 to September 1931, April to November 1932, March to November 1933, March 1934 to current year. Monthly discharge only for some periods, published in WSP 1308.

GAGE.--Water-stage recorder. Datum of gage is 1,034.95 ft above mean sea level, adjustment of 1912. Prior to Nov. 22, 1934, nonrecording gage on highway bridge 1 mile downstream at datum 6.77 ft lower.

AVERAGE DISCHARGE.--41 years (1909-12, 1930-31, 1934-71), 254 cfs (3.73 inches per year).

EXTREMES.--Current year: Maximum discharge, 1,940 cfs Apr. 9 (gage height, 5.19 ft); maximum gage height, 5.89 ft Apr. 6 (backwater from ice); minimum discharge, 31 cfs Oct. 5 (gage height, 0.81 ft).
Period of record: Maximum discharge, 9,100 cfs Apr. 13, 1965 (gage height, 10.68 ft); minimum, 0.3 cfs Nov. 25, 1936.

REMARKS.--Records good except those for winter periods, which are fair. Flow regulated by powerplants and reservoirs above station.

REVISIONS (WATER YEARS).--WSP 895: Drainage area. WSP 1308: 1912(M), 1932(M), WSP 1508: 1937(m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	46	151	230	91	66	97	780	561	487	852	216	283
2	44	138	225	89	67	100	930	533	558	785	208	225
3	43	145	220	85	68	105	1,100	520	561	722	196	236
4	42	167	210	84	69	107	1,340	510	582	674	185	261
5	42	173	200	81	70	110	1,600	484	622	626	178	188
6	45	161	190	79	72	112	1,780	454	614	565	173	191
7	45	161	180	76	73	115	1,740	448	572	533	169	185
8	68	161	165	74	74	120	1,780	421	510	603	164	180
9	73	253	156	71	75	122	1,910	401	471	593	159	185
10	72	295	152	68	76	125	1,900	382	444	575	156	208
11	67	302	150	66	77	128	1,850	359	434	558	151	202
12	71	334	145	65	77	130	1,720	342	401	551	144	196
13	74	332	142	65	78	135	1,610	329	372	551	131	199
14	77	354	140	65	78	140	1,480	309	329	514	118	194
15	78	366	138	65	79	145	1,370	299	322	500	113	185
16	79	364	135	65	78	150	1,270	276	302	481	115	175
17	80	352	132	65	80	155	1,170	264	286	448	115	296
18	80	359	130	65	80	160	1,080	257	267	428	113	156
19	77	347	126	65	80	170	1,030	312	279	415	120	149
20	77	344	123	65	81	180	947	395	289	395	115	146
21	76	330	120	65	82	190	458	365	267	375	111	141
22	75	366	117	65	83	205	395	359	254	355	107	141
23	83	310	115	65	85	225	461	378	245	335	98	146
24	81	290	110	65	87	240	491	438	242	316	98	141
25	84	280	107	65	88	260	510	467	231	302	103	134
26	100	265	105	65	90	285	510	461	216	286	96	127
27	136	260	103	65	92	320	510	451	213	264	92	127
28	138	250	100	65	95	375	561	438	216	261	88	134
29	131	245	99	65	------	440	568	421	610	248	86	139
30	124	235	96	65	------	520	568	395	951	239	88	127
31	142	------	94	66	------	640	------	375	------	225	137	------
TOTAL	2,450	8,090	4,455	2,165	2,200	6,306	33,419	12,404	12,147	14,575	4,143	5,397
MEAN	79.0	270	144	69.8	78.6	203	1,114	400	405	470	134	180
MAX	142	366	230	91	95	640	1,910	561	951	852	216	296
MIN	42	138	94	65	66	97	395	257	213	225	86	127
CFSM	.09	.29	.16	.08	.09	.22	1.20	.43	.44	.51	.14	.19
IN.	.10	.33	.18	.09	.09	.25	1.34	.50	.49	.59	.17	.22

CAL YR 1970 TOTAL 74,635 MEAN 204 MAX 910 MIN 42 CFSM .22 IN 3.00
WTR YR 1971 TOTAL 107,751 MEAN 295 MAX 1,910 MIN 42 CFSM .32 IN 4.33

05275000 Elk River near Big Lake, Minn.

LOCATION.--Lat 45°20'02", long 93°40'00", in NE¼SW¼ sec.23, T.33 N., R.27 W., Sherburne County, on right bank at upstream side of highway bridge, 4 miles east of Big Lake and 4 miles downstream from St. Francis River.

DRAINAGE AREA.--615 sq mi.

PERIOD OF RECORD.--April 1911 to September 1917, April to September 1931, April to November 1932, March to November 1933, March 1934 to current year.

GAGE.--Water-stage recorder. Datum of gage is 899.60 ft above mean sea level, datum of 1929. April 1911 to Sept. 30, 1917, Apr. 1, 1931, to July 26, 1934, nonrecording gage at same site and datum.

AVERAGE DISCHARGE.--43 years (1911-17, 1934-71), 250 cfs (5.52 inches per year).

EXTREMES.--Current year: Maximum discharge, 1,630 cfs Apr. 12 (gage height, 4.97 ft); minimum, 72 cfs Oct. 7 (gage height, 0.80 ft).
Period of record: Maximum discharge, 7,360 cfs Apr. 16, 1965 (gage height, 10.86 ft); minimum, 3.6 cfs July 31, 1934.

REMARKS.--Records good except those for winter periods, which are fair.

REVISIONS (WATER YEARS).--WSP 895: 1939. WSP 1308: 1912(M), 1915-17(M).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	80	211	265	95	81	135	440	555	633	252	146	83
2	77	217	260	92	82	138	570	557	638	276	139	86
3	74	234	255	88	85	139	733	557	629	314	132	91
4	75	252	245	86	87	140	950	552	617	363	126	98
5	75	253	240	84	89	141	1,130	529	610	393	121	105
6	74	251	225	82	91	144	1,150	496	579	389	114	103
7	77	247	210	81	94	148	1,290	465	533	379	111	102
8	148	246	190	80	96	149	1,380	442	483	369	108	102
9	214	305	177	78	100	150	1,410	419	432	335	105	102
10	241	358	170	76	102	152	1,490	391	387	311	101	104
11	233	376	164	75	106	155	1,570	372	364	306	101	107
12	225	393	160	75	109	155	1,610	351	340	290	99	110
13	221	414	156	75	110	158	1,590	333	318	270	95	110
14	213	430	153	75	112	159	1,480	312	300	255	96	106
15	203	435	150	75	113	162	1,330	290	282	244	93	105
16	190	428	145	75	114	164	1,210	273	263	234	90	105
17	179	412	141	75	116	168	1,090	269	242	220	84	105
18	169	385	140	75	117	170	992	265	225	219	87	105
19	161	359	138	75	118	171	922	299	230	219	107	105
20	155	343	135	75	120	174	860	353	233	208	108	105
21	153	334	132	75	122	175	803	362	222	205	97	105
22	149	322	130	75	123	176	760	359	211	198	97	108
23	147	320	128	75	124	180	730	386	197	194	91	112
24	150	312	122	75	127	188	696	454	197	185	88	115
25	152	308	118	76	128	190	648	498	199	177	85	117
26	162	305	115	77	130	195	603	512	194	170	81	118
27	181	300	112	77	131	205	580	528	187	169	77	118
28	190	292	108	78	132	210	591	592	177	172	75	119
29	185	282	105	78	------	230	583	658	187	166	73	119
30	187	275	102	79	------	270	565	660	240	165	76	123
31	200	------	97	80	------	320	------	637	------	155	80	------
TOTAL	4,940	9,599	4,988	2,437	3,059	5,411	29,756	13,726	10,349	7,802	3,083	3,193
MEAN	159	320	161	78.6	109	175	992	443	345	252	99.5	106
MAX	241	435	265	95	132	320	1,610	660	638	393	146	123
MIN	74	211	97	75	81	135	440	265	177	155	73	83
CFSM	.26	.52	.26	.13	.18	.28	1.61	.72	.56	.41	.16	.17
IN.	.30	.58	.30	.15	.19	.33	1.80	.83	.63	.47	.19	.19

CAL YR 1970 TOTAL 72,955 MEAN 200 MAX 1,190 MIN 54 CFSM .33 IN 4.41
WTR YR 1971 TOTAL 98,343 MEAN 269 MAX 1,610 MIN 73 CFSM .44 IN 5.95

05278000 Middle Fork Crow River near Spicer, Minn.

LOCATION.--Lat 45°15'45", long 94°48'10", in NE¼ sec.27, T.121 N., R.33 W., Kandiyohi County, on right bank 75 ft upstream from highway bridge, 1.5 miles downstream from Lake Calhoun, 3 miles downstream from Green Lake, and 6.8 miles northeast of Spicer.

DRAINAGE AREA.--179 sq mi.

PERIOD OF RECORD.--March 1949 to current year.

GAGE.--Water-stage recorder and concrete and steel sharp-crested V-notch weir. Datum of gage is 1,147.93 ft above mean sea level, datum of 1929 (Kandiyohi County Highway Department bench mark). Prior to July 20, 1950, nonrecording gage at bridge 75 ft downstream at same datum.

AVERAGE DISCHARGE.--22 years, 49.3 cfs (3.74 inches per year).

EXTREMES.--Current year: Maximum discharge, 265 cfs June 30 (gage height, 4.77 ft); minimum, 1.7 cfs Oct. 2 (gage height, 1.97 ft).
Period of record: Maximum discharge, 408 cfs June 29, 1953; maximum gage height, 6.67 ft June 25, 1957; no flow Mar. 15-24, 1949, Feb. 26 to Mar. 26, 1960, Dec. 8, 1963, Feb. 10-21, 1965, Feb. 19-28, 1968.

REMARKS.--Records good except those for winter period, which are fair. Flow affected by natural storage and some regulation from lakes above station.

REVISIONS (WATER YEARS).--WSP 1508: 1949(M), 1950.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.1	4.2	14	11	12	21	124	134	107	251	103	43
2	2.0	4.0	15	9.0	12	21	112	124	109	217	100	41
3	1.9	4.4	15	11	12	21	113	118	109	179	93	41
4	2.0	4.7	15	11	12	21	112	126	106	162	89	49
5	2.0	4.4	14	11	12	21	112	126	108	152	85	49
6	1.9	4.4	13	11	12	21	116	121	106	143	81	51
7	2.1	4.2	13	11	12	21	120	121	110	155	78	49
8	2.7	4.7	13	11	12	21	127	120	125	173	75	50
9	2.8	14	13	11	12	21	130	117	120	175	72	49
10	2.5	15	13	11	12	21	129	114	118	169	71	49
11	2.9	18	13	11	12	25	129	111	121	167	68	49
12	3.1	18	13	12	12	30	129	108	120	170	65	48
13	2.8	16	13	12	12	35	131	107	114	180	60	46
14	2.7	16	13	12	12	42	127	105	107	183	55	46
15	2.5	18	13	12	13	49	136	104	101	180	50	45
16	2.7	18	13	12	14	52	134	100	95	175	46	43
17	2.5	18	13	12	16	56	132	98	90	168	45	42
18	2.5	19	13	12	17	60	130	99	87	163	47	39
19	2.5	19	13	12	17	66	134	112	112	163	53	39
20	2.4	21	12	12	17	70	133	117	121	158	50	37
21	2.5	21	12	12	17	76	133	110	113	153	49	37
22	2.5	20	12	12	17	82	134	102	103	148	46	36
23	2.5	17	12	12	17	89	140	105	92	143	43	35
24	2.5	15	12	12	18	85	136	118	87	136	42	35
25	2.7	13	12	12	19	83	132	119	82	133	43	33
26	2.9	11	12	12	20	85	129	118	78	127	41	31
27	3.8	11	12	12	21	90	128	113	74	122	40	32
28	3.6	11	12	12	21	102	136	109	70	120	38	33
29	3.4	12	11	12	------	103	133	106	178	115	36	32
30	3.2	13	11	12	------	109	139	101	262	112	37	32
31	3.6	------	11	12	------	120	------	100	------	108	41	------
TOTAL	81.8	389.0	396	359.0	412	1,719	3,850	3,483	3,325	4,900	1,842	1,241
MEAN	2.64	13.0	12.8	11.6	14.7	55.5	128	112	111	158	59.4	41.4
MAX	3.8	21	15	12	21	120	140	134	262	251	103	51
MIN	1.9	4.0	11	9.0	12	21	112	98	70	108	36	31
CFSM	.01	.07	.07	.06	.08	.31	.72	.63	.62	.88	.33	.23
IN.	.02	.08	.08	.07	.09	.36	.80	.72	.69	1.02	.38	.26

CAL YR 1970 TOTAL 13,915.3 MEAN 38.1 MAX 182 MIN 1.8 CFSM .21 IN 2.89
WTR YR 1971 TOTAL 21,997.8 MEAN 60.3 MAX 262 MIN 1.9 CFSM .34 IN 4.57

05279000 South Fork Crow River near Mayer, Minn.

LOCATION.--Lat 44°54'20", long 93°53'05", in SW¼SW¼ sec.30, T.117 N., R.25 W., Carver County, near center of span on downstream side of bridge on State Highway 7, 1.3 miles north of Mayer, 4.3 miles southwest of Watertown, and 16 miles upstream from confluence with North Fork.

DRAINAGE AREA.--1,170 sq mi, approximately.

PERIOD OF RECORD.--April 1934 to current year. Monthly discharge only for some periods, published in WSP 1308.

GAGE.--Nonrecording gage read once or twice daily. Datum of gage is 925.78 ft above mean sea level, datum of 1929 (levels by Minnesota Highway Department).

AVERAGE DISCHARGE.--37 years, 241 cfs (2.80 inches per year).

EXTREMES.--Current year: Maximum discharge, 2,500 cfs Apr. 1 (gage height, 9.37 ft); maximum gage height, 10.40 ft Mar. 29 (backwater from ice); minimum discharge, 9.1 cfs Oct. 5 (G.H. 0.83 ft).
Period of record: Maximum discharge, 16,100 cfs Apr. 13, 1965 (gage height, 19.23 ft, from floodmark); no flow at times.

REMARKS.--Records good except those for winter periods, which are fair.

REVISIONS (WATER YEARS).--WSP 1508: 1935-36.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	14	128	415	72	31	28	2,500	555	486	950	243	101
2	13	160	385	69	31	28	2,470	528	475	1,090	221	93
3	12	185	355	67	31	28	2,440	495	441	1,190	201	80
4	11	231	330	64	30	28	2,310	466	412	1,310	184	130
5	9.1	253	310	62	30	28	2,260	444	375	1,440	170	143
6	13	280	290	60	30	28	2,100	398	358	1,600	175	140
7	14	278	270	58	30	28	1,920	368	389	1,680	148	128
8	32	324	250	56	29	28	1,890	348	518	1,770	136	122
9	79	521	235	54	29	28	1,780	334	539	2,170	125	110
10	130	860	220	52	29	28	1,740	298	523	1,750	115	170
11	135	961	210	50	28	28	1,670	281	539	1,630	104	146
12	136	1,010	194	49	28	28	1,540	262	553	1,540	94	138
13	136	1,140	183	47	28	29	1,470	245	546	1,330	86	112
14	138	1,330	172	46	28	30	1,350	230	539	1,240	76	90
15	141	1,500	160	45	28	50	1,060	214	548	1,190	76	77
16	141	1,530	150	43	28	84	883	204	555	1,140	70	71
17	135	1,410	143	42	28	150	813	196	555	1,100	66	64
18	130	1,220	136	40	28	250	782	192	550	1,040	66	60
19	123	1,050	130	39	28	450	764	208	528	1,020	79	57
20	104	923	123	38	28	800	737	358	754	953	79	51
21	98	826	117	37	28	1,000	734	491	831	915	80	51
22	87	821	111	37	28	1,150	724	544	926	851	79	50
23	69	787	107	36	28	1,320	694	581	837	744	73	55
24	74	785	102	36	28	1,490	663	690	754	632	69	64
25	76	700	96	35	28	1,630	629	915	740	541	61	65
26	80	640	92	34	28	1,770	596	917	734	461	55	62
27	86	580	89	34	28	1,890	572	840	707	394	49	55
28	98	540	85	33	28	2,020	586	750	656	364	46	53
29	102	490	81	33	------	2,160	588	653	584	332	41	51
30	101	460	78	32	------	2,280	579	588	750	287	38	61
31	117	------	75	32	------	2,400	------	500	------	269	42	------
TOTAL	2,634.1	21,923	5,694	1,432	804	21,289	38,844	14,093	17,702	32,923	3,147	2,650
MEAN	85.0	731	184	46.2	28.7	687	1,295	455	590	1,062	102	88.3
MAX	141	1,530	415	72	31	2,400	2,500	917	926	2,170	243	170
MIN	9.1	128	75	32	28	28	572	192	358	269	38	50
CFSM	.07	.62	.16	.04	.02	.59	1.11	.39	.50	.91	.09	.08
IN.	.08	.70	.18	.05	.03	.68	1.24	.45	.56	1.05	.10	.08

CAL YR 1970 TOTAL 66,709.6 MEAN 183 MAX 1,530 MIN 6.7 CFSM .16 IN 2.12
WTR YR 1971 TOTAL 163,135.1 MEAN 447 MAX 2,500 MIN 9.1 CFSM .38 IN 5.19

05280000 Crow River at Rockford, Minn.

LOCATION.--Lat 45°05'12", long 93°44'02", in sec.29, T.119 N., R.24 W., Hennepin County, on right bank at Rockford, 150 ft downstream from bridge on State Highway 55 and 1 mile downstream from confluence of North and South Forks.

DRAINAGE AREA.--2,520 sq mi, approximately.

PERIOD OF RECORD.--April to July 1906 (published as "near Dayton"), June 1909 to September 1917, April to November 1929, March 1930 to September 1931, April to November 1932, March to November 1933, March 1934 to current year. Monthly discharge only for some periods, published in WSP 1308.

GAGE.--Water-stage recorder. Datum of gage is 893.08 ft above mean sea level, datum of 1929. Apr. 13 to July 21, 1906, nonrecording gage at Berning Mill 14 miles downstream at different datum. June 4, 1909, to Sept. 30, 1917, nonrecording gage at site 600 ft downstream at different datum. Apr. 23, 1929, to Aug. 21, 1934, nonrecording gage at site 600 ft downstream at present datum.

AVERAGE DISCHARGE.--46 years (1909-17, 1930-31, 1934-71), 596 cfs (3.21 inches per year).

EXTREMES.--Current year: Maximum discharge, 4,300 cfs Apr. 1 (gage height, 8.05 ft); maximum gage height, 9.72 ft Mar. 30 (backwater from ice); minimum, 57 cfs Oct. 7 (gage height, 1.75 ft).
Period of record: Maximum discharge, 22,400 cfs Apr. 16, 1965 (gage height, 19.27 ft, from floodmark); minimum, 1.8 cfs Nov. 15, 1936 (gage height, 1.05 ft), caused by ice jam upstream.

REMARKS.--Records good except those for winter period, which are fair. Records of specific conductance for the current year are published in Part 2 of this report.

REVISIONS (WATER YEARS).--WSP 1115: 1932. WSP 1508: 1933.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	76	263	915	204	131	118	4,280	1,890	1,390	1,420	1,110	273
2	71	282	910	200	131	120	4,070	1,830	1,360	1,600	1,020	316
3	66	316	900	197	130	120	3,930	1,760	1,340	1,750	952	312
4	61	354	890	188	129	120	4,020	1,700	1,290	1,890	889	330
5	60	430	880	182	129	120	4,020	1,640	1,250	2,040	826	354
6	60	470	860	179	129	120	4,020	1,560	1,210	2,170	770	374
7	60	470	840	174	129	120	3,940	1,480	1,210	2,410	731	388
8	100	476	810	170	128	120	3,840	1,420	1,260	2,590	686	388
9	143	712	770	165	128	120	3,710	1,360	1,310	2,680	646	402
10	206	1,130	740	160	128	120	3,600	1,290	1,300	2,750	604	420
11	248	1,380	715	155	128	120	3,520	1,220	1,300	2,780	568	425
12	260	1,550	690	150	128	122	3,450	1,160	1,300	2,790	520	397
13	254	1,660	650	147	127	124	3,360	1,080	1,300	2,800	487	366
14	254	1,760	615	142	127	130	3,250	1,020	1,280	2,760	455	334
15	251	1,880	560	140	127	180	3,100	966	1,240	2,690	425	309
16	251	2,010	530	138	126	270	2,850	917	1,220	2,600	402	289
17	244	2,110	480	136	124	410	2,640	868	1,190	2,530	379	273
18	238	2,120	445	135	122	580	2,540	833	1,150	2,480	358	257
19	226	2,000	400	133	120	900	2,500	868	1,130	2,410	370	244
20	215	1,840	360	133	118	1,300	2,450	995	1,160	2,360	370	232
21	200	1,640	325	132	114	1,650	2,400	1,190	1,300	2,300	362	223
22	189	1,440	310	131	113	1,850	2,360	1,220	1,410	2,220	354	220
23	183	1,210	290	131	112	2,050	2,300	1,240	1,430	2,120	334	226
24	183	1,210	270	131	112	2,200	2,240	1,360	1,440	1,980	316	226
25	181	1,100	260	130	113	2,500	2,170	1,610	1,360	1,840	292	229
26	186	1,050	250	130	114	2,800	2,100	1,800	1,320	1,680	269	229
27	203	1,020	240	130	118	3,000	2,060	1,880	1,280	1,550	254	226
28	212	970	230	129	119	3,250	2,040	1,810	1,200	1,430	241	220
29	223	940	225	129	------	3,380	2,000	1,690	1,190	1,340	232	212
30	238	920	220	128	------	3,660	1,960	1,570	1,260	1,250	223	218
31	248	------	210	128	------	4,090	------	1,450	------	1,180	244	------
TOTAL	5,590	34,713	16,790	4,657	3,454	35,764	90,720	42,677	38,380	66,390	15,689	8,912
MEAN	180	1,157	542	150	123	1,154	3,024	1,377	1,279	2,142	506	297
MAX	260	2,120	915	204	131	4,090	4,280	1,890	1,440	2,800	1,110	425
MIN	60	263	210	128	112	118	1,960	833	1,130	1,180	223	212
CFSM	.07	.46	.22	.06	.05	.46	1.20	.55	.51	.85	.20	.12
IN.	.08	.51	.25	.07	.05	.53	1.34	.63	.57	.98	.23	.13

CAL YR 1970 TOTAL 165,059 MEAN 452 MAX 2,120 MIN 60 CFSM .18 IN 2.44
WTR YR 1971 TOTAL 363,736 MEAN 997 MAX 4,280 MIN 60 CFSM .40 IN 5.37

05284000 Mille Lacs Lake at Garrison, Minn.

LOCATION.--Lat 46°18'05", long 93°49'05", in SW¼SE¼ sec.12, T.44 N., R.28 W., Crow Wing County, at pumphouse of Minnesota Division of Game and Fish, 0.2 mile southwest of Borden Lake Outlet and 0.8 mile northeast of Garrison.

PERIOD OF RECORD.--June 1931 to current year. Prior to October 1939, published as "at Wealthwood".

GAGE.--Water-stage recorder. Datum of gage is 1,240.40 ft above mean sea level, datum of 1929. Prior to Oct. 1, 1941, nonrecording gage at Wealthwood at various datums; gage readings have been reduced to elevations above mean sea level, adjustment of 1912. Oct. 1, 1941, to Sept. 30, 1958, water-stage recorder at datum 1,240.50 ft above mean sea level, adjustment of 1912. To convert these records to datum of 1929, subtract 0.10 ft.

EXTREMES.--Current year: Maximum elevation recorded, 1,252.37 ft June 11 (affected by wind action); maximum daily recorded, 1,252.05 ft July 2, but may have been exceeded during period of no gage-height record July 3-8; minimum, 1,250.25 ft Oct. 2 (affected by wind action).

Period of record: Maximum elevation, 1,253.51 ft July 25, 1952 (present datum, affected by wind and seiche action); maximum daily, 1,253.12 ft Aug. 13, 1953 (present datum); minimum observed, 1,245.74 ft Oct. 16-19, 1936 (present datum).

REMARKS.--Water level affected by fixed-crest spillway constructed in 1939 at outlet of Ogechie Lake with crest at elevation 1,250.50 ft. Water level subject to fluctuation caused by change in direction and velocity of wind and by seiches.

MONTHEND ELEVATION, IN FEET, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

Oct. 31	1,250.90	Feb. 28	1,251.33	June 30	1,252.02
Nov. 30	1,251.04	Mar. 31	1,251.37	July 31	1,251.72
Dec. 31	1,251.08	Apr. 30	1,251.78	Aug. 31	1,251.62
Jan. 31	1,251.16	May 31	1,252.00	Sept.30	1,251.25

NOTE.--Elevations other than those shown are available.

1240.40
13.11
1253.51
.13

1240.40
13.05
1253.45

1240.40
12.72
1253.12 1953

05286000 Rum River near St. Francis, Minn.

LOCATION.--Lat 45°19'40", long 93°22'20", in SE¼ Sec.19, T.33 N., R.24 W., Anoka County, on left bank at upstream side of highway bridge, 4 miles south of St. Francis and 15.8 miles upstream from mouth.

DRAINAGE AREA.--1,360 sq mi, approximately.

PERIOD OF RECORD.--May to November 1929, March 1930 to September 1931, April to November 1932, March 1933 to current year.

GAGE.--Water-stage recorder. Datum of gage is 860.74 ft above mean sea level, datum of 1929 (levels by Anoka County Highway Department). Prior to Nov. 9, 1933, nonrecording gage at site 50 ft downstream at same datum.

AVERAGE DISCHARGE.--39 years (1930-31, 1933-71), 561 cfs (5.60 inches per year).

EXTREMES.--Current year: Maximum discharge, 4,650 cfs Apr. 15 (gage height, 7.54 ft); minimum, 165 cfs Oct. 5 (gage height, 2.36 ft)
Period of record: Maximum discharge, 10,100 cfs Apr. 20, 1965, Apr. 13, 1969; maximum gage height 11.63 ft Apr. 13, 1969; minimum discharge, 29 cfs Aug. 18, 1934 (gage height, 1.91 ft).

REMARKS.--Records good except those for winter periods, which are fair. Records of specific conductance for the current year are published in Part 2 of this report. Occasional regulation by Ogechie (also controls Mille Lacs Lake) and Onamia Lakes.

REVISIONS (WATER YEARS).--WSP 1308: 1930(M), 1932(M).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	185	361	385	201	182	215	1,060	1,370	2,140	488	375	254
2	178	380	380	201	182	215	1,140	1,410	1,900	578	362	274
3	175	412	375	200	182	220	1,320	1,480	1,600	709	348	290
4	172	420	370	200	182	220	1,430	1,560	1,330	798	330	303
5	168	441	365	198	182	225	1,660	1,570	1,160	813	320	278
6	175	446	360	195	182	225	1,990	1,500	1,020	763	311	264
7	175	441	360	195	182	230	2,340	1,370	937	685	300	272
8	221	424	360	195	185	230	2,640	1,230	865	613	292	266
9	294	468	355	190	185	235	2,800	1,110	800	557	284	260
10	365	528	350	189	185	240	2,710	1,000	758	520	275	262
11	412	617	340	183	185	245	2,690	930	734	491	265	268
12	428	710	325	182	185	245	2,890	852	704	471	256	272
13	416	803	315	182	185	250	3,370	807	663	451	253	271
14	388	857	305	182	189	255	4,020	770	635	435	266	260
15	353	890	295	182	191	265	4,520	740	640	434	253	249
16	335	897	280	180	195	280	4,580	710	640	427	244	243
17	320	837	270	180	195	300	4,290	680	620	416	235	238
18	309	743	260	180	195	320	3,860	663	598	430	236	236
19	294	704	250	180	195	355	3,410	674	570	443	250	233
20	284	679	240	180	200	390	2,960	758	551	443	243	236
21	273	641	235	180	200	435	2,560	865	525	480	237	242
22	266	592	230	180	205	495	2,230	951	516	536	232	242
23	259	473	225	180	205	530	2,040	1,070	509	549	226	242
24	266	460	220	180	205	560	1,930	1,230	518	530	223	243
25	270	445	215	180	205	510	1,840	1,400	499	489	220	245
26	277	430	215	180	210	474	1,720	1,510	482	449	213	246
27	298	420	210	180	210	474	1,590	1,570	465	422	211	243
28	312	410	210	180	210	529	1,480	1,700	457	409	208	254
29	323	400	205	180	------	635	1,410	1,920	462	398	207	286
30	338	390	205	180	------	658	1,380	2,120	491	391	217	283
31	349	------	202	180	------	764	------	2,210	------	384	244	------
TOTAL	8,878	16,719	8,912	5,755	5,394	11,224	73,860	37,730	23,789	16,002	8,136	7,755
MEAN	286	557	287	186	193	362	2,462	1,217	793	516	262	259
MAX	428	897	385	201	210	764	4,580	2,210	2,140	813	375	303
MIN	168	361	202	180	182	215	1,060	663	457	384	207	233
CFSM	.21	.41	.21	.14	.14	.27	1.81	.89	.58	.38	.19	.19
IN.	.24	.46	.24	.16	.15	.31	2.02	1.03	.65	.44	.22	.21

CAL YR 1970 TOTAL 163,561 MEAN 448 MAX 3,180 MIN 160 CFSM .33 IN 4.47
WTR YR 1971 TOTAL 224,154 MEAN 614 MAX 4,580 MIN 168 CFSM .45 IN 6.13

05288500 Mississippi River near Anoka, Minn.

LOCATION.--Lat 45°07'36", long 93°17'48", in SW¼ sec.12, T.119 N., R.21 W., Hennepin County, on right bank 0.5 mile downstream from Coon Creek, 1.5 miles downstream from abandoned hydroelectric plant of Northern States Power Co. at Coon Rapids, 6.5 miles downstream from Anoka, and at mile 864.8 upstream from Ohio River.

DRAINAGE AREA.--19,100 sq mi, approximately.

PERIOD OF RECORD.--June 1931 to current year. Prior to October 1931 published as "at Coon Rapids, near Anoka."

GAGE.--Water-stage recorder. Datum of gage is 805.02 ft above mean sea level, adjustment of 1912. Prior to June 14, 1932, at site 1.2 miles upstream at different datum.

AVERAGE DISCHARGE.--40 years, 7,166 cfs (5.09 inches per year).

EXTREMES.--Current year: Maximum discharge, 35,000 cfs Apr. 15 (gage height, 10.41 ft); minimum, 1,100 cfs Oct. 2 (gage height, .75 ft).
Period of record: Maximum discharge, 91,000 cfs Apr. 17, 1965 (gage height, 19.53 ft); minimum, 586 cfs Sept. 13, 1934 (gage height, 0.37 ft).

REMARKS.--Records good. Flow slightly regulated by six reservoirs on headwaters; total usable capacity, 1,640,600 acre-ft. Diurnal regulation caused by dam above station. Coon Rapids hydroelectric plant discontinued operation Dec. 31, 1968.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1,760	4,270	7,400	4,600	3,800	4,400	15,800	23,800	15,700	10,100	5,720	3,570
2	2,050	4,150	7,400	4,600	4,000	4,350	16,900	23,600	15,600	10,100	5,120	3,700
3	1,830	4,430	7,400	4,600	3,950	4,250	17,100	22,000	14,300	10,300	5,120	3,600
4	1,920	4,910	6,900	4,500	4,100	4,300	18,100	22,400	14,000	9,890	4,950	3,830
5	1,810	5,200	6,500	4,350	4,000	4,400	18,800	21,700	13,200	10,000	4,770	3,260
6	2,090	4,960	5,000	4,050	3,950	4,300	20,000	20,700	12,300	10,000	4,090	3,270
7	1,790	4,810	4,600	4,100	3,950	4,300	22,100	19,400	12,000	9,910	4,090	3,690
8	1,950	4,930	5,000	4,000	3,900	4,300	25,000	18,400	11,100	10,100	3,880	3,720
9	3,220	6,310	5,800	4,100	3,950	4,350	26,500	17,400	10,500	9,840	3,930	3,950
10	3,350	7,620	6,100	4,300	4,050	4,450	29,600	16,200	9,820	9,710	3,800	4,010
11	3,350	8,640	6,200	4,150	4,050	4,650	32,700	15,600	9,610	9,150	3,510	3,760
12	3,450	9,200	6,300	4,000	4,050	4,750	32,800	14,600	9,350	8,960	3,150	3,740
13	3,390	10,000	6,300	4,000	3,850	5,100	33,000	13,700	9,320	8,940	3,170	3,730
14	3,620	10,700	6,100	4,000	3,900	5,300	33,900	12,900	8,670	8,870	2,980	3,690
15	3,720	10,200	5,800	4,200	3,950	5,600	34,800	12,200	8,780	8,410	3,080	3,590
16	3,370	9,750	5,850	4,100	4,000	5,850	34,100	11,100	8,800	7,750	3,060	3,140
17	3,080	10,400	5,900	3,900	4,100	6,050	32,300	10,600	8,520	7,560	3,290	3,050
18	3,010	11,000	6,000	4,150	4,200	6,400	30,800	10,600	8,330	7,630	3,190	2,900
19	2,980	10,500	5,700	4,100	4,250	6,650	29,700	10,700	7,470	7,520	3,230	2,940
20	2,940	10,500	5,000	4,000	4,200	6,950	29,100	11,000	7,160	7,300	3,110	2,850
21	2,960	10,100	4,700	4,050	4,150	7,300	28,500	11,100	8,040	7,390	3,290	2,740
22	2,660	9,270	4,700	4,150	4,200	7,700	27,100	11,400	8,520	7,130	3,000	2,960
23	2,800	7,000	4,700	4,200	4,250	8,000	26,300	11,900	8,650	7,130	3,300	3,000
24	2,990	5,300	4,700	4,300	4,300	8,400	25,900	12,800	8,980	7,140	3,370	2,940
25	4,180	4,800	4,600	4,300	4,400	8,800	25,200	13,700	9,180	6,590	3,240	2,840
26	2,820	6,100	4,500	4,100	4,350	9,150	24,600	14,100	8,990	7,220	3,030	2,600
27	3,780	6,000	4,700	4,100	4,300	9,500	24,200	15,000	8,620	6,520	2,720	2,710
28	4,390	6,100	4,750	3,800	4,300	10,000	24,200	15,300	8,410	5,780	2,670	2,870
29	4,250	6,500	4,800	4,100	------	10,600	24,000	15,900	8,920	5,880	2,650	2,910
30	4,430	6,700	4,700	4,200	------	12,000	23,800	15,500	10,400	6,130	2,650	2,860
31	4,240	------	4,500	4,000	------	14,000	------	15,500	------	5,950	3,080	------
TOTAL	94,180	220,350	172,600	129,100	114,450	206,150	786,900	480,800	303,240	254,900	110,240	98,420
MEAN	3,038	7,345	5,568	4,165	4,088	6,650	26,230	15,510	10,110	8,223	3,556	3,281
MAX	4,430	11,000	7,400	4,600	4,400	14,000	34,800	23,800	15,700	10,300	5,720	4,010
MIN	1,760	4,150	4,500	3,800	3,800	4,250	15,800	10,600	7,160	5,780	2,650	2,600
CFSM	.16	.38	.29	.22	.21	.35	1.37	.81	.53	.43	.19	.17
IN.	.18	.43	.34	.25	.22	.40	1.53	.94	.59	.50	.21	.19

CAL YR 1970 TOTAL 2,471,970 MEAN 6,773 MAX 25,500 MIN 1,480 CFSM .35 IN 4.81
WTR YR 1971 TOTAL 2,971,330 MEAN 8,141 MAX 34,800 MIN 1,760 CFSM .43 IN 5.79

05290000 Little Minnesota River near Peever, S. Dak.

LOCATION.--Lat 45°36'05", long 96°52'18", in SW¼ sec. 13, T.125 N., R.50 W., Roberts County, on right bank 2 miles northwest of town of Browns Valley, Minn., 3.2 miles upstream from proposed Lake Traverse diversion, 5.3 miles northeast of Peever, 7.2 miles downstream from Jorgenson River, and 8 miles upstream from Big Stone Lake.

DRAINAGE AREA.--447 sq mi.

PERIOD OF RECORD.--October 1939 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,000 ft (from topographic map). Oct. 1, 1939, to Mar. 20, 1940, nonrecording gage at site 4.5 miles downstream at different datum. Mar. 21 to Apr. 12, 1940, nonrecording gage at site 100 ft downstream at present datum. April 13 to Aug. 27, 1940, nonrecording gage at present site and datum.

AVERAGE DISCHARGE.--32 years, 45.6 cfs (1.39 inches per year, 33,040 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 595 cfs June 30 (gage height, 5.25 ft); maximum gage height, 7.66 ft Mar. 14 (backwater from ice); minimum discharge, 0.05 cfs Jan. 12 to Feb. 14; minimum gage height, 2.17 ft Aug. 24, 25, 27, 28, 29, 30, Sept. 20, 25, 26, 27.

Period of record: Maximum discharge, 4,730 cfs Apr. 8, 1952 (gage height, 12.16 ft); maximum gage height, 13.35 ft Mar. 25, 1943, from floodmark (backwater from ice); no flow at times in 1940, 1942, 1950, 1954, 1957, 1959, 1963, 1968.

REMARKS.--Records fair.

REVISIONS (WATER YEARS).--WSP 1308: 1943(M).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.26	1.3	.68	.13	.05	1.4	110	26	25	345	6.1	1.1
2	.22	1.3	.67	.13	.05	1.4	102	21	158	183	5.9	.93
3	.18	1.3	.66	.13	.05	1.4	92	18	104	158	5.2	1.6
4	.18	1.2	.64	.12	.05	1.4	63	17	85	149	5.0	3.5
5	.22	.96	.78	.12	.05	1.4	74	16	77	131	4.5	2.4
6	.16	.98	.76	.11	.05	1.4	63	14	68	115	4.1	2.2
7	.18	.98	.61	.11	.05	1.4	57	14	58	110	3.9	3.1
8	.26	1.5	.50	.10	.05	1.4	52	12	48	112	3.7	2.5
9	.24	2.4	.46	.09	.05	1.5	47	12	43	106	3.1	1.8
10	.30	1.9	.40	.05	.05	1.6	44	9.5	40	84	2.6	1.6
11	.36	2.1	.39	.07	.05	10	42	7.6	48	73	2.3	1.3
12	.33	2.0	.34	.05	.05	50	40	6.4	47	63	1.9	1.0
13	.36	2.0	.32	.05	.05	300	37	5.9	54	58	1.7	.81
14	.33	2.0	.30	.05	.05	240	33	5.6	42	50	1.5	.73
15	.33	2.1	.28	.05	.10	190	31	5.2	33	45	1.2	.62
16	.36	2.1	.26	.05	.15	147	30	5.0	25	39	1.0	.59
17	.30	2.0	.25	.05	.23	170	23	5.0	23	34	.93	.60
18	.26	1.9	.24	.05	.34	160	20	4.8	20	30	1.3	.55
19	.26	1.8	.23	.05	.43	150	18	4.5	26	26	1.0	.54
20	.26	1.8	.22	.05	.44	145	17	4.5	21	24	.92	.53
21	.26	1.8	.21	.05	.45	140	15	4.3	21	21	.92	.54
22	.26	1.8	.20	.05	.66	135	14	4.3	24	18	.81	.54
23	.30	1.7	.19	.05	1.0	130	13	5.9	19	16	.68	.55
24	.33	1.5	.18	.05	1.1	128	12	6.4	19	13	.62	.57
25	.46	1.4	.18	.05	1.2	125	11	5.2	20	12	.59	.53
26	.64	1.3	.17	.05	1.3	122	10	13	19	9.9	.60	.51
27	.64	1.2	.16	.05	1.3	120	11	12	21	9.2	.54	.62
28	.70	1.1	.16	.05	1.4	140	15	9.5	18	8.5	.54	.92
29	.83	1.0	.15	.05	------	133	28	7.9	77	7.9	.54	.99
30	1.2	.90	.15	.05	------	125	31	7.1	410	7.1	1.1	.90
31	1.3	------	.14	.05	------	118	------	9.2	------	6.9	2.4	------
TOTAL	12.27	47.44	11.61	2.19	10.80	2,992.3	1,175	301.8	1,683	2,065.5	67.19	34.67
MEAN	.40	1.58	.37	.071	.39	96.5	39.2	9.74	56.1	66.6	2.17	1.16
MAX	1.3	2.4	.68	.13	1.4	300	110	26	410	345	6.1	3.5
MIN	.16	.90	.14	.05	.05	1.4	10	4.3	18	6.9	.54	.51
CFSM	.0009	.004	.0008	.0002	.0009	.22	.09	.02	.13	.15	.005	.003
IN.	.001	.003	0	0	0	.25	.10	.03	.14	.17	.005	.002
AC-FT	24	94	23	4.3	21	5,940	2,330	599	3,340	4,100	133	69

CAL YR 1970 TOTAL 5,806.24 MEAN 15.9 MAX 263 MIN .05 CFSM .04 IN .48 AC-FT 11,520
WTR YR 1971 TOTAL 8,403.77 MEAN 23.0 MAX 410 MIN .05 CFSM .05 IN .70 AC-FT 16,670

PEAK DISCHARGE (BASE, 450 CFS),--June 30 (1830) 595 cfs (5.25 ft).

05291000 Whetstone River near Big Stone City, S. Dak.

LOCATION.--Lat 45°17'32", long 96°29'14", in SE¼NW¼ sec.18, T.121 N., R.46 W., Grant County, on right bank 20 ft downstream from highway bridge, 1.5 miles west of Big Stone City, and 4.5 miles upstream from Big Stone Lake.

DRAINAGE AREA.--389 sq mi.

PERIOD OF RECORD.--March 1910 to November 1912 (no winter records), and March 1931 to current year. Monthly discharge only for some periods, published in WSP 1308.

GAGE.--Water-stage recorder. Datum of gage is 996.96 ft above mean sea level, adjustment of 1912. Mar. 8, 1910, to Nov. 30, 1912, nonrecording gage 2 miles downstream at different datum. Mar. 18, 1931, to May 3, 1939, nonrecording gage, at site 20 ft upstream at present datum. May 4, 1939, to Nov. 8, 1952, water-stage recorder at site 80 ft downstream at present datum.

AVERAGE DISCHARGE.--40 years (1931-71), 45.5 cfs (1.59 inches per year, 32,960 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 2,540 cfs June 30 (gage height, 9.94 ft); minimum, .8 cfs Sept. 25.
Period of record: Maximum discharge, 6,870 cfs Apr. 8, 1969 (gage height, 14.32 ft, from floodmark); no flow at times in most years.
Maximum stage known, about 26 ft in June 1919, present site and datum, from information by local resident.

REMARKS.--Records good except those for winter periods or periods of no gage-height record, which are fair.

REVISIONS (WATER YEARS).--WSP 895: Drainage area. WSP 1308: 1932(M), 1935(M).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.2	7.7	11	3.8	4.6	11	67	38	28	1.370	8.8	21
2	2.4	7.7	10	3.8	4.6	11	62	33	721	545	8.7	15
3	2.1	8.0	9.6	3.8	4.6	12	55	28	533	264	7.3	10
4	2.2	10	9.3	3.8	4.7	12	49	24	245	159	5.9	9.7
5	2.3	11	9.0	3.9	4.8	13	43	22	165	116	6.0	8.7
6	2.0	11	8.4	3.9	4.8	13	38	19	139	94	5.2	8.4
7	2.6	12	7.9	3.9	4.9	13	35	17	115	127	6.0	8.1
8	5.0	13	7.4	3.9	4.9	14	34	16	86	331	6.0	6.0
9	6.2	19	7.2	3.9	5.0	15	33	15	67	334	4.9	7.7
10	5.9	28	6.8	3.9	5.0	17	34	15	59	187	4.9	8.1
11	5.6	24	6.4	3.9	5.2	30	32	14	51	125	4.8	7.3
12	5.3	20	6.1	3.9	5.3	50	30	14	66	93	4.1	5.7
13	5.0	17	5.8	3.9	5.4	90	28	13	50	74	4.0	5.5
14	4.4	14	5.4	3.9	5.6	1,500	25	12	43	59	4.3	4.5
15	4.1	14	5.2	3.9	6.3	1,210	23	12	35	48	4.2	4.1
16	3.6	11	5.0	3.9	7.0	500	22	11	28	40	2.8	3.6
17	3.1	10	4.7	3.9	7.5	270	21	11	21	35	2.6	3.1
18	3.4	9.9	4.5	3.9	8.2	220	19	11	16	31	14	3.0
19	3.4	9.8	4.3	4.0	8.6	195	20	11	16	28	16	2.7
20	4.0	9.7	4.2	4.0	9.0	175	20	11	14	27	10	2.6
21	4.1	9.8	4.0	4.0	9.4	165	20	10	13	24	7.2	2.3
22	4.3	10	3.9	4.1	9.8	135	19	9.8	13	20	5.9	2.7
23	4.5	10	3.9	4.1	10	90	18	13	13	19	4.2	2.3
24	4.7	10	3.9	4.2	10	78	18	17	14	17	3.9	2.1
25	5.0	11	3.9	4.2	10	74	16	20	19	15	3.2	1.7
26	5.5	11	3.9	4.2	11	80	15	24	17	13	2.9	2.1
27	6.5	11	3.9	4.3	11	90	20	24	25	12	2.9	2.1
28	6.2	11	3.9	4.4	11	100	24	21	34	11	3.5	3.1
29	6.5	11	3.9	4.4	------	82	29	17	92	10	3.2	2.5
30	7.2	11	3.9	4.5	------	78	38	16	1,600	9.8	4.7	3.1
31	7.7	------	3.9	4.5	------	73	------	16	------	9.6	12	------
TOTAL	137.0	372.6	181.2	124.7	198.2	5,416	907	534.8	4,338	4,247.4	184.1	168.8
MEAN	4.42	12.4	5.85	4.02	7.08	175	30.2	17.3	145	137	5.94	5.63
MAX	7.7	28	11	4.5	11	1,500	67	38	1,600	1,370	16	21
MIN	2.0	7.7	3.9	3.8	4.6	11	15	9.8	13	9.6	2.6	1.7
CFSM	.01	.03	.02	.01	.02	.45	.08	.04	.37	.35	.02	.01
IN.	.01	.04	.02	.01	.02	.52	.09	.05	.41	.41	.02	.02
AC-FT	272	739	359	247	393	10,740	1,800	1,060	8,600	8,420	365	335

CAL YR 1970 TOTAL 12,576.0 MEAN 34.5 MAX 1,300 MIN 1.8 CFSM .09 IN 1.20 AC-FT 24,940
WTR YR 1971 TOTAL 16,809.8 MEAN 46.1 MAX 1,600 MIN 1.7 CFSM .12 IN 1.61 AC-FT 33,340

PEAK DISCHARGE (BASE, 200 CFS)

DATE	TIME	G. H.	DISCHARGE	DATE	TIME	G. H.	DISCHARGE
3-14	Unknown	9.36	2,210	6-30	1515	9.94	2,540
6-2	1445	6.40	934	7-8	1315	4.77	438

NOTE.--No gage-height record Oct. 20 to Nov. 15, Jan. 6 to Apr. 5.

05291500 Big Stone Lake at Ortonville, Minn.

LOCATION.--Lat 45°18'18", long 96°26'57", in NW¼SW¼ sec.9, T.121 N., R.46 W., Big Stone County, at powerplant intake at west edge of Ortonville, 0.5 mile north of concrete dam at outlet, 0.5 mile southwest of Ortonville.

PERIOD OF RECORD.--March 1937 to current year.

GAGE.--Nonrecording gage read once a day. Datum of gage is 957.69 ft above mean sea level, datum of 1929. Prior to Sept. 17, 1947, nonrecording gage at site 0.5 mile south at same datum. Sept. 18, 1947, to June 30, 1963, water-stage recorder at site 0.5 mile south at same datum. Sept. 21, 1959, to June 30, 1963, supplementary nonrecording gage read once daily, at present site and datum.

EXTREMES.--Current year: Maximum gage height observed, 8.38 ft July 7; minimum observed, 5.02 ft Oct. 10.
Period of record: Maximum gage height, 12.73 ft Apr. 17, 1952; minimum observed, 3.53 ft Mar. 2, 1957 (strong upstream wind in channel). Minimum observations of 3.10 ft Mar. 2, 1940 and 2.20 ft Nov. 20, 1940 at spillway site are the result of blockage of channel to spillway by ice and snow and do not represent lake elevations.

REMARKS.--Reservoir is formed by natural lake with concrete dam at outlet. Fixed crest of dam is at elevation 963.64 ft, with one 5-foot and two 2.5-foot gates with lowest sill at elevation 958.40 ft (all elevations are referred to datum of 1929). Changes in gate openings are not made.
Silt barrier dam 700 ft upstream in outlet channel of lake completed July 7, 1958; crest elevation, 963.6 ft. Supplementary nonrecording gage readings used for stages below crest of silt barrier to June 30, 1963. Water level subject to fluctuation caused by wind action.

GAGE HEIGHT, IN FEET, OCTOBER 1970 TO SEPTEMBER 1971

Oct. 31	6.25	Feb. 28	6.65	June 30	8.00
Nov. 30	6.40	Mar. 31	7.93	July 31	7.50
Dec. 31	6.40	Apr. 30	7.84	Aug. 31	6.83
Jan. 31	6.45	May 31	7.18	Sept. 30	6.63

NOTE.--Gage-height record other than that shown above is available.

05292000 Minnesota River at Ortonville, Minn.

LOCATION.--Lat 45°17'44", long 96°26'38", in NE¼NW¼ sec.16, T.121 N., R.46 W., Big Stone County, on left bank 400 ft downstream from bridge on U.S. Highway 12 and 1,300 ft downstream from dam at outlet of Big Stone Lake, at Ortonville.

DRAINAGE AREA.--1,160 sq mi, approximately.

PERIOD OF RECORD.--February 1938 to current year.

GAGE.--Water-stage recorder. Datum of gage is 956.38 ft above mean sea level, datum of 1929. Prior to Mar. 31, 1939, nonrecording gage on downstream side of dam 1,300 ft upstream at datum 1.31 ft higher.

AVERAGE DISCHARGE.--33 years, 112 cfs (81,140 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 596 cfs June 30 (gage height, 6.81 ft); minimum, 7.1 cfs Oct. 12, (gage height, 1.35 ft).
Period of record: Maximum discharge, 3,060 cfs Apr. 13, 1952 (gage height, 12.92 ft); no flow Dec. 13, 1940.

REMARKS.--Records good except those for winter periods, which are fair. Flow affected by natural storage in Big Stone Lake (see preceding page).

REVISIONS (WATER YEARS).--WSP 895: 1939. WSP 1508: 1942 (yearly mean).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	16	19	11	12	11	15	253	158	76	414	82	48
2	19	14	11	12	11	15	240	107	97	254	76	49
3	13	17	11	12	11	15	201	76	105	229	60	48
4	9.8	17	11	11	11	15	193	96	91	291	54	49
5	10	11	11	11	11	15	188	76	131	278	52	49
6	12	13	11	11	11	15	184	72	138	254	53	58
7	13	10	11	11	11	15	178	95	169	284	51	71
8	13	14	11	11	11	15	195	72	111	305	51	67
9	15	21	12	11	11	14	178	53	82	267	56	63
10	9.3	17	12	11	11	14	105	83	107	267	73	65
11	10	24	12	11	11	15	184	165	118	242	56	59
12	9.1	17	12	11	11	20	196	54	142	287	54	62
13	13	17	12	11	11	50	200	58	143	338	54	59
14	11	18	12	11	11	210	125	56	131	300	54	68
15	10	16	12	11	11	190	116	64	121	300	53	62
16	9.1	16	12	11	11	161	147	46	104	311	53	57
17	8.9	16	12	11	12	133	102	68	126	248	53	55
18	9.1	15	12	11	13	154	58	75	106	326	60	52
19	8.8	12	13	11	14	206	108	82	98	234	57	50
20	9.1	12	13	11	14	215	103	49	138	209	53	51
21	8.6	14	13	11	14	210	69	44	91	189	48	50
22	9.5	24	13	11	14	206	105	41	102	187	48	45
23	9.7	16	13	11	14	199	151	53	90	173	46	45
24	9.5	10	13	11	14	190	121	139	84	132	53	41
25	9.5	10	13	11	15	184	139	106	76	220	47	37
26	10	10	12	11	15	183	93	49	58	155	46	37
27	11	11	12	11	15	190	101	49	66	136	46	41
28	10	11	12	11	15	196	157	47	89	148	45	46
29	8.9	11	12	11	------	187	102	49	112	134	46	38
30	16	11	12	11	------	190	150	56	341	83	47	34
31	22	------	12	11	------	202	------	60	------	76	49	------
TOTAL	352.9	444	371	344	345	3,639	4,442	2,298	3,443	7,271	1,676	1,556
MEAN	11.4	14.8	12.0	11.1	12.3	117	148	74.1	115	235	54.1	51.9
MAX	22	24	13	12	15	215	253	165	341	414	82	71
MIN	8.6	10	11	11	11	14	58	41	58	76	45	34
AC-FT	700	881	736	682	684	7,220	8,810	4,560	6,830	14,420	3,320	3,090

CAL YR 1970 TOTAL 14,703.9 MEAN 40.3 MAX 320 MIN 8.6 AC-FT 29,170
WTR YR 1971 TOTAL 26,181.9 MEAN 71.7 MAX 414 MIN 8.6 AC-FT 51,930

05293000 Yellow Bank River near Odessa, Minn.

LOCATION.--Lat 45°13'35", long 96°21'12", in SE¼SE¼ sec.1, T.120 N., R.46 W., Lac qui Parle County, on left bank 150 ft downstream from highway bridge, 2.5 miles southwest of Odessa, and 4.5 miles upstream from mouth.

DRAINAGE AREA.--398 sq mi.

PERIOD OF RECORD.--October 1939 to current year.

GAGE.--Water-stage recorder. Datum of gage is 953.34 ft above mean sea level, datum of 1929 (Corps of Engineers bench mark). Prior to Aug. 28, 1940, nonrecording gage at site 150 ft upstream at same datum.

AVERAGE DISCHARGE.--32 years, 56.2 cfs (1.92 inches per year, 40,720 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 1,050 cfs July 1 (gage height, 6.99 ft); maximum gage height, 12.13 ft Mar. 15 (backwater from ice); minimum discharge, 1.4 cfs Oct. 1; minimum gage height, 1.65 ft Aug. 30.
Period of record: Maximum discharge, 6,970 cfs Apr. 9, 1969 (gage height, 19.07 ft, from floodmark); no flow Jan. 26 to Feb. 8, 1940, Jan. 8, 9, 1942, Jan. 25 to Feb. 25, 1959, Feb. 11 to Mar. 9, 1965.

REMARKS.--Records good except those for winter periods, which are fair.

REVISIONS (WATER YEARS).--WSP 1388: 1947(M), 1950.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.4	9.4	21	6.0	5.7	36	96	103	25	957	11	12
2	1.7	11	21	6.0	5.8	38	103	87	28	605	9.9	9.1
3	1.8	13	21	5.9	5.8	40	110	73	59	402	9.1	6.3
4	2.0	13	20	5.8	5.9	42	116	64	68	264	8.7	4.6
5	2.1	13	19	5.8	6.0	44	106	57	58	186	7.9	6.3
6	2.2	14	18	5.7	6.0	46	83	52	55	140	7.5	6.0
7	2.4	13	17	5.6	6.1	49	79	46	52	165	6.7	5.2
8	4.3	17	16	5.6	6.2	52	75	42	48	153	6.3	4.6
9	6.4	33	15	5.6	6.3	57	70	39	44	110	6.0	4.9
10	6.8	45	15	5.6	6.3	69	68	35	43	87	5.6	4.6
11	8.4	61	14	5.5	6.5	120	62	32	42	77	4.9	4.3
12	8.3	64	13	5.4	6.5	190	57	31	37	73	4.6	3.7
13	12	55	12	5.4	6.5	300	54	29	34	70	4.6	3.4
14	5.3	47	11	5.3	6.6	500	51	26	31	63	4.3	2.9
15	3.9	53	11	5.2	6.7	900	47	25	28	55	4.0	2.5
16	3.3	41	10	5.2	6.9	700	45	23	25	48	3.7	2.3
17	4.3	35	9.6	5.2	7.8	380	44	21	21	42	3.4	2.3
18	4.8	32	9.0	5.1	10	300	43	19	19	37	3.7	2.3
19	4.4	31	8.8	5.1	15	220	43	19	18	33	4.6	2.3
20	3.9	29	8.0	5.1	18	190	43	18	16	31	4.9	2.1
21	4.2	28	7.7	5.1	20	170	43	17	15	28	4.6	1.7
22	4.1	27	7.4	5.1	22	130	43	17	15	24	4.0	1.9
23	9.0	26	7.2	5.1	23	100	43	21	13	22	3.2	2.3
24	5.6	26	7.0	5.2	25	85	43	24	15	20	2.9	2.3
25	4.4	25	6.9	5.2	28	80	43	22	17	18	2.7	1.7
26	7.2	24	6.7	5.2	29	78	41	22	16	16	2.5	2.1
27	5.5	23	6.6	5.3	31	76	46	24	19	15	2.1	2.1
28	5.5	23	6.4	5.3	33	73	54	23	26	15	2.1	3.7
29	8.1	22	6.4	5.4	------	72	61	19	73	13	1.9	4.0
30	7.7	22	6.3	5.5	------	79	100	18	411	12	2.3	2.7
31	8.2	------	6.1	5.6	------	86	------	19	------	11	8.7	------
TOTAL	159.2	875.4	364.1	168.1	361.6	5,302	1,912	1,067	1,371	3,792	158.4	116.2
MEAN	5.14	29.2	11.7	5.42	12.9	171	63.7	34.4	45.7	122	5.11	3.87
MAX	12	64	21	6.0	33	900	116	103	411	957	11	12
MIN	1.4	9.4	6.1	5.1	5.7	36	41	17	13	11	1.9	1.7
CFSM	.01	.07	.03	.01	.03	.43	.16	.09	.11	.31	.01	.010
IN.	.01	.08	.03	.02	.03	.50	.18	.10	.13	.35	.01	.01
AC-FT	316	1,740	722	333	717	10,520	3,790	2,120	2,720	7,520	314	230

CAL YR 1970 TOTAL 16,949.6 MEAN 46.4 MAX 658 MIN 1.1 CFSM .12 IN 1.58 AC-FT 33,620
WTR YR 1971 TOTAL 15,647.0 MEAN 42.9 MAX 957 MIN 1.4 CFSM .11 IN 1.46 AC-FT 31,040

PEAK DISCHARGE (BASE, 300 CFS).--Mar. 15 (0100) 975 cfs (12.13 ft); July 1 (0615) 1,050 cfs (6.99 ft).

05294000 Pomme de Terre River at Appleton, Minn.

LOCATION.--Lat 45°12'10", long 96°01'20", in SW¼NW¼ sec.14, T.120 N., R.43 W., Swift County, on left bank 60 ft upstream from bridge on U.S. Highway 59 and State Highway 119 at Appleton and 8 miles upstream from mouth.

DRAINAGE AREA.--905 sq mi, approximately.

PERIOD OF RECORD.--March 1931 to September 1935 (no winter records), October 1935 to current year. Prior to October 1953, published as "near Appleton."

GAGE.--Water-stage recorder and concrete control. Datum of gage is 978.00 ft above mean sea level, datum of 1929. Prior to Dec. 22, 1952, nonrecording gage at site 4 miles upstream at datum 25.17 ft higher.

AVERAGE DISCHARGE.--36 years (1935-71), 101 cfs (1.52 inches per year, 73,170 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 792 cfs Mar. 16 (gage height, 6.74 ft); minimum daily discharge, 14 cfs Feb. 7, 8; minimum gage height, 4.17 ft Feb. 27.
Period of record: Maximum discharge, 5,520 cfs Apr. 11, 1969 (gage height, 13.78 ft); maximum gage height, 14.58 ft Apr. 9, 1969 (backwater from ice); no flow for several periods.

REMARKS.--Records good except those for winter periods, which are fair. Flow affected by lakes above station. Occasional regulation at low flow by old milldam 500 ft upstream.

REVISIONS (WATER YEARS).--WSP 1308: 1931(M), 1937(M).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	16	42	56	24	18	17	469	148	93	176	48	47
2	15	43	59	24	17	17	250	140	274	149	46	59
3	16	47	57	24	16	17	147	131	234	126	44	47
4	18	46	49	22	16	16	294	123	170	111	42	44
5	20	47	48	22	15	16	441	117	157	110	41	42
6	19	44	45	20	15	16	340	111	170	103	39	40
7	24	43	43	19	14	16	302	107	158	124	38	40
8	34	55	43	18	14	17	276	102	143	147	36	41
9	42	86	43	18	15	18	259	99	131	143	34	44
10	44	135	42	17	15	19	239	95	120	126	33	46
11	46	141	41	16	15	20	231	90	111	107	32	49
12	44	132	40	17	16	21	248	87	104	96	32	48
13	45	126	39	17	16	50	243	86	100	88	31	46
14	41	104	39	18	16	150	224	78	95	84	30	44
15	39	83	36	18	16	350	205	73	89	80	28	44
16	37	84	35	18	17	567	188	70	82	77	27	43
17	35	86	35	18	17	539	182	69	80	72	25	42
18	34	79	36	18	17	404	176	67	76	71	26	41
19	32	77	33	18	18	344	166	69	79	72	32	40
20	28	75	30	18	18	369	161	72	150	69	35	38
21	26	72	28	18	19	336	162	75	251	73	28	36
22	25	48	27	19	19	275	153	68	211	69	26	36
23	25	39	26	19	20	282	145	73	181	64	25	35
24	25	52	26	20	20	211	137	75	164	61	24	34
25	29	54	26	20	20	253	136	84	144	56	25	33
26	30	50	26	20	21	273	129	86	131	53	24	32
27	36	48	25	20	19	273	138	81	116	53	23	32
28	37	49	25	19	16	324	158	72	104	53	22	31
29	37	50	24	20	------	386	173	66	142	52	22	33
30	37	52	24	19	------	464	162	64	157	51	25	38
31	38	------	24	18	------	546	------	68	------	50	43	------
TOTAL	974	2,089	1,130	596	475	6,606	6,534	2,746	4,217	2,766	986	1,225
MEAN	31.4	69.6	36.5	19.2	17.0	213	218	88.6	141	89.2	31.8	40.8
MAX	46	141	59	24	21	567	469	148	274	176	48	59
MIN	15	39	24	16	14	16	129	64	76	50	22	31
CFSM	.03	.08	.04	.02	.02	.24	.24	.10	.16	.10	.04	.05
IN.	.04	.09	.05	.02	.02	.27	.27	.11	.17	.11	.04	.05
AC-FT	1,930	4,140	2,240	1,180	942	13,100	12,960	5,450	8,360	5,490	1,960	2,430

CAL YR 1970 TOTAL 30,141 MEAN 82.6 MAX 565 MIN 15 CFSM .09 IN 1.24 AC-FT 59,780
WTR YR 1971 TOTAL 30,344 MEAN 83.1 MAX 567 MIN 14 CFSM .09 IN 1.25 AC-FT 60,190

PEAK DISCHARGE (BASE, 200 CFS)

DATE	TIME	G. H.	DISCHARGE	DATE	TIME	G. H.	DISCHARGE
3-16	1200	6.74	792	6-2	1515	5.75	324
3-30	1800	6.38	594				

05300000 Lac qui Parle River near Lac qui Parle, Minn.

LOCATION.--Lat 44°59'42", long 95°55'09", in SW¼SW¼ sec.27, T.118 N., R.42 W., Lac qui Parle County, on right bank 40 ft downstream from highway bridge and 0.5 mile southwest of village of Lac qui Parle.

DRAINAGE AREA.--983 sq mi.

PERIOD OF RECORD.--April 1910 to November 1914; March 1931 to current year (winter records incomplete prior to 1934). Published as "at Lac qui Parle," 1910-14.

GAGE.--Water-stage recorder. Datum of gage is 951.98 ft above mean sea level (Minnesota Highway Department bench mark). Apr. 27, 1910, to Nov. 15, 1914, nonrecording gage at site 2 miles downstream at different datum. Mar. 17, 1931, to Mar. 9, 1937, nonrecording gage at site 40 ft upstream at present datum.

AVERAGE DISCHARGE.--40 years (1912-13, 1931-32, 1933-71), 121 cfs (1.67 inches per year, 87,660 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 1,540 cfs July 2 (gage height, 5.75 ft); maximum gage height, 10.90 ft Mar. 17 (backwater from ice); minimum discharge 2.8 cfs Oct. 6 (gage height, 0.50 ft).
Period of record: Maximum discharge, 17,100 cfs Apr. 10, 1969 (gage height, 18.94 ft, from floodmark); maximum gage height, 19.37 ft Apr. 9, 1965, from floodmark, backwater from ice; no flow at times in several years.

REMARKS.--Records good except those for winter periods, which are fair.

REVISIONS (WATER YEARS).--WSP 1308: 1912(M), 1935(M).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8.4	92	194	44	14	45	443	300	79	1,090	58	6.8
2	6.5	101	200	43	13	43	350	268	87	1,490	53	10
3	5.3	109	190	41	12	43	245	238	100	1,520	47	16
4	4.2	124	176	39	12	45	245	215	120	1,430	42	16
5	3.6	124	166	37	12	48	255	196	129	1,130	37	17
6	3.3	133	143	36	11	47	243	180	150	817	33	18
7	5.7	133	135	34	11	45	238	167	196	806	29	19
8	9.5	144	127	33	1	43	223	154	178	782	25	19
9	27	410	118	32	10	42	208	146	156	638	22	15
10	33	665	112	30	10	44	198	136	140	572	19	12
11	50	850	106	29	10	46	187	129	144	542	17	11
12	73	918	100	28	10	110	178	122	140	539	18	11
13	86	814	94	27	10	250	169	116	127	554	18	10
14	89	694	90	26	10	520	163	111	113	545	16	9.5
15	90	569	88	25	10	700	158	105	102	458	14	9.0
16	83	482	85	24	11	800	152	100	91	368	13	8.4
17	77	418	84	23	11	1,000	150	98	80	310	11	7.9
18	75	384	82	22	12	1,100	148	95	70	263	10	7.5
19	70	358	80	21	12	860	148	93	65	225	9.2	6.7
20	63	344	75	20	12	740	150	89	64	198	9.4	6.5
21	58	330	70	19	12	650	158	84	56	174	10	7.1
22	55	300	68	19	12	590	169	80	52	154	11	7.7
23	53	185	64	18	23	550	187	84	49	138	12	7.3
24	51	210	62	18	46	490	196	89	59	125	11	6.9
25	53	300	60	17	60	465	191	87	79	113	10	6.5
26	58	265	57	16	58	445	178	93	87	98	8.6	6.9
27	63	240	54	16	54	420	176	93	114	89	7.3	6.7
28	68	230	52	16	48	440	185	89	123	80	7.0	6.9
29	80	215	50	15	------	470	198	82	300	72	6.8	7.3
30	84	205	48	14	------	500	295	77	680	65	6.7	7.7
31	90	------	46	14	------	470	------	75	------	62	6.6	------
TOTAL	1,575.5	10,340	3,076	796	536	12,061	6,184	3,991	3,931	15,447	597.6	307.3
MEAN	50.8	345	99.2	25.7	19.1	389	206	129	131	498	19.3	10.2
MAX	90	918	200	44	60	1,100	443	300	680	1,520	58	19
MIN	3.3	92	46	14	11	42	148	75	49	62	6.6	6.5
CFSM	.05	.35	.10	.03	.02	.40	.21	.13	.13	.51	.02	.01
IN.	.06	.39	.12	.03	.02	.46	.23	.15	.15	.58	.02	.01
AC-FT	3,130	20,520	6,100	1,580	1,060	23,920	12,270	7,920	7,800	30,640	1,190	610

CAL YR 1970 TOTAL 67,531.3 MEAN 185 MAX 2,360 MIN 1.6 CFSM .19 IN 2.56 AC-FT 133,900
WTR YR 1971 TOTAL 58,847.4 MEAN 161 MAX 1,520 MIN 3.3 CFSM .16 IN 2.23 AC-FT 116,700

05301000 Minnesota River near Lac qui Parle, Minn.

LOCATION.--Lat 45°01'17", long 95°52'05", in NW¼NE¼ sec.24, T.118 N., R.42 W., Chippewa County, on left bank 200 ft downstream from dam at Lac qui Parle Lake Outlet, 2.4 miles northeast of village of Lac qui Parle, and 3.5 miles west of Watson.

DRAINAGE AREA.--4,050 sq mi, approximately.

PERIOD OF RECORD.--October 1942 to current year.

GAGE.--Water-stage recorder. Datum of gage is 900.00 ft above mean sea level, datum of 1929 (levels by Corps of Engineers). Prior to Nov. 10, 1944, at datum 0.20 ft lower.

AVERAGE DISCHARGE.--29 years, 633 cfs (458,600 acre ft per year).

EXTREMES.--Current year: Maximum daily discharge, 3,400 cfs Mar. 18; maximum gage height, 31.17 ft Mar. 20; minimum discharge, 4.4 cfs Aug. 30 (gage height, 20.16 ft).
Period of record: Maximum discharge, 29,400 cfs Apr. 12, 1969 (gage height, 39.75 ft); no flow Nov. 17, 1942, Sept. 29, 1947, Oct. 19 to Nov. 18, 1951, Nov. 24, 1952.

REMARKS.--Records good except those for winter periods, which are fair. Part of flow from 2,050 square miles of Chippewa River basin at times diverted into Minnesota River above station. Some regulation by Big Stone Lake since Apr. 17, 1937, Lac qui Parle Lake since January 1938, and Marsh Lake since Nov. 1, 1939.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	42	173	375	208	191	177	2,210	644	327	1,510	209	42
2	44	219	463	208	192	169	2,450	646	330	1,530	161	42
3	45	271	540	210	191	169	2,410	646	331	1,530	71	43
4	45	303	605	215	192	165	2,290	645	336	1,590	65	43
5	45	307	583	219	195	162	2,120	645	339	1,660	63	44
6	46	319	595	220	196	161	1,910	643	341	1,690	61	45
7	46	291	571	220	197	189	1,430	642	388	1,560	59	46
8	45	303	531	220	198	166	1,150	637	531	1,500	54	50
9	46	612	519	220	198	162	1,310	632	593	1,640	55	51
10	45	912	519	220	195	160	1,210	548	588	1,680	55	56
11	45	1,060	516	219	190	161	1,200	478	654	1,670	55	57
12	45	1,110	514	215	186	159	1,200	377	785	1,660	55	61
13	46	1,290	509	211	182	288	1,190	273	789	1,670	68	76
14	46	1,360	463	210	180	700	1,080	192	786	1,630	31	122
15	46	1,300	372	208	174	1,000	811	134	777	1,600	31	117
16	46	1,260	307	202	172	1,700	667	136	763	1,530	38	114
17	46	1,200	209	200	170	2,500	660	137	583	1,480	21	113
18	46	1,170	206	198	168	3,400	648	139	387	1,460	22	110
19	44	1,120	215	197	182	3,300	648	142	374	1,400	21	108
20	45	1,090	215	195	167	3,200	643	142	376	1,320	20	108
21	46	1,050	210	192	168	3,100	635	143	384	1,280	20	111
22	84	900	210	191	167	3,000	637	144	382	1,230	20	107
23	142	740	212	190	173	2,800	639	147	332	1,190	21	107
24	139	636	220	189	173	2,700	635	183	246	1,160	32	106
25	139	586	215	186	166	2,500	636	282	246	1,130	36	105
26	147	528	210	188	169	2,400	631	318	245	1,100	36	104
27	159	514	210	190	169	2,330	628	317	245	912	64	107
28	147	461	210	190	168	2,210	639	320	244	564	106	111
29	142	415	220	190	------	1,940	634	320	431	550	104	106
30	159	389	220	190	------	1,830	638	321	1,190	466	49	108
31	173	------	210	190	------	1,980	------	325	------	219	41	------
TOTAL	2,381	21,889	11,174	6,301	5,069	44,878	33,589	11,298	14,323	41,113	1,744	2,528
MEAN	76.8	730	360	203	181	1,448	1,120	364	477	1,326	56.3	84.3
MAX	173	1,360	605	220	198	3,400	2,450	646	1,190	1,690	209	122
MIN	42	173	206	186	166	159	628	134	244	219	21	42
AC-FT	4,720	43,420	22,160	12,500	10,050	89,020	66,620	22,410	28,410	81,550	3,460	5,000

CAL YR 1970 TOTAL 161,899.9 MEAN 444 MAX 2,080 MIN 5.4 AC-FT 321,100
WTR YR 1971 TOTAL 196,279.0 MEAN 538 MAX 3,400 MIN 20 AC-FT 389,300

05304500 Chippewa River near Milan, Minn.

LOCATION.--Lat 45°06'39", long 95°47'57", in SE¼SE¼ sec.16, T. 119 N., R.41 W., Chippewa County, on right bank 800 ft upstream from bridge on State Highway 40, 2.0 miles upstream from small tributary, and 5.5 miles east of Milan.

DRAINAGE AREA.--1,870 sq mi. approximately.

PERIOD OF RECORD.--March 1937 to current year.

GAGE.--Water-stage recorder. Datum of gage is 959.69 ft above mean sea level, datum of 1929. Prior to June 15, 1942, nonrecording gage on bridge 800 ft downstream at same datum.

AVERAGE DISCHARGE.--34 years, 250 cfs (1.82 inches per year, 181,100 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 2,140 cfs Apr. 1 (gage height, 5.97 ft); maximum gage height, 7.08 ft Mar. 15 (backwater from ice); minimum discharge 26 cfs Oct. 6 (gage height, 1.30 ft).
Period of Record: Maximum discharge, 11,400 cfs Apr. 9, 1969 (gage height, 15.45 ft); no flow at times during 1940.

REMARKS.--Records good except those for winter periods, which are fair. Flow regulated by several small lakes above gage.

REVISIONS (WATER YEARS).--WSP 1145: Drainage area.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	32	103	200	54	35	42	1,490	473	384	1,300	144	86
2	28	110	195	53	36	43	938	457	731	1,070	139	92
3	28	119	188	52	37	43	882	444	733	929	133	87
4	29	124	180	51	37	43	1,060	428	653	821	130	84
5	28	128	172	50	37	44	1,020	410	630	702	125	81
6	28	136	165	48	38	45	979	394	598	606	123	88
7	31	137	152	47	38	46	950	379	549	830	117	88
8	49	146	144	46	38	47	941	363	576	999	116	80
9	59	261	135	45	38	48	892	351	566	902	110	78
10	67	537	127	44	38	51	830	335	522	795	108	79
11	83	524	120	43	39	66	784	316	500	697	105	80
12	89	550	112	42	39	92	722	300	454	609	102	80
13	96	523	105	40	39	280	675	288	402	543	99	76
14	98	474	100	39	39	400	628	271	354	482	93	74
15	97	440	94	38	39	1,130	594	259	313	436	89	73
16	93	425	88	38	40	990	564	242	280	389	86	68
17	89	423	83	37	40	990	538	228	254	351	85	68
18	86	412	80	36	40	1,150	511	220	230	314	85	69
19	80	403	78	36	40	1,150	500	216	214	294	89	71
20	77	387	78	35	40	1,020	496	234	240	273	86	73
21	73	374	74	35	40	1,100	491	242	295	256	82	71
22	71	277	72	34	40	1,120	487	233	285	236	77	71
23	72	247	70	34	41	1,020	473	247	270	220	75	70
24	71	240	68	34	41	962	454	272	268	205	71	69
25	76	232	66	34	41	934	440	284	257	191	69	68
26	77	230	64	34	41	934	425	284	247	176	67	71
27	83	220	63	34	41	962	437	281	236	168	65	72
28	84	220	61	34	42	1,040	453	271	219	163	63	74
29	85	214	60	34	------	1,110	469	258	440	160	61	78
30	92	210	58	34	------	1,180	482	250	1,280	155	63	78
31	98	------	56	34	------	1,460	------	253	------	152	81	------
TOTAL	2,149	8,826	3,308	1,249	1,094	19,542	20,605	9,483	12,980	15,424	2,938	2,297
MEAN	69.3	294	107	40.3	39.1	630	687	306	433	498	94.8	76.6
MAX	98	550	200	54	42	1,460	1,490	473	1,280	1,300	144	92
MIN	28	103	56	34	35	42	425	216	214	152	61	68
CFSM	.04	.16	.06	.02	.02	.34	.37	.16	.23	.27	.05	.04
IN.	.04	.18	.07	.02	.02	.39	.41	.19	.26	.31	.06	.05
AC-FT	4,260	17,510	6,560	2,480	2,170	38,760	40,870	18,810	25,750	30,590	5,830	4,560

CAL YR 1970 TOTAL 74,318 MEAN 204 MAX 1,130 MIN 27 CFSM .11 IN 1.48 AC-FT 147,400
WTR YR 1971 TOTAL 99,895 MEAN 274 MAX 1,490 MIN 28 CFSM .15 IN 1.99 AC-FT 198,100

PEAK DISCHARGE (BASE, 400 CFS)

DATE	TIME	G. H.	DISCHARGE	DATE	TIME	G. H.	DISCHARGE
11-10	1330	3.11	567	6-3	0300	3.68	771
3-19	0145	6.79	1,240	6-30	2115	4.80	1,400
4-1	0145	5.97	2,140	7-8	0115	4.11	1,030

05311000 Minnesota River at Montevideo, Minn.

LOCATION.--Lat 44°56'00", long 95°44'00", in NW¼NW¼ sec.19, T.117 N., R.40 W., Lac qui Parle County, on right bank 100 ft upstream from bridge on U.S. Highway 212, at Montevideo, and 400 ft downstream from Chippewa River.

DRAINAGE AREA.--6,180 sq mi, approximately.

PERIOD OF RECORD.--July 1909 to September 1917, October 1917 to September 1929 (no winter records), October 1929 to current year. Prior to October 1939, published as "near Montevideo." Monthly discharge only for some periods, published in WSP 1308.

GAGE.--Water-stage recorder. Datum of gage is 909.12 ft above mean sea level, datum of 1929. July 22, 1909, to Feb. 4, 1932, nonrecording gage at bridge 600 ft downstream at present datum. Feb. 5, 1932, to Nov. 26, 1934, nonrecording gage at bridge 100 ft downstream at present datum.

AVERAGE DISCHARGE.--50 years (1909-17, 1929-71), 659 cfs, (477,400 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 3,440 cfs Mar. 20 (gage height, 13.16 ft); maximum gage height, 13.55 ft Mar. 21 (backwater from ice); minimum discharge, 58 cfs Oct. 7; minimum gage height, 1.60 ft Oct. 2, 3, 7.

Period of record: Maximum discharge, 35,100 cfs Apr. 12, 1969 (gage height, 21.68 ft, from high-water mark); no flow for several days in 1933-34, 1936.

REMARKS.--Records good except those for winter periods, which are fair. Flow regulated by Big Stone Lake since Apr. 17, 1937, Lac qui Parle Lake since January 1938 and Marsh Lake since Nov. 1, 1939.

REVISIONS (WATER YEARS).--WSP 1035: 1919(M). WSP 1085: 1935-36. WSP 1508: 1912, 1925(M), 1929(M).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	63	275	660	280	220	210	2,840	1,100	691	2,500	399	115
2	61	278	660	275	220	211	2,900	1,100	751	2,310	382	112
3	60	325	680	270	220	211	2,860	1,090	937	2,250	286	110
4	61	392	730	265	218	211	2,960	1,090	952	2,210	220	110
5	62	447	750	260	218	212	3,000	1,080	945	2,230	208	110
6	61	456	760	255	219	211	2,910	1,070	915	2,220	201	106
7	60	467	740	255	218	212	2,490	1,060	928	2,270	195	111
8	74	467	700	250	218	211	1,910	1,040	1,020	2,190	189	108
9	74	558	680	249	215	210	2,020	1,030	1,140	2,260	185	109
10	75	999	680	245	215	210	1,930	988	1,140	2,370	175	113
11	73	1,470	660	241	215	210	1,870	850	1,250	2,330	168	116
12	76	1,660	630	240	215	212	1,840	811	1,410	2,230	164	117
13	76	1,790	580	240	215	212	1,810	657	1,390	2,210	143	117
14	74	1,820	510	240	215	300	1,740	609	1,330	2,140	129	121
15	73	1,830	440	238	217	700	1,540	467	1,260	2,070	110	166
16	70	1,770	394	235	216	1,100	1,290	452	1,170	1,950	107	167
17	68	1,700	380	235	218	1,800	1,240	449	1,060	1,840	103	159
18	64	1,650	370	230	215	2,630	1,210	447	751	1,770	100	155
19	62	1,580	360	230	211	3,200	1,180	456	684	1,730	95	150
20	73	1,510	350	230	210	3,400	1,160	455	664	1,610	97	153
21	121	1,400	345	229	210	3,200	1,150	457	658	1,540	97	157
22	170	1,250	335	229	210	3,150	1,130	456	692	1,480	94	159
23	225	1,110	330	230	210	3,200	1,120	480	689	1,410	93	156
24	240	1,020	325	230	210	3,180	1,110	496	605	1,330	88	155
25	250	965	315	230	210	3,160	1,090	572	570	1,290	89	152
26	260	915	310	229	210	3,100	1,080	653	560	1,280	92	152
27	262	845	305	228	210	3,000	1,080	654	552	1,190	88	151
28	268	800	300	225	210	3,000	1,100	650	540	748	99	150
29	248	740	295	225	------	2,800	1,100	641	1,070	676	117	150
30	248	720	290	222	------	2,400	1,100	640	2,030	686	123	148
31	257	------	290	221	------	2,560	------	653	------	470	120	------
TOTAL	3,909	31,209	15,154	7,461	6,010	48,623	51,760	22,653	28,359	54,790	4,759	4,058
MEAN	126	1,040	489	241	215	1,568	1,725	731	945	1,767	154	135
MAX	268	1,830	760	280	220	3,400	3,000	1,100	2,030	2,500	399	167
MIN	60	275	290	221	210	210	1,080	447	540	470	88	108
AC-FT	7,750	61,900	30,060	14,800	11,920	96,440	102,700	44,930	56,250	108,700	9,440	8,050

CAL YR 1970 TOTAL 222,249 MEAN 609 MAX 2,800 MIN 24 AC-FT 440,800
WTR YR 1971 TOTAL 278,745 MEAN 764 MAX 3,400 MIN 60 AC-FT 552,900

05311400 South Branch Yellow Medicine River at Minneota, Minn.

LOCATION.--Lat 44°33'50", long 95°59'50", in SE¼ sec.26, T.113 N., R.43 W., Lyon County, on downstream side of bridge on State Highway 68, 0.5 mile northwest of Minneota and 6 miles upstream from mouth.

DRAINAGE AREA.--111 sq mi, approximately.

PERIOD OF RECORD.--April 1960 to current year. Monthly and daily discharge for the period Apr. 1, 1960 to June 30, 1960, published in WSP 1914.

GAGE.--Nonrecording gage read once daily. Datum of gage is 1,150.00 ft above mean sea level, datum of 1929.

AVERAGE DISCHARGE.--11 years, 23.4 cfs (2.86 inches per year, 16,950 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 415 cfs Mar. 13 (gage height, 9.61 ft); minimum daily, 0.01 cfs Sept. 18-22; minimum gage height, 2.87 ft Sept. 22.
Period of record: Maximum discharge, 4,430 cfs Apr. 8, 1969 (gage height, 13.41 ft); no flow at times.

REMARKS.--Records good except those for winter periods, which are fair.

DISCHARGE, IN CUBIC FEET PER SECCND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	CCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.29	2.9	8.1	1.9	1.2	38	22	13	6.7	82	2.3	.15
2	.24	2.8	8.1	1.8	1.3	38	24	12	9.8	57	1.8	.24
3	.24	5.0	8.0	1.7	1.3	37	22	11	6.7	47	1.6	.15
4	.24	7.5	7.7	1.6	1.3	36	20	10	5.1	53	1.4	.20
5	.24	7.2	7.4	1.5	1.3	35	19	9.0	6.1	69	1.2	.13
6	.19	7.2	7.0	1.5	1.3	33	16	8.2	6.1	136	1.2	.06
7	.19	6.4	6.8	1.4	1.3	32	15	7.4	6.7	210	1.1	.03
8	.82	14	6.5	1.4	1.3	31	15	6.1	10	205	.82	.04
9	6.4	31	6.4	1.3	1.4	30	14	6.1	9.8	153	.67	.04
10	5.3	35	6.2	1.3	1.5	32	13	6.1	9.8	116	.57	.04
11	6.1	26	5.8	1.3	1.5	70	12	5.9	20	99	.47	.04
12	8.6	23	5.6	1.3	1.5	150	12	5.5	19	61	.38	.04
13	8.3	19	5.3	1.2	1.5	340	12	5.1	15	48	.32	.03
14	6.1	17	5.1	1.2	2.0	200	11	4.9	9.8	40	.26	.02
15	4.2	15	4.9	1.2	4.0	110	12	4.7	8.5	31	.26	.02
16	3.1	14	4.6	1.2	15	100	12	4.4	7.4	26	.24	.02
17	2.6	13	4.4	1.2	94	92	11	4.5	5.9	21	.20	.02
18	2.3	13	4.2	1.2	84	72	11	4.0	5.1	17	.17	.01
19	1.9	12	3.9	1.2	60	66	11	4.5	5.9	14	.47	.01
20	2.2	12	3.7	1.2	30	58	11	4.7	19	14	1.7	.01
21	2.3	12	3.6	1.2	28	50	12	4.2	15	12	1.5	.01
22	2.0	12	3.3	1.2	27	47	13	4.0	13	9.2	.72	.01
23	1.9	11	3.2	1.2	28	45	12	4.7	9.2	7.7	.32	.02
24	2.0	11	3.1	1.2	30	37	12	5.1	7.2	6.5	.24	.02
25	1.6	10	2.9	1.2	31	32	10	5.1	6.5	5.5	.13	.02
26	2.8	9.8	2.7	1.2	34	31	9.2	4.5	5.9	4.7	.08	.02
27	2.8	9.3	2.5	1.2	36	27	11	4.2	5.3	4.0	.06	.02
28	2.9	9.0	2.4	1.2	37	19	16	3.8	7.4	3.8	.08	.02
29	2.9	8.4	2.2	1.2	------	13	16	3.6	66	3.5	.04	.02
30	2.9	8.1	2.1	1.2	------	15	15	5.1	144	3.0	.03	.02
31	2.9	------	2.0	1.2	------	18	------	5.7	------	3.0	.08	------
TOTAL	86.55	383.6	149.7	40.8	557.7	1,934	421.2	187.1	471.9	1,561.9	20.41	1.48
MEAN	2.79	12.8	4.83	1.32	19.9	62.4	14.0	6.04	15.7	50.4	.66	.049
MAX	8.6	35	8.1	1.9	94	340	24	13	144	210	2.3	.24
MIN	.19	2.8	2.0	1.2	1.2	13	9.2	3.6	5.1	3.0	.03	.01
CFSM	.03	.12	.04	.01	.18	.56	.13	.05	.14	.45	.006	.0004
IN.	.03	.13	.05	.01	.19	.65	.14	.06	.16	.52	.006	0
AC-FT	172	761	297	81	1,110	3,840	835	371	936	3,100	40	2.9

CAL YR 1970 TOTAL 4,657.46 MEAN 12.8 MAX 208 MIN .07 CFSM .12 IN 1.56 AC-FT 9,240
WTR YR 1971 TOTAL 5,816.34 MEAN 15.9 MAX 340 MIN .01 CFSM .14 IN 1.95 AC-FT 11,540

PEAK DISCHARGE (BASE, 82 CFS)

DATE	TIME	G. H.	DISCHARGE	DATE	TIME	G. H.	DISCHARGE
2-17	2200	7.58	186	6-29	2130	6.12	187
3-13	1400	9.61	415	7-7	2200	6.37	226

05313500 Yellow Medicine River near Granite Falls, Minn.

LOCATION.--Lat 44°43'18" long 95°31'07", in SW¼ sec.35, T.115 N., R.39 W., Yellow Medicine County, on right bank 50 ft downstream from highway bridge, 6 miles upstream from mouth, and 8 miles south of town of Granite Falls.

DRAINAGE AREA.--653 sq mi.

PERIOD OF RECORD.--March 1931 to September 1935 (no winter records), October 1935 to September 1938, October 1939 to current year. Monthly discharge only for some periods, published in WSP 1308.

GAGE.--Water-stage recorder. Datum of gage is 971.59 ft above mean sea level, datum of 1929. Mar. 16, 1931, to June 13, 1938, nonrecording gage, on bridge 50 ft upstream at same datum. Oct. 12, 1939, to Nov. 30, 1952, nonrecording gage 500 ft downstream at same datum.

AVERAGE DISCHARGE.--35 years (1935-38, 1939-71), 106 cfs (2.20 inches per year, 76,800 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 1,010 cfs July 2 (gage height, 4.73 ft): minimum, 2.8 cfs Sept. 20, 21 (gage height, 2.19 ft).
Period of record: Maximum discharge, 17,200 cfs Apr. 10, 1969 (gage height, 14.90 ft); no flow at times in 1931, 1933, 1948, 1959.
Flood in June 1919 reached a stage of 17.5 ft, from information by local residents.

REMARKS.--Records good except those for winter periods, which are fair. Natural discharge affected by unknown amount of interbasin flow between Yellow Medicine, Redwood, and Cottonwood River basins during extreme floods.

REVISIONS (WATER YEARS).--WSP 1508: 1931, 1934(M), 1937(M), 1946(M), 1950(M).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	13	91	135	26	12	74	226	171	72	760	39	14
2	11	96	132	24	12	70	181	158	55	980	36	11
3	13	104	130	23	12	73	145	145	55	948	34	9.0
4	13	122	104	22	12	76	145	133	72	863	32	8.3
5	13	138	110	21	11	79	145	120	87	784	29	7.7
6	15	144	105	20	11	81	133	109	95	694	27	7.2
7	18	142	99	19	11	83	130	98	192	652	26	9.7
8	29	160	92	19	11	85	120	90	205	640	24	7.2
9	46	369	88	18	11	84	117	85	216	742	21	6.7
10	57	572	83	18	11	81	111	80	230	730	19	6.7
11	71	619	79	18	11	80	106	76	205	600	18	6.7
12	103	617	75	17	11	90	103	72	181	555	16	5.0
13	120	574	70	17	11	110	98	65	171	570	15	4.3
14	117	514	67	17	11	140	98	63	155	486	14	3.7
15	116	455	63	16	11	190	98	60	130	374	13	3.7
16	109	404	60	16	11	220	95	55	106	297	12	3.3
17	99	365	56	16	11	240	92	54	92	244	10	3.3
18	90	338	54	16	12	230	95	51	78	205	20	3.1
19	81	317	50	15	26	225	95	54	74	175	43	3.1
20	77	301	47	15	65	220	95	52	76	152	30	2.8
21	73	287	44	15	90	220	114	51	72	130	24	2.9
22	70	248	42	15	100	220	123	51	74	117	19	3.1
23	64	147	40	14	110	215	130	52	78	103	18	3.5
24	61	140	38	14	120	210	133	52	78	90	19	3.3
25	62	185	36	14	110	210	123	51	80	78	15	3.3
26	63	175	34	14	100	210	117	52	92	69	12	3.3
27	67	165	33	13	88	210	120	52	87	62	10	3.5
28	70	155	31	13	80	215	136	49	90	57	9.0	3.3
29	72	145	29	13	------	226	158	48	356	51	8.3	3.3
30	78	140	28	13	------	262	178	43	600	48	8.3	2.9
31	84	------	27	12	------	262	------	85	------	43	14	------
TOTAL	1,975	8,229	2,081	523	1,092	4,991	3,760	2,377	4,154	12,299	634.6	158.9
MEAN	63.7	274	67.1	16.9	39.0	161	125	76.7	138	397	20.5	5.30
MAX	120	619	135	26	120	262	226	171	600	980	43	14
MIN	11	91	27	12	11	70	92	43	55	43	8.3	2.8
CFSM	.10	.42	.10	.03	.06	.25	.19	.12	.21	.61	.03	.008
IN.	.11	.47	.12	.03	.06	.28	.21	.14	.24	.70	.04	.009
AC-FT	3,920	16,320	4,130	1,040	2,170	9,900	7,460	4,710	8,240	24,400	1,260	315

CAL YR 1970 TOTAL 42,625.2 MEAN 117 MAX 876 MIN 6.1 CFSM .18 IN 2.43 AC-FT 84,550
WTR YR 1971 TOTAL 42,274.5 MEAN 116 MAX 980 MIN 2.8 CFSM .18 IN 2.41 AC-FT 83,850

PEAK DISCHARGE (BASE, 300 CFS).--Nov. 11 (1915) 628 cfs (4.16 ft); July 2 (1245) 1010 cfs (4.73 ft).

05315000 Redwood River at Marshall, Minn.

LOCATION.--Lat 44°27'05", long 95°47'13", in SE¼NW¼ sec.4, T.111 N., R.41 W., Lyon County, on downstream side of highway bridge on Fourth Street in Marshall and 10 miles upstream from Threemile Creek.

DRAINAGE AREA.--307 sq mi.

PERIOD OF RECORD.--March 1940 to current year. Monthly discharge only for some periods, published in WSP 1308.

GAGE.--Nonrecording gage and crest-stage gage. Datum of gage is 1,144.88 ft above mean sea level, datum of 1929. Nonrecording gage and crest-stage gage on diversion channel. Datum of gage is 1,100.00 ft above mean sea level, datum of 1929 (levels by Corps of Engineers).

AVERAGE DISCHARGE.--31 years, 48.2 cfs (2.13 inches per year, 34,920 acre-ft per year).

EXTREMES (Combined flow).--Current year: Maximum discharge, 523 cfs July 7; minimum daily, .8 cfs Sept. 27.
Period of record: Maximum discharge, 5,590 cfs Apr. 10, 1969; no flow at times.
(River only).--Current year: Maximum discharge, 523 cfs July 7 (gage height, 3.49 ft from crest-stage gage); minimum daily, .8 cfs Sept. 27 (gage height, 0.77 ft); minimum gage height, 0.75 ft Aug. 25, 26.
Period of record: Maximum discharge, 5,370 cfs June 17, 1957 (gage height, 10.14 ft; maximum gage height, 11.05 ft Apr. 6, 1951 (from floodmark); no flow at times.
(Diversion only).--Current year: Maximum daily discharge, 32 cfs Mar. 17; no flow most of year.
Period of record: Maximum discharge, 4,440 cfs Apr. 10, 1969 (gage height, 78.45 ft); no flow on many days.

REMARKS.--Records good except those for winter periods, which are fair. Water diverted at medium and high stages into diversion channel 3 miles above station, bypasses station and returns to river 1 mile below station. Diversion began Mar. 18, 1964. These records include flow in diversion channel. Unknown amount of natural diversion into Cottonwood River basin at extremely high stages. Records of suspended sediment loads for the current year are published in Part 2 of this report.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.6	10	10	4.7	3.6	87	70	27	6.7	248	27	5.1
2	3.2	11	9.9	4.5	3.6	86	66	23	13	329	25	3.2
3	3.2	12	9.7	4.3	3.6	87	66	21	14	292	24	2.6
4	3.6	12	9.6	4.2	3.7	88	67	18	18	292	21	3.2
5	5.1	11	9.3	3.9	3.7	88	67	15	12	296	21	4.1
6	7.3	11	9.2	3.8	3.7	88	69	13	14	306	20	3.2
7	9.1	10	9.1	3.7	3.7	89	69	12	22	440	18	2.9
8	11	14	9.0	3.5	3.8	90	66	12	36	394	16	2.9
9	11	43	8.8	3.4	3.8	91	63	9.8	62	118	12	3.2
10	12	39	8.8	3.3	3.8	97	62	11	65	27	9.1	3.2
11	11	25	8.7	3.2	3.9	120	54	11	62	28	7.8	3.2
12	9.1	23	8.7	3.1	3.9	160	50	10	56	28	6.9	2.6
13	8.5	22	8.5	3.1	4.0	148	40	9.8	50	29	4.1	2.4
14	7.3	20	8.5	3.1	4.0	140	35	8.5	36	29	4.1	2.0
15	6.2	15	8.5	3.1	4.2	132	30	7.3	29	37	3.6	2.0
16	5.6	12	8.3	3.1	12	130	25	7.3	29	39	3.2	2.2
17	5.1	12	8.2	3.1	35	160	22	6.7	20	41	3.2	2.0
18	3.6	12	7.9	3.1	112	156	18	6.2	55	43	3.2	1.6
19	4.6	14	7.7	3.2	122	146	14	10	153	44	4.1	1.6
20	6.2	12	7.5	3.2	112	144	15	7.3	116	53	4.1	1.4
21	6.7	13	7.3	3.2	108	131	16	6.2	96	46	3.6	1.2
22	6.2	13	7.0	3.2	104	123	16	6.2	89	40	3.2	1.8
23	5.6	12	6.7	3.2	100	124	16	7.3	65	32	2.9	1.6
24	6.7	12	6.5	3.3	97	131	15	9.8	50	26	2.6	1.4
25	10	12	6.2	3.3	94	119	14	9.1	43	31	2.6	1.4
26	10	12	5.9	3.3	92	108	13	7.9	36	34	2.9	1.4
27	9.8	11	5.7	3.3	90	97	16	7.9	29	33	2.9	.80
28	8.5	11	5.5	3.3	89	90	20	6.2	27	35	2.6	1.2
29	8.5	11	5.3	3.4	------	83	23	6.2	51	32	2.6	1.0
30	9.8	10	5.1	3.4	------	78	27	5.1	197	32	2.6	1.0
31	10	------	4.9	3.5	------	74	------	5.6	------	29	3.2	------
TOTAL	228.1	457	242.0	107.0	1,224.0	3,485	1,144	323.4	1,551.7	3,483	269.1	67.40
MEAN	7.36	15.2	7.81	3.45	43.7	112	38.1	10.4	51.7	112	8.68	2.25
MAX	12	43	10	4.7	122	160	70	27	197	440	27	5.1
MIN	3.2	10	4.9	3.1	3.6	74	13	5.1	6.7	26	2.6	.80
CFSM	.02	.05	.03	.01	.14	.36	.12	.03	.17	.36	.03	.007
IN.	.03	.06	.03	.01	.15	.42	.14	.04	.19	.42	.03	.008

CAL YR 1970 TOTAL 11,029.00 MEAN 30.2 MAX 350 MIN 2.0 CFSM .10 IN 1.34
WTR YR 1971 TOTAL 12,581.70 MEAN 34.5 MAX 440 MIN .80 CFSM .11 IN 1.52

05316500 Redwood River near Redwood Falls, Minn.

LOCATION.--Lat 44°31'25", long 95°10'20", in SE¼NE¼ sec. 9, T.112 N., R.36 W., Redwood County, on right bank 20 ft upstream from highway bridge, 3 miles west of town of Redwood Falls, and 8.5 miles upstream from mouth.

DRAINAGE AREA.--697 sq mi.

PERIOD OF RECORD.--July 1909 to September 1914 (no winter records except 1911-12), August 1930 to September 1935 (no winter records), October 1935 to current year.

GAGE.--Water-stage recorder. Datum of gage is 972.33 ft above mean sea level, datum of 1929. July 1909 to September 1914, nonrecording gage at bridge 20 ft downstream at datum 0.22 ft lower. August 1930, to Oct. 25, 1949, nonrecording gage, at bridge 20 ft downstream at present datum.

AVERAGE DISCHARGE.--37 years (1911-12, 1935-71), 104 cfs (2.03 inches per year, 75,400 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 445 cfs Nov. 10 (gage height, 3.12 ft); maximum gage height, 7.12 ft Mar. 18 (backwater from ice); minimum discharge, 1.8 cfs Sept. 21, 22 (gage height, 1.38 ft); minimum gage height, 1.36 ft Sept. 1.

Period of Record: Maximum discharge, 19,700 cfs June 18, 1957 (gage height, 15.92 ft, from floodmark); no flow for several days in January 1940 and for part of each day Aug. 19, 20, 1959.

REMARKS.--Records good except those for winter periods, which are fair. Natural discharge affected by unknown amount of interbasin flow between Yellow Medicine, Redwood, and Cottonwood River basins during extreme floods.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	11	68	135	15	7.7	95	323	115	65	297	50	12
2	11	74	130	13	7.7	89	248	106	94	347	45	12
3	11	78	122	12	7.8	84	200	94	96	378	38	10
4	8.7	85	115	11	7.9	80	179	89	97	375	32	9.7
5	8.2	117	105	10	8.0	78	181	81	94	333	28	8.9
6	9.4	118	97	9.5	8.1	80	177	75	104	377	26	8.5
7	17	113	89	8.8	8.2	92	172	71	170	369	24	7.8
8	19	116	82	8.4	8.3	110	168	67	314	370	22	7.8
9	50	239	75	7.8	8.4	120	153	64	313	373	20	9.7
10	66	425	70	7.6	8.5	130	135	62	277	347	18	9.3
11	68	412	66	7.5	8.7	135	127	59	318	354	17	8.4
12	81	406	62	7.4	8.9	150	118	57	257	353	15	7.8
13	95	387	58	7.4	9.1	170	111	56	223	338	13	7.1
14	92	338	55	7.3	9.3	200	105	56	191	311	13	6.8
15	84	292	52	7.3	9.6	250	102	52	164	283	11	5.8
16	79	254	49	7.2	10	320	102	49	140	248	11	4.9
17	72	227	48	7.2	11	370	97	47	119	212	10	4.8
18	65	205	46	7.2	15	400	98	47	109	182	10	4.1
19	59	189	44	7.2	24	390	116	55	125	156	13	3.5
20	54	180	42	7.3	33	370	114	57	186	137	13	2.3
21	51	173	39	7.3	50	350	117	59	197	122	13	1.9
22	49	170	36	7.3	80	340	122	54	187	111	13	3.2
23	49	141	33	7.4	100	330	122	58	162	102	11	3.4
24	49	135	30	7.4	110	320	120	61	145	93	10	3.4
25	49	146	28	7.4	120	315	115	64	134	84	9.0	3.7
26	55	148	25	7.5	125	320	109	63	116	77	8.3	3.8
27	60	148	23	7.5	120	325	107	63	104	70	7.2	5.1
28	60	148	21	7.5	105	335	115	61	93	66	6.3	4.6
29	62	145	20	7.5	------	351	116	59	91	61	5.8	3.9
30	65	143	18	7.6	------	358	118	54	175	57	5.8	3.8
31	66	------	16	7.6	------	350	------	56	------	53	9.1	------
TOTAL	1,575.3	5,820	1,831	258.1	1,029.2	7,407	4,187	2,011	4,860	7,036	527.5	188.0
MEAN	50.8	194	59.1	8.33	36.8	239	140	64.9	162	227	17.0	6.27
MAX	95	425	135	15	125	400	323	115	318	378	50	12
MIN	8.2	68	16	7.2	7.7	78	97	47	65	53	5.8	1.9
CFSM	.07	.28	.08	.01	.05	.34	.20	.09	.23	.33	.02	.009
IN.	.08	.31	.10	.01	.05	.40	.22	.11	.26	.38	.03	.01
AC-FT	3,120	11,540	3,630	512	2,040	14,690	8,300	3,990	9,640	13,960	1,050	373

CAL YR 1970 TOTAL 32,668.7 MEAN 89.5 MAX 568 MIN 4.3 CFSM .13 IN 1.74 AC-FT 64,800
WTR YR 1971 TOTAL 36,730.1 MEAN 101 MAX 425 MIN 1.9 CFSM .14 IN 1.96 AC-FT 72,850

PEAK DISCHARGE (BASE, 150 CFS)

DATE	TIME	G. H.	DISCHARGE	DATE	TIME	G. H.	DISCHARGE
11-10	1400	3.12	445	6-21	1900	2.51	205
3-18	0645	7.12	426	7-6	1315	2.97	394
6-11	0015	2.94	376				

05316770 Minnesota River at New Ulm, Minn.

LOCATION.--Lat 44°19'20", long 94°27'09", in NE¼NE¼ sec.20, T.110 N., R.30 W., Nicollet County, on left bank 30 ft downstream from U.S. Highway 14, at New Ulm and 6.1 miles upstream from Cottonwood River.

DRAINAGE AREA.--9,530 sq mi.

PERIOD OF RECORD.--October 1967 to current year.

GAGE.--Water-stage recorder. Datum of gage is 778.72 ft above mean sea level, datum of 1929.

EXTREMES.--Current year: Maximum discharge, 8,470 cfs Mar. 19 (gage height, 18.78 ft); minimum discharge, 166 cfs Oct. 3; minimum gage heights, 6.98 ft on Oct. 7.
Period of record: Maximum discharge, 58,000 cfs Apr. 15, 1969 (gage height, 30.65 ft); minimum daily discharge, 42 cfs Jan. 15, 19, 1968.

REMARKS.--Records good except those for winter periods, which are fair. Records of water temperatures and suspended sediment loads for the current year are published in Part 2 of this report.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	184	734	1,600	710	550	920	7,640	2,130	1,620	2,960	1,220	300
2	179	776	1,600	690	550	900	7,400	2,110	2,100	3,570	1,140	333
3	169	840	1,500	680	540	900	6,930	2,050	2,540	3,990	1,040	360
4	168	914	1,450	670	540	880	6,500	2,010	2,790	4,400	944	357
5	170	1,000	1,400	660	540	870	6,100	1,970	2,770	4,850	879	328
6	172	1,110	1,350	650	540	860	5,730	1,920	2,630	5,190	817	285
7	175	1,220	1,300	640	540	850	5,360	1,870	2,690	5,390	733	263
8	215	1,310	1,250	630	540	840	5,150	1,810	3,390	5,380	677	247
9	238	1,630	1,200	620	540	840	4,950	1,760	3,870	5,200	649	247
10	270	2,380	1,150	610	540	840	4,760	1,700	4,160	5,000	612	245
11	326	3,050	1,100	590	540	850	4,500	1,650	4,520	4,870	584	240
12	427	3,540	1,080	580	540	850	4,190	1,610	4,850	4,770	556	240
13	508	3,910	1,060	580	540	890	3,860	1,540	5,360	4,650	534	238
14	583	4,040	1,040	580	540	1,050	3,530	1,470	5,860	4,490	514	236
15	652	4,060	1,020	570	540	2,000	3,280	1,380	5,910	4,330	492	232
16	674	4,100	980	570	540	3,500	3,080	1,280	5,590	4,170	472	230
17	662	3,990	950	570	540	5,400	2,880	1,200	5,080	4,010	453	224
18	622	3,770	930	560	540	7,000	2,680	1,100	4,440	3,820	439	222
19	589	3,520	910	560	540	8,320	2,520	1,080	3,690	3,540	444	224
20	561	3,280	880	560	540	8,400	2,420	1,090	2,990	3,230	427	238
21	531	3,080	860	560	540	8,220	2,420	1,110	2,530	2,910	419	242
22	510	2,000	850	560	560	8,260	2,470	1,120	2,290	2,640	433	247
23	496	1,500	830	560	580	7,940	2,490	1,120	2,150	2,420	416	253
24	494	1,600	820	560	660	7,880	2,440	1,210	2,040	2,250	383	249
25	499	1,600	810	560	760	7,680	2,350	1,280	2,180	2,090	349	251
26	512	1,600	790	560	840	7,430	2,250	1,290	2,240	1,930	330	260
27	537	1,600	780	560	960	7,130	2,190	1,270	2,110	1,810	313	263
28	601	1,600	770	560	940	6,930	2,130	1,260	1,900	1,710	298	260
29	636	1,700	760	560	------	6,990	2,110	1,270	1,750	1,660	288	253
30	662	1,700	750	550	------	7,280	2,130	1,270	2,080	1,520	275	256
31	698	------	730	550	------	7,560	------	1,260	------	1,340	290	------
TOTAL	13,720	67,154	32,500	18,420	16,660	130,260	116,440	46,190	98,120	110,090	17,420	7,823
MEAN	443	2,238	1,048	594	595	4,202	3,881	1,490	3,271	3,551	562	261
MAX	698	4,100	1,600	710	960	8,400	7,640	2,130	5,910	5,390	1,220	360
MIN	168	734	730	550	540	840	2,110	1,080	1,620	1,340	275	222
CFSM	.05	.23	.11	.06	.06	.44	.41	.16	.34	.37	.06	.03
IN.	.05	.26	.13	.07	.07	.51	.45	.18	.38	.43	.07	.03
AC-FT	27,210	133,200	64,460	36,540	33,050	258,400	231,000	91,620	194,600	218,400	34,550	15,520

CAL YR 1970 TOTAL 465,092 MEAN 1,274 MAX 5,320 MIN 168 CFSM .13 IN 1.82 AC-FT 922,500
WTR YR 1971 TOTAL 674,797 MEAN 1,849 MAX 8,400 MIN 168 CFSM .19 IN 2.63 AC-FT 1,338,000

05317000 Cottonwood River near New Ulm, Minn.

LOCATION.--Lat 44°17'40", long 94°26'40", in N½ sec.33, T.110 N., R.30 W., Brown County, on left bank 600 ft upstream from highway bridge, 1.8 miles south of New Ulm, and 2 miles upstream from mouth.

DRAINAGE AREA.--1,280 sq mi, approximately.

PERIOD OF RECORD.--July 1909 to December 1913, March 1931 to March 1938, August 1938 to current year (winter records incomplete prior to 1936).

GAGE.--Water-stage recorder. Datum of gage is 799.09 ft above mean sea level, adjustment of 1912. July 1, 1909, to Dec. 13, 1913, nonrecording gage at site 2.7 miles upstream at different datum. Mar. 15, 1931, to Mar. 31, 1938, nonrecording gage 2.2 miles upstream at datum 11.41 ft higher. Aug. 23, 1938, to June 25, 1948, nonrecording gage at present site and datum.

AVERAGE DISCHARGE.--37 years (1911-13, 1935-37, 1938-71), 281 cfs (2.98 inches per year, 203,600 acre-ft per year).

EXTREMES.--Current year: Maximum discharge during year, 7,460 cfs Mar. 16 (gage height, 13.10 ft); maximum gage height, 14.43 ft Mar. 15 (backwater from ice); minimum 19 cfs, Sept. 21; minimum gage height, 1.18 ft Sept. 20, 21.

Period of record: Maximum discharge, 28,700 cfs Apr. 10, 1969 (gage height, 19.15 ft); maximum gage height, 20.86 ft Apr. 8, 1965 (from floodmark, backwater from ice); minimum observed, 0.5 cfs Nov. 27, 1952; minimum gage height, 0.72 ft Nov. 20, 1964.

REMARKS.--Records good except those for winter periods, which are fair. Records of water temperatures, and suspended sediment loads for the current year are published in Part 2 of this report.

REVISIONS (WATER YEARS).--WSP 355: 1912.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	51	179	335	112	63	410	1,990	354	373	555	97	50
2	46	180	330	108	63	390	1,620	338	738	551	91	51
3	42	198	320	106	62	380	1,220	320	747	554	85	42
4	36	226	310	104	62	370	1,060	306	645	547	81	44
5	33	261	305	100	62	360	968	292	561	494	76	47
6	30	283	290	98	61	360	888	276	603	431	73	42
7	37	317	280	96	61	355	693	262	723	455	70	35
8	86	345	265	94	61	350	784	249	1,360	477	66	30
9	118	568	250	91	61	350	750	237	1,880	418	63	30
10	161	958	240	89	60	350	684	226	1,820	405	59	27
11	189	1,140	225	87	60	350	627	218	1,570	412	54	27
12	198	1,340	220	85	60	350	579	206	1,320	407	51	26
13	224	1,310	210	83	59	410	534	199	1,120	457	48	25
14	230	1,180	200	80	59	1,000	489	192	960	467	42	25
15	240	1,020	195	78	58	2,600	463	185	808	425	41	22
16	240	890	190	77	58	5,940	443	178	687	374	39	21
17	224	832	180	76	58	4,500	425	173	591	329	38	21
18	209	744	170	75	58	3,600	410	168	534	290	42	20
19	189	673	168	74	58	2,780	415	182	519	255	45	20
20	172	624	162	73	58	2,200	428	201	498	229	45	20
21	156	578	158	72	80	1,900	448	201	495	211	42	19
22	150	528	150	71	400	1,600	460	201	534	196	39	26
23	148	500	148	70	390	1,400	468	209	603	180	36	27
24	143	455	142	69	360	1,200	450	254	540	167	35	26
25	139	420	138	68	340	1,100	425	367	564	154	32	27
26	141	400	132	67	390	1,000	395	378	494	139	31	27
27	143	380	128	66	450	1,040	378	356	423	133	31	26
28	143	370	124	66	430	1,270	367	326	376	127	29	25
29	144	360	122	65	------	1,720	360	296	356	118	27	25
30	158	345	118	64	------	2,140	358	268	438	112	26	24
31	172	------	115	64	------	2,210	------	262	------	103	48	------
TOTAL	4,392	17,604	6,320	2,528	4,042	43,985	19,579	7,880	22,880	10,172	1,582	877
MEAN	142	587	204	81.5	144	1,419	653	254	763	328	51.0	29.2
MAX	240	1,340	335	112	450	5,940	1,990	378	1,880	555	97	51
MIN	30	179	115	64	58	350	358	168	356	103	26	19
CFSM	.11	.46	.16	.06	.11	1.11	.51	.20	.60	.26	.04	.02
IN.	.13	.51	.18	.07	.12	1.28	.57	.23	.66	.30	.05	.03
AC-FT	8,710	34,920	12,540	5,010	8,020	87,240	38,830	15,630	45,380	20,180	3,140	1,740

CAL YR 1970 TOTAL 92,072 MEAN 252 MAX 2,100 MIN 30 CFSM .20 IN 2.68 AC-FT 182,600
WTR YR 1971 TOTAL 141,841 MEAN 389 MAX 5,940 MIN 19 CFSM .30 IN 4.12 AC-FT 281,300

05320000 Blue Earth River near Rapidan, Minn.

LOCATION.--Lat 44°05'44", long 94°06'33", in SE¼SE¼ sec.6, T.107 N., R.27 W., Blue Earth County, on left bank 0.2 mile downstream from abandoned powerplant of Northern States Power Co., 2 miles west of Rapidan, 3.5 miles downstream from Watonwan River, and 7.8 miles upstream from Le Sueur River.

DRAINAGE AREA.--2,430 sq mi approximately.

PERIOD OF RECORD.--July 1909 to November 1910 (published as "at Rapidan Mills," no winter records), October 1939 to September 1945, July 1949 to current year.

GAGE.--Water-stage recorder. Datum of gage is 808.80 ft above mean sea level, adjustment of 1912. July 20, 1909, to Apr. 28, 1910, nonrecording gage at site 0.2 mile upstream at different datum. Apr. 29 to Nov. 12, 1910, nonrecording gage at site 800 ft upstream at different datum. Oct. 4 to Nov. 14, 1939, nonrecording gage at present site and datum.

AVERAGE DISCHARGE.--28 years (1939-45, 1949-71), 1,206 cfs (4.69 inches per year, 607,900 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 8,580 cfs Mar. 21 (gage height, 8.15 ft); maximum gage height, 8.32 ft Mar. 27 (backwater from ice); minimum daily discharge, 46 cfs Sept. 17-19; minimum gage height, 1.37 ft Sept. 17, 18, 19, 20, 21.
Period of record: Maximum discharge, 43,100 cfs Apr. 9, 1965 (gage height, 21.36 ft, from floodmark); minimum, 6.9 cfs Oct. 12, 1955 (gage height, 1.04 ft).

REMARKS.--Records good except those for winter periods, which are fair. Rapidan Reservoir gates destroyed during April 1965 flood and not replaced. Regulation discontinued with closing of Northern States Power Co. plant on Dec. 31, 1966.

REVISIONS (WATER YEARS).--WSP 895: Drainage area. WSP 1508: 1910.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	138	645	1,250	410	270	305	8,080	1,190	1,110	1,860	240	80
2	128	659	1,210	400	260	315	8,010	1,140	1,220	2,100	222	77
3	116	717	1,230	390	260	325	7,410	1,100	2,270	2,100	209	74
4	114	941	1,110	390	250	335	6,530	1,060	2,910	1,800	194	77
5	1.9	997	944	360	250	355	5,530	1,010	2,930	1,540	162	72
6	98	1,100	573	350	240	370	4,820	965	2,420	1,420	170	67
7	113	1,150	531	340	240	400	4,310	908	2,180	1,290	162	67
8	127	1,160	490	330	240	435	3,920	845	2,390	1,170	153	66
9	528	1,530	500	330	240	470	3,630	792	3,020	1,070	140	60
10	1,210	2,290	520	320	230	520	3,340	755	3,440	986	134	60
11	1,630	2,860	520	320	225	580	3,070	729	3,550	952	127	55
12	1,740	3,080	520	310	220	730	2,800	707	3,070	970	120	57
13	1,670	2,910	520	310	215	900	2,670	678	2,660	899	117	55
14	1,510	2,620	520	310	210	1,500	2,460	647	2,500	817	111	53
15	1,360	2,380	520	300	208	3,300	2,270	622	2,350	733	102	51
16	1,250	2,200	520	300	205	5,250	2,140	597	2,170	660	99	49
17	1,160	2,040	520	300	200	6,160	2,030	560	1,940	594	95	46
18	1,060	1,910	520	290	200	7,110	1,930	530	1,870	533	93	46
19	951	1,800	515	290	200	7,710	1,820	624	1,720	480	111	46
20	910	1,710	500	290	200	7,990	1,740	715	1,620	440	99	49
21	845	1,640	490	290	203	8,210	1,690	835	1,590	397	93	49
22	795	1,550	480	290	207	7,930	1,640	878	1,560	367	90	55
23	754	931	475	280	210	7,320	1,560	966	1,480	334	85	60
24	716	571	470	280	215	6,450	1,480	1,360	1,400	311	80	57
25	691	675	460	280	225	5,850	1,390	1,630	1,320	345	77	60
26	668	1,170	450	280	240	5,380	1,310	1,900	1,320	300	74	64
27	650	1,180	440	280	275	5,600	1,280	1,920	1,650	277	69	62
28	635	1,260	440	270	295	5,800	1,260	1,600	1,650	261	67	60
29	615	1,260	430	270	------	6,440	1,260	1,400	1,510	261	64	62
30	616	1,180	420	270	------	6,660	1,240	1,280	1,540	263	64	64
31	627	------	420	270	------	7,460	------	1,190	------	259	77	------
TOTAL	23,624	46,016	16,478	9,690	6,435	118,180	92,680	31,183	62,410	25,849	3,721	1,794
MEAN	762	1,534	596	313	230	3,812	3,089	1,006	2,080	834	120	59.8
MAX	1,740	3,080	1,250	410	295	8,210	8,080	1,920	3,550	2,160	240	80
MIN	98	571	420	270	200	305	1,240	560	1,110	259	64	46
CFSM	.31	.63	.25	.13	.09	1.57	1.27	.41	.86	.34	.05	.02
IN.	.36	.70	.28	.15	.10	1.81	1.42	.48	.95	.40	.06	.03
AC-FT	46,860	91,270	36,650	19,220	12,760	234,400	183,800	61,850	123,800	51,270	7,380	3,560

CAL YR 1970 TOTAL 247,406 MEAN 678 MAX 3,420 MIN 57 CFSM .28 IN 3.79 AC-FT 490,700
WTR YR 1971 TOTAL 440,060 MEAN 1,206 MAX 8,210 MIN 46 CFSM .50 IN 6.74 AC-FT 872,900

05320500 Le Sueur River near Rapidan, Minn.

LOCATION.--Lat 44°06'40", long 94°02'28", in SW¼ sec.35, T.108 N., R.27 W., Blue Earth County, on right bank 600 ft downstream from highway bridge, 1.8 miles northeast of Rapidan, and 2.3 miles upstream from mouth.

DRAINAGE AREA.--1,100 sq mi, approximately.

PERIOD OF RECORD.--October 1939 to September 1945, July 1949 to current year.

GAGE.--Water-stage recorder. Datum of gage is 775.76 ft above mean sea level, datum of 1929. Prior to Nov. 15, 1939, nonrecording gage at same site and datum.

AVERAGE DISCHARGE.--28 years, 420 cfs (5.19 inches per year, 304,300 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 5,680 cfs Mar. 19 (gage height, 9.06 ft); maximum gage height, 14.28 ft Mar. 16 (from floodmark, backwater from ice); minimum daily, 26 cfs Sept. 16, 17.
Period of record: Maximum discharge, 24,700 cfs Apr. 8, 1965 (gage height, 22.10 ft, from floodmark); maximum gage height, 22.72 ft May 22, 1960 (from floodmark); minimum daily discharge, 1.6 cfs Feb. 9-25, 1959; minimum gage height, 1.22 ft Aug. 31, 1970.

REMARKS.--Records good except those for winter periods, which are fair.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	265	610	690	130	50	49	3,560	525	615	854	108	54
2	234	635	660	130	49	51	3,450	505	555	959	97	51
3	201	809	655	120	48	52	2,630	475	505	1,020	86	45
4	178	1,050	606	120	47	53	2,410	455	467	982	84	45
5	163	1,160	524	110	46	54	2,210	439	435	871	86	42
6	148	1,200	510	110	45	56	2,040	419	435	761	84	38
7	150	1,150	480	100	44	58	1,890	398	625	761	80	37
8	318	1,190	460	98	43	62	1,750	380	1,260	893	76	35
9	1,070	2,090	430	96	43	66	1,650	356	1,330	772	70	33
10	1,720	2,720	410	90	42	75	1,520	335	1,320	645	63	31
11	2,050	2,850	390	88	41	88	1,410	328	1,590	630	57	30
12	2,230	2,880	370	86	40	115	1,310	319	2,470	670	54	29
13	2,100	2,800	350	82	40	200	1,200	312	2,440	700	49	28
14	1,890	2,590	320	79	39	800	1,100	301	2,310	620	45	27
15	1,680	2,300	310	76	38	2,000	1,010	290	2,060	565	42	27
16	1,480	2,050	290	74	38	3,500	926	277	1,850	475	42	26
17	1,290	1,820	280	72	37	4,500	882	272	1,620	401	42	26
18	1,120	1,640	260	70	37	5,100	832	267	1,430	345	46	27
19	988	1,480	250	68	37	4,990	800	319	1,290	301	68	28
20	868	1,380	230	66	37	4,280	778	376	1,230	267	74	29
21	760	1,280	220	64	38	4,000	756	411	1,150	243	76	31
22	670	1,190	210	62	38	3,540	728	427	1,010	223	76	33
23	610	892	200	61	39	2,910	695	455	920	201	72	36
24	578	552	190	60	40	2,600	655	734	805	182	66	38
25	547	640	180	58	41	2,420	615	1,160	744	166	61	40
26	520	970	170	57	43	2,300	570	1,100	706	168	59	42
27	529	792	170	55	45	2,300	565	1,010	712	154	57	44
28	534	765	160	54	48	2,980	550	926	675	138	57	45
29	542	721	150	53	------	3,060	555	849	680	129	55	46
30	583	690	150	51	------	3,340	545	761	783	125	52	46
31	601	------	140	50	------	3,450	------	685	------	120	54	------
TOTAL	26,617	42,896	10,415	2,490	1,173	59,049	39,592	15,866	34,022	15,341	2,038	1,089
MEAN	859	1,430	336	80.3	41.9	1,905	1,320	512	1,134	495	65.7	36.3
MAX	2,230	2,880	690	130	50	5,100	3,560	1,160	2,470	1,020	108	54
MIN	148	552	140	50	37	49	545	267	435	120	42	26
CFSM	.78	1.30	.31	.07	.04	1.73	1.20	.47	1.03	.45	.06	.03
IN.	.90	1.45	.35	.08	.04	2.00	1.34	.54	1.15	.52	.07	.04
AC-FT	52,790	85,080	20,660	4,940	2,330	117,100	78,530	31,470	67,480	30,430	4,040	2,160

CAL YR 1970 TOTAL 172,637 MEAN 473 MAX 2,880 MIN 20 CFSM .43 IN 5.84 AC-FT 342,400
WTR YR 1971 TOTAL 250,588 MEAN 687 MAX 5,100 MIN 26 CFSM .62 IN 8.47 AC-FT 497,000

PEAK DISCHARGE (BASE, 1,300 CFS)

DATE	TIME	G. H.	DISCHARGE	DATE	TIME	G. H.	DISCHARGE
10-12	1100	5.79	2,240	4-1	1300	7.32	3,580
11-12	unknown	about 6.66	2,910	6-12	1600	6.11	2,490
3-19	0030	9.06	5,680				

05325000 Minnesota River at Mankato, Minn.

LOCATION.--Lat 44°10'10", long 94°00'15", in sec.7, T.108 N., R.26 W., Nicollet County, on left bank at downstream side of Main Street Bridge in Mankato, 1.8 miles downstream from Blue Earth River and at mile 106.4 upstream from Mississippi River.

DRAINAGE AREA.--14,900 sq mi, approximately.

PERIOD OF RECORD.--May 1903 to current year (no winter records 1904, 1906-10, 1918-29). Monthly discharge only for some periods, published in WSP 1308. Published as "near Mankato: 1903-21.

GAGE.--Water-stage recorder. Datum of gage is 747.92 ft above mean sea level, datum of 1929. Prior to Oct. 19, 1921, nonrecording gage, at site 1.8 miles upstream at datum 6.4 ft higher. Mar. 15, 1922, to Nov. 30, 1924, nonrecording gage at present site and datum.

AVERAGE DISCHARGE.--50 years (1905, 1910-17, 1929-71), 2,642 cfs (2.41 inches per year, 1,914,000 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 21,400 cfs Mar. 22 (gage height, 17.21 ft); minimum daily, 304 cfs Sept. 19; minimum gage height, 2.33 ft Oct. 6.
Period of record: Maximum discharge, 94,100 cfs Apr. 10, 1965 (gage height, 29.09 ft); minimum observed, 26 cfs Aug. 4, 1934.
Maximum stage known, 29.9 ft Apr. 26, 1881, from floodmark, present site and datum (discharge, 90,000 cfs).

REMARKS.--Records good except those for winter periods, which are fair. Records of water temperatures and suspended sediment loads for the current year are published in Part 2 of this report. Station operated at a temporary location during flood protection project construction after May 28, 1971.

REVISIONS (WATER YEARS).--WSP 875: 1917. WSP 955: Drainage area. WSP 1085: 1929. WSP 1238: 1903, 1908, 1919. WSP 1508: 1916(M), 1918(M), 1926(M), 1928, 1930, 1932(M), 1938(M).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	734	2,450	4,900	1,300	750	2,350	19,700	4,350	3,410	5,760	1,690	431
2	668	2,560	4,750	1,300	735	2,250	19,900	4,250	4,020	6,830	1,560	408
3	593	2,860	4,650	1,250	725	2,150	18,800	4,100	5,410	7,390	1,500	486
4	523	3,380	4,350	1,250	715	2,050	17,400	4,000	6,580	7,560	1,400	587
5	487	3,780	4,300	1,200	705	1,950	16,200	3,850	6,950	7,570	1,240	504
6	450	4,030	4,000	1,200	695	1,850	14,900	3,700	6,430	7,640	1,140	447
7	542	4,110	3,700	1,150	685	1,800	13,800	3,550	6,230	7,930	1,070	455
8	932	4,220	3,450	1,150	675	1,750	12,900	3,450	7,190	8,160	949	375
9	2,280	6,060	3,200	1,100	670	1,650	12,000	3,300	8,650	7,910	861	416
10	4,020	8,530	3,050	1,100	665	1,600	11,300	3,150	9,560	7,520	806	447
11	4,940	9,980	2,860	1,060	660	1,640	10,600	3,040	10,200	7,260	751	388
12	5,340	10,900	2,700	1,060	660	1,680	10,000	2,910	11,100	7,140	696	368
13	5,230	11,000	2,600	1,040	650	1,720	9,420	2,770	10,900	7,020	663	368
14	4,830	10,600	2,500	1,020	650	2,000	8,720	2,580	10,900	6,780	620	355
15	4,470	10,200	2,350	1,000	640	3,000	8,040	2,420	10,800	6,530	576	337
16	4,160	9,770	2,250	990	640	10,000	7,440	2,240	10,500	6,210	576	331
17	3,810	9,310	2,150	980	640	15,000	7,070	2,090	9,790	5,870	495	325
18	3,470	8,860	2,100	960	660	18,000	6,630	1,980	9,180	5,540	495	315
19	3,150	8,390	2,000	940	670	20,500	6,400	2,110	8,360	5,180	540	304
20	2,870	7,910	1,900	930	720	20,000	6,100	2,260	7,480	4,760	559	310
21	2,640	7,450	1,850	910	770	20,800	5,800	2,410	6,520	4,290	540	310
22	2,450	7,150	1,800	900	830	20,900	5,650	2,470	5,800	3,840	522	382
23	2,320	6,000	1,750	880	960	19,700	5,350	2,610	5,290	3,420	522	331
24	2,220	6,050	1,700	860	1,100	18,500	5,200	3,440	4,910	3,090	513	368
25	2,140	6,100	1,600	850	1,300	17,900	5,100	4,300	4,710	2,900	470	349
26	2,120	6,200	1,600	840	1,600	17,200	4,900	4,680	4,640	2,700	431	349
27	2,130	6,000	1,550	820	2,000	16,300	4,800	4,720	4,790	2,470	408	382
28	2,130	5,700	1,500	800	2,200	17,000	4,700	4,440	4,670	2,330	395	382
29	2,180	5,500	1,450	790	------	17,200	4,600	4,110	4,360	2,230	375	355
30	2,270	5,200	1,400	770	------	17,500	4,500	3,830	4,750	2,170	362	362
31	2,360	------	1,350	760	------	18,500	------	3,580	------	1,990	349	------
TOTAL	78,459	200,250	81,310	31,160	24,370	314,440	287,920	102,690	214,080	167,990	23,074	11,527
MEAN	2,531	6,675	2,623	1,005	870	10,140	9,597	3,313	7,136	5,419	744	384
MAX	5,340	11,000	4,900	1,300	2,200	20,900	19,900	4,720	11,100	8,160	1,690	587
MIN	450	2,450	1,350	760	640	1,600	4,500	1,980	3,410	1,990	349	304
CFSM	.17	.45	.18	.07	.06	.68	.64	.22	.48	.36	.05	.03
IN.	.20	.50	.20	.08	.06	.79	.72	.26	.53	.42	.06	.03
AC-FT	155,600	397,200	161,300	61,810	48,340	623,700	571,100	203,700	424,600	333,200	45,770	22,860

CAL YR 1970 TOTAL 1,038,850 MEAN 2,846 MAX 11,000 MIN 320 CFSM .19 IN 2.59 AC-FT 2,061,000
WTR YR 1971 TOTAL 1,537,270 MEAN 4,212 MAX 20,900 MIN 304 CFSM .28 IN 3.84 AC-FT 3,049,000

05330000 Minnesota River near Jordan, Minn.

LOCATION.--Lat 44°41'35", long 93°38'30", in NW¼SW¼ sec.7, T.114 N., R.23 W., Carver County, on left bank 1.5 miles northwest of Jordan and at mile 39.4 upstream from Mississippi River.

DRAINAGE AREA.--16,200 sq mi, approximately.

PERIOD OF RECORD.--September 1934 to current year. Prior to Oct. 1, 1966, published as "near Carver, Minn".

GAGE.--Water-stage recorder. Datum of gage is 690.00 ft above mean sea level, datum of 1929. Prior to Oct. 1, 1966, water-stage recorder 2.8 miles downstream with auxiliary chain gage at present site and same datum.

AVERAGE DISCHARGE.--37 years, 3,358 cfs (2.81 inches per year, 2,433,000 acre-ft).

EXTREMES.--Current year: Maximum daily discharge, 24,100 cfs Mar. 24, 25; maximum gage height, 25.21 ft Mar. 22 (backwater from ice); minimum discharge, 500 cfs Sept. 21; minimum gage height, 4.34 ft Sept. 21, 22. Period of record: Maximum discharge, 117,000 cfs Apr. 11, 1965; maximum gage height, 34.37 ft Apr. 12, 1965 (backwater from Mississippi River); minimum discharge, 79 cfs Nov. 17, 1955; minimum gage height, 2.66 ft Nov. 22, 1935.

REMARKS.--Records good except for winter periods, which are fair.

REVISIONS (WATER YEARS).--WSP 955: Drainage area. WSP 1508: 1935.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	952	2,850	5,320	2,300	1,060	2,500	22,700	5,720	4,840	6,260	2,610	829
2	906	2,850	5,490	2,300	1,030	2,690	23,200	5,590	5,050	6,580	2,410	835
3	838	3,010	5,730	2,250	1,030	2,700	23,400	5,440	5,520	7,270	2,400	785
4	776	3,350	5,490	2,190	1,020	2,550	23,200	5,280	6,320	7,890	2,260	790
5	731	3,800	5,400	2,100	1,020	2,450	22,500	5,070	7,350	8,190	2,100	838
6	687	4,130	4,580	2,010	1,030	2,400	21,300	4,890	8,030	8,210	1,930	875
7	678	4,320	4,900	1,980	1,020	2,350	19,900	4,730	7,830	8,270	1,790	850
8	771	4,420	5,050	1,880	1,020	2,300	18,700	4,510	7,780	8,650	1,690	818
9	1,010	5,510	5,100	1,810	1,020	2,300	17,500	4,330	8,490	9,430	1,570	773
10	1,850	7,960	5,100	1,760	1,020	2,250	16,600	4,150	9,390	9,430	1,470	730
11	3,420	9,670	5,050	1,690	1,020	2,300	15,700	4,100	10,200	8,970	1,370	697
12	4,480	10,600	5,000	1,650	1,010	2,300	14,800	3,960	11,200	8,550	1,300	665
13	4,980	11,300	4,900	1,600	1,010	2,350	13,900	3,790	12,200	8,160	1,240	631
14	5,080	11,700	4,750	1,560	1,010	2,550	13,000	3,670	12,700	7,870	1,180	606
15	4,830	11,800	4,550	1,530	1,010	3,000	11,900	3,560	12,800	7,650	1,220	579
16	4,530	11,800	4,450	1,500	1,000	4,500	11,000	3,380	12,800	7,420	1,060	560
17	4,280	11,500	4,250	1,480	1,000	7,800	10,000	3,330	12,600	7,050	1,010	554
18	4,010	11,000	4,000	1,450	990	10,800	9,300	3,180	12,300	6,610	994	542
19	3,730	10,400	3,850	1,420	1,000	15,800	8,740	3,220	11,900	6,200	984	529
20	3,460	10,000	3,650	1,380	1,050	19,500	8,200	3,800	11,500	5,810	966	515
21	3,220	9,440	3,500	1,360	1,060	22,500	7,790	4,140	10,500	5,400	977	508
22	3,030	8,840	3,350	1,340	1,120	23,900	7,340	4,020	9,110	4,970	958	527
23	2,860	7,970	3,200	1,300	1,200	24,000	7,260	3,900	7,770	4,560	934	570
24	2,740	6,510	3,050	1,280	1,300	24,100	7,070	4,210	6,820	4,200	945	588
25	2,650	4,760	2,950	1,250	1,500	24,100	6,880	5,100	6,690	3,890	922	592
26	2,570	4,340	2,850	1,220	1,650	24,000	6,590	5,990	6,560	3,640	889	592
27	2,530	4,270	2,700	1,190	1,850	23,200	6,350	6,200	6,420	3,440	850	598
28	2,510	4,250	2,600	1,170	2,100	22,900	6,220	6,100	5,990	3,290	810	594
29	2,500	4,700	2,500	1,150	------	22,100	6,050	5,880	5,770	3,130	780	591
30	2,540	5,100	2,400	1,130	------	21,900	5,870	5,480	5,970	3,010	753	607
31	2,630	------	2,350	1,090	------	22,200	------	4,980	------	2,910	824	------
TOTAL	81,779	212,150	128,060	49,320	32,150	350,290	392,960	141,700	262,400	196,910	41,196	19,768
MEAN	2,638	7,072	4,131	1,591	1,148	11,300	13,100	4,571	8,747	6,352	1,329	659
MAX	5,080	11,800	5,730	2,300	2,100	24,100	23,400	6,200	12,800	9,430	2,610	875
MIN	678	2,850	2,350	1,090	990	2,250	5,870	3,180	4,840	2,910	753	508
CFSM	.16	.44	.26	.10	.07	.70	.81	.28	.54	.39	.08	.04
IN.	.19	.49	.29	.11	.07	.80	.90	.33	.60	.45	.09	.05
AC-FT	162,200	420,800	254,000	97,830	63,770	694,800	779,400	281,100	520,500	390,600	81,710	39,210

CAL YR 1970 TOTAL 1,187,036 MEAN 3,252 MAX 11,800 MIN 495 CFSM .20 IN 2.73 AC-FT 2,354,000
WTR YR 1971 TOTAL 1,908,683 MEAN 5,229 MAX 24,100 MIN 508 CFSM .32 IN 4.38 AC-FT 3,786,000

05330900 Nine Mile Creek at Bloomington, Minn.

LOCATION.--Lat 44°48'46", long 93°18'07", in NW¼ sec.21, T.27 N., R.24 W., Hennepin County, on left bank between 105th and 106th Street in Bloomington, Minn., 1.2 miles downstream from bridge on Old Shakopee Road and 2.1 miles upstream from mouth.

PERIOD OF RECORD.--January 1963 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 731 ft (from topographic map). Prior to May 16, 1963, nonrecording gage 30 ft upstream at datum 0.81 ft higher.

AVERAGE DISCHARGE.--8 years, 17.8 cfs (12,900 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 237 cfs July 7 (gage height, 3.54 ft); minimum 1.5 cfs Aug. 9 (gage height, 1.30 ft).
Period of record: Maximum discharge, 535 cfs Apr. 8, 1965 (gage height, 4.32 ft); minimum daily, 1.2 cfs Feb. 24, 1965; minimum gage height, 1.28 ft Oct. 14, 1966.

REMARKS.--Records good except those for winter periods, which are fair.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7.2	31	25	6.8	7.1	11	78	28	24	15	5.9	21
2	6.6	36	22	6.8	7.3	11	66	26	22	12	4.7	20
3	6.3	47	21	6.8	7.4	11	56	25	19	8.9	3.0	19
4	6.9	30	18	6.8	7.5	11	51	27	17	7.2	2.6	22
5	5.8	24	14	6.8	7.7	11	48	24	19	6.2	2.6	14
6	6.6	34	14	6.8	7.8	11	44	22	17	5.5	2.5	12
7	19	34	14	6.8	8.0	11	42	19	32	31	2.2	9.9
8	41	37	13	6.8	8.2	12	41	17	28	76	2.3	6.9
9	56	87	13	6.8	8.4	12	40	15	27	69	3.0	10
10	48	94	11	6.8	8.5	12	37	14	25	57	6.1	7.9
11	49	97	13	6.8	8.7	13	36	14	20	45	4.2	6.2
12	50	95	15	6.8	8.9	14	34	13	17	55	4.2	5.8
13	48	87	13	6.8	9.1	17	33	13	14	45	4.2	5.5
14	40	76	10	6.8	9.3	58	31	12	12	34	4.3	6.1
15	27	63	9.6	6.8	9.4	68	29	11	11	27	4.1	6.1
16	19	53	9.6	6.8	9.6	66	27	11	9.1	19	3.6	5.6
17	15	46	9.6	6.8	9.8	87	26	13	7.8	12	3.5	5.9
18	13	42	10	6.8	10	76	25	15	7.1	10	5.5	5.6
19	12	39	10	6.8	10	70	25	40	21	9.0	4.5	6.9
20	11	37	10	6.8	10	68	27	44	25	7.0	4.6	7.1
21	11	35	10	6.8	10	73	27	48	31	5.8	7.0	6.1
22	11	31	9.7	6.8	10	72	24	44	32	5.4	4.7	21
23	11	20	9.3	6.8	11	74	23	52	27	4.9	4.5	17
24	16	25	8.8	6.8	11	85	19	61	26	4.2	4.5	19
25	23	25	8.5	6.8	11	96	17	64	24	3.5	4.2	20
26	26	22	8.1	6.8	11	112	17	65	24	2.4	3.7	18
27	35	22	7.7	6.8	11	113	23	60	20	3.3	3.5	18
28	34	21	7.4	6.8	11	102	28	54	15	2.6	2.9	23
29	30	22	7.1	6.9	------	90	29	42	17	9.7	3.0	24
30	30	21	6.9	7.0	------	88	29	30	19	8.3	3.3	25
31	30	------	6.8	7.1	------	85	------	24	------	6.4	28	------
TOTAL	744.4	1,333	365.1	211.4	258.7	1,640	1,032	947	609.0	607.3	146.9	394.6
MEAN	24.0	44.4	11.8	6.82	9.24	52.9	34.4	30.5	20.3	19.6	4.74	13.2
MAX	56	97	25	7.1	11	113	78	65	32	76	28	25
MIN	5.8	20	6.8	6.8	7.1	11	17	11	7.1	2.4	2.2	5.5
AC-FT	1,480	2,640	724	419	513	3,250	2,050	1,880	1,210	1,200	291	783

CAL YR 1970 TOTAL 6,435.5 MEAN 17.6 MAX 97 MIN 2.9 AC-FT 12,760
WTR YR 1971 TOTAL 8,289.4 MEAN 22.7 MAX 113 MIN 2.2 AC-FT 16,440

05331000 Mississippi River at St. Paul, Minn.

LOCATION.--Lat 44°56'40", long 93°05'20", in SE¼NE¼ sec.6, T.28 N., R.22 W., Ramsey County, on left bank in St. Paul, 300 ft upstream from Robert Street Bridge, 6 miles downstream from Minnesota River, and at mile 839.3 upstream from Ohio River.

DRAINAGE AREA.--36,800 sq mi, approximately.

PERIOD OF RECORD.--Water year 1867-69, 1872-92 (annual maximum), March 1892 to current year (prior to 1901, fragmentary during some winters). Records prior to March 1892, published in the 19th Annual Report, Part 4, have been found to be unreliable and should not be used. Monthly discharge only for some periods, published in WSP 1308. Gage-height records (winter records incomplete) collected at same site since 1866 are contained in reports of U.S. Weather Bureau, War Department and Mississippi River Commission.

GAGE.--Water-stage recorder. Datum of gage is 683.62 ft above mean sea level, datum of 1929. Prior to Mar. 18, 1925, nonrecording gage at several sites within 300 ft of present site at same datum. Mar. 18, 1925, to Mar. 10, 1933, water-stage recorder and Mar. 11, 1933, to Sept. 14, 1939, nonrecording gage, at present site and datum. Since September 1938, auxiliary water-stage recorder 5.6 miles downstream.

AVERAGE DISCHARGE (ADJUSTED FOR DIVERSION).--73 years (1894-95, 1896-97, 1900-1971), 10,280 cfs (3.79 inches per year).

EXTREMES.--Current year: Maximum discharge, 49,800 cfs Apr. 12 (gage height, 10.81 ft); minimum daily, 2,200 cfs Oct. 5.

Period of record (1867-70, 1872-1971): Maximum discharge, 171,000 cfs Apr. 16, 1965 (gage height, 26.01 ft, from floodmark).

Period of record (1897, 1917-71): Minimum daily discharge, 632 cfs Aug. 26, 1934.

Maximum flood known since at least 1851, 171,000 cfs Apr. 16, 1965 (gage height, 26.01 ft, from floodmark). Flood of Apr. 11, 1870 reached a stage of 19.4 ft (discharge, 100,000 cfs).

REMARKS.--Records good. Records of water temperatures for the current year are published in Part 2 of this report. Slight regulation except during extreme floods by reservoirs on headwaters and by powerplants. Beginning July 20, 1938, sewage from Minneapolis and St. Paul, which formerly entered above station, was diverted to a sewage-disposal plant, thence to river below station. Figures of daily discharge do not include this diversion.

COOPERATION.--Records of Mississippi River at Twin City lock and dam computed and furnished by Ford Motor Co. Diversion through sewage disposal plant furnished by Metropolitan Sewer Board.

REVISIONS (WATER YEARS).--WSP 285: 1892-96. WSP 715: Drainage area. WSP 875: 1938. WSP 895: 1939. WSP 1308: 1867(M). WSP 1508: 1897, 1898(M), 1903(M), 1917-18(M), 1928(M), 1929. See also Period of Record.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2,610	6,940	12,400	6,990	4,680	6,540	38,900	31,500	20,600	16,800	8,240	3,940
2	2,760	7,080	12,700	6,970	4,960	6,840	39,400	31,300	20,700	16,900	7,520	4,220
3	2,610	7,460	12,900	6,840	4,910	6,990	40,800	30,200	19,600	17,200	6,980	4,150
4	2,300	7,600	12,400	6,780	5,060	6,870	42,200	29,800	19,200	17,900	6,850	4,250
5	2,200	9,040	11,900	6,400	4,990	6,990	43,200	29,300	19,900	18,800	6,550	3,830
6	2,290	8,580	10,000	6,050	4,610	6,610	43,800	28,500	20,000	19,100	5,700	3,520
7	2,690	9,060	8,700	6,170	5,010	6,700	44,600	26,800	19,800	19,200	5,350	4,440
8	2,910	9,500	9,720	5,830	4,760	6,740	46,500	21,700	18,400	19,500	5,120	4,190
9	4,170	13,200	10,600	5,880	4,870	6,600	46,200	22,300	18,400	19,700	4,940	4,360
10	4,260	15,400	11,100	6,180	4,960	6,570	47,800	21,700	18,800	20,200	5,110	4,200
11	5,280	18,600	11,400	5,850	5,110	7,080	49,100	21,000	19,400	19,300	4,850	3,980
12	7,260	20,600	11,400	5,740	5,030	7,210	49,500	19,500	20,000	18,700	4,070	3,990
13	7,820	22,200	11,300	5,660	4,510	7,320	48,800	18,100	21,000	18,200	3,950	4,010
14	8,580	23,300	10,700	5,530	4,720	8,340	48,600	16,900	21,700	17,900	4,000	4,060
15	8,820	23,300	10,300	5,810	4,920	8,630	48,400	15,400	21,800	17,300	3,510	3,760
16	8,360	23,100	10,400	5,410	4,790	8,970	47,200	14,000	22,000	16,100	3,880	3,430
17	7,650	22,500	10,400	5,370	4,970	11,200	45,000	12,800	21,800	15,700	3,820	3,230
18	6,930	23,100	10,300	5,590	5,120	15,200	42,800	12,200	21,500	15,200	3,820	3,110
19	7,240	21,900	9,710	5,520	5,200	18,300	40,900	13,100	20,800	14,900	4,090	2,950
20	6,440	21,200	8,650	5,410	4,960	20,800	39,300	13,400	20,100	14,100	3,580	3,020
21	6,270	20,900	8,390	5,390	5,020	24,200	38,100	13,700	20,300	13,600	3,850	2,960
22	5,860	19,300	8,380	5,470	5,150	28,400	36,700	14,300	19,600	13,000	3,430	3,330
23	5,680	15,300	8,240	5,510	5,380	29,900	35,300	15,700	18,100	12,500	3,680	3,830
24	5,860	12,300	8,060	5,580	5,300	31,700	34,600	17,000	17,400	12,000	3,910	3,250
25	6,860	10,500	7,560	5,530	5,740	33,100	33,900	18,100	16,400	11,300	3,790	3,280
26	6,220	10,500	7,410	5,490	5,980	34,500	33,100	19,700	16,200	11,300	3,530	2,910
27	6,270	9,680	7,550	5,400	6,250	35,300	32,800	21,700	15,700	10,800	3,100	3,100
28	6,640	9,480	7,450	4,910	6,440	35,300	32,500	22,200	15,300	9,740	3,110	3,530
29	6,830	10,600	7,380	5,330	------	35,200	32,100	22,400	15,400	9,380	2,880	3,240
30	6,860	11,500	7,220	5,380	------	35,800	31,700	21,700	16,600	9,500	3,240	3,430
31	6,860	------	6,820	5,110	------	37,800	------	21,000	------	8,280	3,990	------
TOTAL	173,390	443,720	301,440	179,080	143,600	541,700	1,233.8M	637,000	576,500	474,100	140,440	109,500
MEAN	5,593	14,790	9,724	5,777	5,129	17,470	41,130	20,550	19,220	15,290	4,530	3,650
MAX	8,820	23,300	12,900	6,990	6,440	37,800	49,500	31,500	22,000	20,200	8,240	4,440
MIN	2,200	6,940	6,820	4,910	4,510	6,540	31,700	12,200	15,300	8,280	2,880	2,910
(≠)	357	360	304	278	311	365	329	353	396	369	362	344
MEAN ≠	5,950	15,150	10,030	6,055	5,440	17,840	41,460	20,900	19,620	15,660	4,892	3.994
CFSM ≠	0.16	0.41	0.27	0.16	0.15	0.48	1.13	0.57	0.53	0.43	0.13	0.11
IN. ≠	0.18	0.46	0.31	0.18	0.16	0.55	1.26	0.66	0.59	0.50	0.15	0.12

CAL YR 1970 TOTAL 3,645,440 MEAN 9,988 MAX 34,100 MIN 1,690 MEAN ≠ 10,330 CFSM ≠ 0.28 IN. ≠ 3.81
WTR YR 1971 TOTAL 4,954,270 MEAN 13,570 MAX 49,500 MIN 2,200 MEAN ≠ 13,910 CFSM ≠ 0.38 IN. ≠ 5.12

≠ Diversion, equivalent in cubic feet per second, through sewage disposal plant.
≠ Adjusted for diversion.

M Expressed in thousands.

05336700 Kettle River below Sandstone, Minn.

LOCATION.--Lat 46°06'20", long 92°51'50", in NW¼SW¼ sec.22, T.42 N., R.20 W., Pine County, on left bank about 900 ft downstream from abandoned powerplant dam, on Sandstone Federal Correctional Institution property, 1.8 miles south of Sandstone.

PERIOD OF RECORD.--October 1967 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 930 ft (from topographic map).

EXTREMES.--Current year: Maximum discharge 12,100 cfs Apr. 12 (gage height, 12.36 ft); minimum daily, 62 cfs Jan. 14-19.
Period of record: Maximum discharge, 12,100 cfs Apr. 12, 1971 (gage height, 12.36 ft); minimum daily, 62 cfs Jan. 14-19, 1971.
Flood in April 1965 reached a stage of 12.96 ft, from floodmark (discharge, 13,400 cfs).

REMARKS.--Records good except those for winter periods, which are fair.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	125	599	540	125	93	140	300	1,580	1,140	287	157	277
2	122	725	520	115	99	140	340	1,450	997	282	151	264
3	112	830	510	110	103	140	430	1,320	877	287	148	246
4	107	800	500	105	110	140	530	1,210	770	273	151	237
5	107	740	490	97	117	140	630	1,170	748	246	145	232
6	105	688	480	92	123	140	800	1,110	830	228	136	220
7	110	646	470	87	130	140	1,210	1,030	877	237	130	204
8	157	586	450	82	138	140	2,400	933	853	241	127	196
9	287	695	440	78	143	142	4,250	853	778	241	125	192
10	521	1,780	424	73	149	144	6,340	770	688	228	125	200
11	580	2,260	410	70	150	145	8,680	703	653	204	122	200
12	508	2,950	390	67	153	147	11,200	646	660	192	122	196
13	471	2,980	370	64	154	150	11,400	593	632	196	136	189
14	424	2,540	355	62	155	155	9,660	547	612	182	151	182
15	368	2,020	340	62	155	165	7,810	495	567	182	151	168
16	342	1,800	325	62	155	175	6,370	453	502	185	148	161
17	316	1,520	310	62	156	190	5,510	418	435	196	139	154
18	292	1,350	295	62	153	200	4,870	418	401	220	136	148
19	268	1,240	280	62	150	210	4,270	547	441	255	154	151
20	259	1,140	265	63	148	220	3,730	1,610	447	316	200	151
21	241	1,050	250	64	147	226	3,280	2,350	401	321	226	148
22	232	981	240	65	146	232	2,850	2,210	358	316	350	142
23	228	920	235	66	144	239	2,420	1,930	316	292	400	142
24	228	845	215	67	142	245	2,060	2,300	302	264	598	142
25	220	660	205	68	141	245	1,750	3,530	282	241	521	139
26	224	630	190	70	140	250	1,530	3,330	259	216	453	139
27	297	600	180	73	140	252	1,360	2,820	241	204	396	139
28	465	580	165	75	140	254	1,380	2,350	224	192	353	139
29	528	570	155	79	------	258	1,630	1,930	264	178	321	136
30	528	550	145	83	------	260	1,670	1,600	347	171	297	154
31	528	------	135	87	------	270	------	1,360	------	164	282	------
TOTAL	9,300	35,275	10,279	2,397	3,874	5,894	110,660	43,566	16,902	7,237	7,051	5,388
MEAN	300	1,176	332	77.3	138	190	3,689	1,405	563	233	227	180
MAX	580	2,980	540	125	156	270	11,400	3,530	1,140	321	598	277
MIN	105	550	135	62	93	140	300	418	224	164	122	136

CAL YR 1970 TOTAL 215,584 MEAN 591 MAX 5,340 MIN 84
WTR YR 1971 TOTAL 257,823 MEAN 706 MAX 11,400 MIN 62

05338500 Snake River near Pine City, Minn.

LOCATION.--Lat 45°50'30", long 92°56'00", in SE¼NW¼ sec.26, T.39 N., R.21 W., Pine County, on left bank at site of former powerplant and dam, 0.5 mile downstream from Cross Lake and 1.5 miles northeast of Pine City.

DRAINAGE AREA.--958 sq mi.

RECORDS AVAILABLE.--June 1913 to September 1917, July 1951 to current year.

GAGE.--Water-stage recorder. Datum of gage is 919.00 ft above mean sea level, datum of 1929. June 25, 1913, to Sept. 30, 1917, nonrecording gage at site 500 ft downstream at different datum. July 1 to Oct. 28, 1951, nonrecording gage at present site and datum.

AVERAGE DISCHARGE.--24 years, 569 cfs (8.07 inches per year).

EXTREMES.--Current year: Maximum discharge, 6,560 cfs Apr. 16 (gage height, 7.65 ft); minimum, 44 cfs Oct. 4 (gage height, 2.79 ft).
Period of record: Maximum discharge 11,500 cfs April 18, 1965 (gage height, 9.56 ft); minimum, 5.5 cfs Oct. 1, 1964 (gage height, 2.57 ft), result of dam rehabilitation 0.5 mile upstream.
A discharge measurement of 12,500 cfs was made May 9, 1950.

REMARKS.--Records good except those for winter periods, which are fair.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	77	311	350	118	128	130	578	1,540	1,910	253	120	134
2	89	335	350	113	129	130	936	1,590	1,580	289	108	139
3	75	387	350	111	128	129	1,180	1,610	1,300	324	100	129
4	48	447	350	108	132	129	1,320	1,570	1,090	350	93	134
5	49	458	350	105	137	126	1,450	1,430	905	342	93	129
6	58	453	335	102	135	125	1,550	1,300	756	310	93	139
7	67	439	315	99	132	129	1,700	1,180	665	292	93	112
8	155	418	300	96	131	129	2,380	1,030	589	297	93	104
9	287	495	293	94	129	128	3,340	907	522	255	97	89
10	342	566	272	92	122	127	4,270	801	503	230	97	125
11	328	725	257	90	119	127	4,620	699	524	209	81	104
12	358	955	240	89	118	127	4,990	622	528	209	81	104
13	357	1,160	229	88	116	124	5,540	544	55	227	64	93
14	339	1,350	214	88	119	129	6,050	480	555	186	64	93
15	304	1,410	200	86	119	138	6,420	460	527	188	66	85
16	278	1,370	190	90	116	149	6,510	399	527	164	71	64
17	266	1,270	180	92	117	169	6,190	377	470	151	66	64
18	246	1,190	178	92	121	190	5,660	350	425	173	85	61
19	225	1,060	170	92	125	205	5,060	439	389	212	120	57
20	209	980	161	95	128	220	4,400	561	386	209	108	57
21	193	760	155	96	128	230	3,700	775	346	227	104	61
22	190	600	154	97	128	245	3,230	1,100	312	248	97	57
23	183	510	148	99	125	255	2,790	1,360	285	245	71	74
24	190	475	144	102	123	265	2,390	1,710	253	227	69	66
25	178	450	140	103	118	270	2,070	1,920	230	224	74	61
26	200	420	138	104	121	278	1,760	2,170	212	192	64	61
27	239	400	130	108	123	281	1,530	2,470	215	156	64	74
28	246	380	128	114	129	289	1,450	2,660	205	178	66	97
29	239	360	127	122	------	304	1,380	2,530	211	136	66	82
30	259	350	125	122	------	315	1,440	2,430	258	134	74	104
31	296	------	120	125	------	378	------	2,170	------	126	112	------
TOTAL	6,570	20,484	6,793	3,134	3,496	5,970	95,884	39,284	17,229	6,959	2,674	2,753
MEAN	212	683	219	101	125	193	3,196	1,267	574	224	86.3	91.7
MAX	358	1,410	350	125	137	378	6,510	2,660	1,910	350	120	139
MIN	48	311	120	88	116	124	578	350	205	126	64	57
CFSM	.22	.71	.23	.11	.13	.20	3.34	1.32	.60	.23	.09	.10
IN.	.26	.80	.26	.12	.14	.23	3.72	1.53	.67	.27	.10	.11

CAL YR 1970 TOTAL 163,605 MEAN 448 MAX 4,140 MIN 44 CFSM .47 IN 5.35
WTR YR 1971 TOTAL 211,230 MEAN 579 MAX 6,510 MIN 48 CFSM .60 IN 8.20

05340050 Sunrise River near Lindstrom, Minn.

LOCATION.--Lat 45°27'00", long 92°53'10", in SW¼NE¼ sec.7, T.34 N., R.20 W., Chisago County, on left bank 20 ft downstream from highway bridge and 4.5 miles northwest of Lindstrom.

PERIOD OF RECORD.--July 1965 to current year. Records for January 1949 to July 1965 at site 6.5 miles upstream, published as "near Stacy", not equivalent owing to increased drainage area and Minnesota Game and Fish reservoir between sites.

GAGE.--Water-stage recorder. Altitude of gage is 850 ft (from topographic map).

AVERAGE DISCHARGE.--6 years, 83.4 cfs (60,420 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 365 cfs Apr. 11 (gage height, 6.14 ft); minimum, 4.5 cfs Oct. 3 (gage height, 1.98 ft).
Period of record: Maximum discharge, 704 cfs Apr. 11, 1969 (gage height, 7.28 ft; minimum, 4.5 cfs Oct. 3, 1971 (gage height, 1.98 ft).

REMARKS.--Records good except those for winter period, which are fair. Some regulation by Minnesota Game and Fish Wildlife Refuge ponds above the station. At high stages a small part of flow discharges into the Rum River and Coon Creek basins from West Arm of Coon Lake and South Coon Lake, respectively.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.2	111	145	57	43	45	240	263	204	66	34	51
2	5.2	115	143	56	43	45	222	252	197	64	17	46
3	4.7	122	142	55	42	45	212	241	188	61	14	40
4	4.7	130	140	53	42	45	208	246	180	58	12	39
5	4.7	132	140	52	42	45	220	269	182	56	12	40
6	7.0	132	135	51	41	45	258	273	174	53	12	36
7	8.2	131	130	51	41	45	289	268	168	53	12	34
8	30	132	124	51	40	45	322	254	157	51	12	19
9	56	167	117	50	40	45	346	244	147	49	13	12
10	50	173	110	50	40	46	357	233	144	49	14	13
11	32	180	107	49	40	47	361	217	151	47	14	11
12	30	190	106	49	40	47	354	209	144	47	14	11
13	24	200	105	49	39	48	343	206	137	47	15	12
14	21	210	100	48	39	49	334	202	127	44	21	10
15	20	215	95	48	39	50	324	201	105	45	19	9.5
16	23	215	92	47	39	51	332	193	98	43	20	8.8
17	25	210	90	47	39	52	339	177	92	40	20	9.1
18	19	205	86	47	40	54	307	162	88	45	22	8.3
19	23	200	84	47	40	56	286	173	87	46	37	8.1
20	24	195	82	46	40	60	262	198	83	46	33	8.1
21	28	185	79	46	41	64	242	195	78	45	34	8.5
22	33	180	76	46	41	70	234	190	74	43	35	8.5
23	39	175	74	45	41	76	239	189	70	41	85	12
24	48	170	72	45	42	83	234	210	69	38	93	11
25	61	165	69	45	42	93	225	221	70	37	81	9.6
26	67	160	67	45	43	106	215	227	68	35	71	9.3
27	90	155	66	44	43	105	210	233	67	36	64	9.5
28	112	150	64	44	44	117	219	238	65	43	59	11
29	109	148	62	44	------	137	238	236	64	42	54	11
30	105	145	60	44	------	159	257	228	69	44	49	21
31	108	------	59	44	------	209	------	213	------	45	51	------
TOTAL	1,216.7	4,998	3,021	1,495	1,146	2,184	8,229	6,861	3,547	1,459	1,043	537.3
MEAN	39.2	167	97.5	48.2	40.9	70.5	274	221	118	47.1	33.6	17.9
MAX	112	215	145	57	44	209	361	273	204	66	93	51
MIN	4.7	111	59	44	39	45	208	162	64	35	12	8.1
AC-FT	2,410	9,910	5,990	2,970	2,270	4,330	16,320	13,610	7,040	2,890	2,070	1,070

CAL YR 1970 TOTAL 22,854.6 MEAN 62.6 MAX 289 MIN 4.7 AC-FT 45,330
WTR YR 1971 TOTAL 35,737.0 MEAN 97.9 MAX 361 MIN 4.7 AC-FT 70,880

05340500 St. Croix River at St. Croix Falls, Wis.

LOCATION.--Lat 45°24'25", long 92°38'49", in NW¼ sec.30, T.34 N., R.18 W., Polk County, on left bank 1,800 ft downstream from powerplant of Northern States Power Co., in St. Croix Falls, and at mile 52.2.

DRAINAGE AREA.--5,930 sq mi, approximately.

PERIOD OF RECORD.--January 1902 to current year. Prior to January 1910, monthly discharge only, published in WSP 1308. Prior to October 1939, published as "near St. Croix Falls."

GAGE.--Water-stage recorder. Datum of gage is 690.47 ft above mean sea level, adjustment of 1912. Prior to July 1905, gage heights and discharge measurements were used by Loweth and Wolff, consulting engineers of St. Paul, Minn., to determine the flow. July 1905 to February 1940, records were computed from power generation at the St. Croix Falls powerplant.

AVERAGE DISCHARGE.--69 years, 4,098 cfs (9.38 inches per year).

EXTREMES.--Current year: Maximum discharge, 34,400 cfs Apr. 14 (gage height, 16.00 ft); minimum daily, 1,620 cfs Oct. 6, 1970.
Period of record: Maximum discharge, 54,900 cfs May 8, 1950 (gage height, 25.19 ft); minimum daily, 75 cfs July 17, 1910.

REMARKS.--Records are good. Diurnal fluctuation caused by St. Croix Falls powerplant 1,800 ft upstream.

REVISIONS (WATER YEARS).--WSP 1115: 1929.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1,970	4,790	4,670	2,650	2,580	2,720	8,270	9,460	8,360	2,540	2,030	2,470
2	1,860	5,400	5,150	2,700	1,800	2,520	7,840	9,070	7,740	2,990	2,050	2,430
3	1,780	5,930	4,790	2,450	2,180	2,630	7,760	8,720	7,240	2,470	2,050	2,390
4	1,780	5,990	4,640	2,790	2,250	2,730	8,440	8,340	6,160	2,500	1,760	1,770
5	1,900	5,960	4,670	2,540	2,600	2,660	8,090	7,880	5,990	2,650	1,780	2,350
6	1,620	5,930	3,740	2,400	2,360	2,700	8,950	7,520	4,820	2,820	1,990	2,380
7	1,760	4,970	3,770	2,400	2,290	2,590	9,530	7,370	6,070	2,420	1,900	2,960
8	2,360	4,910	3,770	2,510	2,050	2,580	13,200	6,350	5,080	2,870	1,760	1,760
9	4,040	5,990	3,740	2,200	2,200	2,660	16,000	6,180	4,780	2,280	1,760	1,770
10	5,060	7,070	3,540	2,180	2,180	2,490	22,800	6,150	4,620	1,890	1,820	2,170
11	4,940	8,200	3,890	2,600	2,470	2,520	25,300	5,300	4,480	2,340	1,760	2,310
12	5,660	10,600	3,260	2,420	2,270	2,530	28,700	5,160	4,480	2,510	1,740	2,440
13	4,880	11,600	3,150	2,400	2,220	2,600	32,300	4,780	4,680	1,880	1,920	2,570
14	4,730	11,800	3,450	2,450	2,450	2,940	34,100	4,130	4,950	2,230	2,050	2,290
15	4,430	11,300	2,790	2,420	2,230	3,270	33,100	4,180	4,750	2,220	1,900	2,310
16	4,370	10,300	3,040	2,490	2,280	3,500	30,500	4,050	4,050	2,670	2,010	2,200
17	3,830	9,240	3,120	2,140	2,270	3,510	27,500	3,920	3,850	1,730	1,970	1,980
18	3,860	8,320	3,370	2,450	2,140	3,730	24,800	3,580	3,510	1,990	2,030	1,950
19	3,600	7,870	3,180	2,450	2,280	3,670	22,300	4,810	3,060	2,790	2,450	1,880
20	3,290	7,490	2,630	2,230	2,450	3,930	19,800	4,520	3,530	2,990	3,310	1,870
21	2,840	7,350	2,890	2,270	2,070	4,080	17,500	6,740	3,560	2,540	3,290	1,890
22	3,230	6,230	2,510	2,380	2,490	3,650	15,600	8,870	3,160	2,490	3,450	1,850
23	3,070	4,220	2,600	2,050	2,220	3,920	13,900	9,450	3,040	3,100	2,820	1,930
24	2,490	3,010	2,470	2,160	2,240	3,840	12,100	9,720	3,110	2,820	3,150	1,870
25	3,310	2,890	2,400	2,400	2,410	3,870	11,500	11,600	2,800	2,840	2,740	2,110
26	2,990	3,450	2,720	2,200	2,790	3,740	9,020	13,100	2,400	2,650	2,900	2,070
27	4,010	3,340	2,540	2,310	2,250	3,680	7,360	13,200	2,670	2,650	2,460	1,870
28	4,040	3,680	2,540	1,970	2,470	3,710	8,280	12,600	2,430	2,700	2,220	2,230
29	4,520	3,890	2,490	2,560	------	4,310	8,950	11,300	2,450	2,180	1,890	2,130
30	5,000	4,370	2,630	2,290	------	5,460	9,550	10,200	3,130	2,630	2,400	2,980
31	4,970	------	2,840	2,250	------	6,460	------	9,270	------	2,230	2,050	------
TOTAL	108,190	196,090	102,990	73,710	64,490	105,200	503,040	237,520	130,950	77,610	69,410	65,180
MEAN	3,490	6,536	3,322	2,378	2,303	3,394	16,770	7,662	4,365	2,504	2,239	2,173
MAX	5,660	11,800	5,150	2,790	2,790	6,460	34,100	13,200	8,360	3,100	3,450	2,980
MIN	1,620	2,890	2,400	1,970	1,800	2,490	7,360	3,580	2,400	1,730	1,740	1,760
CFSM	.59	1.10	.56	.40	.39	.57	2.83	1.29	.74	.42	.38	.37
IN.	.68	1.23	.65	.46	.40	.66	3.16	1.49	.82	.49	.44	.41

CAL YR 1970 TOTAL 1,431,810 MEAN 3,923 MAX 19,400 MIN 1,240 CFSM .66 IN 8.98
WTR YR 1971 TOTAL 1,734,380 MEAN 4,752 MAX 34,100 MIN 1,620 CFSM .80 IN 10.88

05344500 Mississippi River at Prescott, Wis.

LOCATION.--Lat 44°44'45", long 92°48'00", in sec.9, T.26 N., R.20 W., Pierce County, on left bank at Prescott, 200 ft downstream from St. Croix River, 300 ft south of Chicago, Burlington & Quincy Railroad bridge, 800 ft south of bridge on U.S. Highway 10, and at mile 811.4 upstream from Ohio River.

DRAINAGE AREA.--44,800 sq mi, approximately.

PERIOD OF RECORD.--June 1928 to current year.

GAGE.--Water-stage recorder. Datum of gage is 600.00 ft above mean sea level, adjustment of 1912 (levels by Corps of Engineers). Prior to Aug. 2, 1932, nonrecording gage at railroad bridge 300 ft upstream at following datums: June 3, 1928, to Sept. 30, 1929, 69.27 ft higher; Oct. 1, 1929, to Sept. 30, 1930, 67.68 ft higher; Oct. 1, 1930, to Aug. 1, 1932, 69.28 ft higher. Aug. 2, 1932, to Oct. 30, 1938, water-stage recorder at present site at datum 69.28 ft higher. Auxiliary water-stage recorder 10.7 miles downstream from base gage.

AVERAGE DISCHARGE.--43 years, 15,700 cfs (4.76 inches per year).

EXTREMES.--Current year: Maximum discharge, 83,000 cfs Apr. 16 (gage height, 84.18 ft); minimum daily, 3,450 cfs Oct. 3; minimum gage height, 74.34 ft July 27.
Period of record: Maximum discharge, 228,000 cfs Apr. 18, 1965 (gage height, 93.11 ft); minimum daily, 1,380 cfs July 13, 1940; minimum gage height, 65.08 ft Aug. 29, 1934, present datum.

REMARKS.--Records good except for winter periods, which are fair. Some regulation by reservoirs, navigation dams, and powerplants at low and medium stages. Flood flow not materially affected by artificial storage.

REVISIONS (WATER YEARS).--WSP 1508: 1941.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5,010	14,700	23,100	13,100	8,200	11,000	47,800	40,900	32,700	20,700	11,200	9,380
2	4,150	14,300	23,600	11,100	8,400	13,300	49,600	40,900	32,300	20,800	10,400	9,440
3	3,450	15,000	22,700	11,300	7,900	12,200	51,500	40,600	31,200	21,400	9,780	8,710
4	5,210	15,600	20,400	10,900	8,400	11,900	52,100	39,300	29,800	22,300	8,830	8,400
5	4,800	16,700	17,600	11,200	9,000	11,400	53,700	38,800	29,600	22,700	8,410	8,230
6	5,670	17,800	14,500	10,800	8,500	11,200	54,700	37,600	29,400	22,700	8,270	6,880
7	4,790	17,400	11,000	9,500	8,500	9,900	55,500	36,300	28,800	23,200	7,830	7,060
8	7,520	16,600	13,700	9,500	8,100	9,700	58,200	35,000	28,400	26,200	7,520	7,300
9	10,300	17,900	15,500	9,600	8,000	10,100	61,600	33,100	27,300	25,400	7,050	8,760
10	12,800	21,700	15,500	9,600	8,200	11,000	64,300	31,300	26,700	24,600	6,750	9,430
11	11,700	25,200	15,200	9,800	8,300	8,900	70,200	30,000	27,000	24,100	6,870	7,810
12	13,200	28,500	16,900	10,200	8,600	11,500	74,600	27,800	27,400	23,700	6,740	6,690
13	14,400	31,300	14,600	9,900	8,200	11,800	77,200	26,200	28,100	23,500	7,040	7,210
14	15,200	33,600	14,400	9,900	8,200	15,200	80,000	24,800	29,000	22,800	6,090	7,250
15	15,300	34,100	14,600	9,800	8,300	15,900	82,500	23,600	28,800	22,400	6,400	7,520
16	14,300	34,200	13,900	9,500	8,200	19,500	82,400	22,100	28,400	21,900	5,990	7,410
17	12,800	34,400	14,200	9,500	8,400	20,800	79,200	19,600	27,800	20,900	6,500	6,670
18	12,100	34,300	14,800	7,900	8,500	26,000	74,100	19,600	27,900	19,100	7,050	6,310
19	11,100	33,600	14,800	8,400	11,000	25,100	69,900	19,700	27,300	17,900	7,710	6,060
20	10,600	32,300	14,300	8,500	7,900	27,400	65,700	20,600	27,500	17,900	8,130	5,760
21	10,900	31,900	12,000	8,400	8,300	29,000	62,200	20,500	25,700	17,600	7,970	5,340
22	10,200	31,200	12,400	9,300	7,300	30,500	58,600	21,900	24,600	17,100	7,690	5,810
23	10,200	20,100	12,000	9,500	8,000	32,000	55,100	24,900	24,000	16,300	9,440	7,470
24	11,000	23,100	12,300	9,000	10,200	34,100	51,500	27,800	23,300	15,300	8,640	7,070
25	11,600	14,000	11,800	9,200	11,200	36,400	49,300	29,400	22,100	14,700	8,220	7,490
26	11,000	14,600	11,600	9,300	12,600	37,900	46,800	30,600	20,700	13,600	7,570	7,820
27	11,400	14,800	11,800	9,100	12,000	39,500	44,600	32,900	20,700	12,400	6,610	6,840
28	11,900	14,400	10,100	9,200	10,800	40,800	43,200	34,900	20,600	12,500	6,800	6,950
29	12,100	16,000	10,600	7,900	------	41,200	41,500	35,500	20,100	11,900	5,670	7,940
30	12,400	21,500	12,000	8,500	------	41,700	41,400	35,200	20,100	11,600	5,180	8,710
31	13,600	------	13,000	8,200	------	43,900	------	34,100	------	11,600	7,220	------
TOTAL	320,700	690,800	454,900	297,600	249,200	700,800	1,799.0M	935,500	797,300	598,800	235,570	223,720
MEAN	10,350	23,030	14,670	9,600	8,900	22,610	59,970	30,180	26,580	19,320	7,599	7,457
MAX	15,300	34,400	23,600	13,100	12,600	43,900	82,500	40,900	32,700	26,200	11,200	9,440
MIN	3,450	14,000	10,100	7,900	7,300	8,900	41,400	19,600	20,100	11,600	5,180	5,340
CFSM	.23	.51	.33	.21	.20	.50	1.34	.67	.59	.43	.17	.17
IN.	.27	.57	.38	.25	.21	.58	1.49	.78	.66	.50	.20	.19

CAL YR 1970 TOTAL 5,530,140 MEAN 15,150 MAX 52,800 MIN 3,450 CFSM .34 IN 4.59
WTR YR 1971 TOTAL 7,303,890 MEAN 20,010 MAX 82,500 MIN 3,450 CFSM .45 IN 6.06

M Expressed in thousands.

05353800 Straight River near Faribault, Minn.

LOCATION.--Lat 44°15'29", long 93°13'51", in W½SE¼ sec.9, T.109 N., R.20 W., Rice County, on right bank 15 ft downstream from highway bridge, 2.8 miles upstream from Falls Creek and 3.2 miles southeast of Faribault.

PERIOD OF RECORD.--October 1965 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,035 ft (from topographic map).

AVERAGE DISCHARGE.--6 years, 235 cfs.

EXTREMES.--Current year: Maximum discharge, 2,520 cfs Apr. 1 (gage height, 8.35 ft); minimum, 24 cfs Sept. 20, 21 (gage height, 3.92 ft); minimum gage height, 3.91 ft, Aug. 29, 30, 31.
Period of record: Maximum discharge, 3,970 cfs Mar. 25, 1969 (gage height 9.86 ft); minimum daily, 11 cfs Feb. 18 to Mar. 1, 1968.

REMARKS.--Records good except for winter period, which are fair. Records of water temperatures and suspended sediment loads for the current year are published in Part 2 of this report.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	73	343	270	122	52	49	2,400	296	196	247	53	34
2	68	383	260	120	51	49	2,300	266	189	202	50	33
3	64	581	250	119	50	50	1,900	246	174	174	48	32
4	58	643	235	116	48	51	1,500	244	162	159	47	32
5	54	640	220	113	47	52	1,300	237	161	143	46	32
6	57	628	210	112	46	53	1,050	218	148	131	45	29
7	85	542	205	110	45	54	853	205	201	129	44	28
8	319	470	195	109	44	55	770	193	283	210	43	28
9	1,000	722	185	106	44	58	710	183	290	195	41	32
10	1,290	929	180	105	44	62	650	178	249	179	42	33
11	1,040	946	175	103	44	66	600	171	724	178	41	29
12	735	890	171	99	44	75	560	172	2,020	158	39	28
13	531	780	169	96	44	140	520	170	1,350	144	39	27
14	412	740	165	94	44	300	480	162	813	135	38	28
15	337	710	163	92	44	800	455	154	544	186	36	28
16	282	670	160	91	44	1,870	425	145	414	146	35	27
17	245	660	158	90	44	1,880	395	144	332	113	35	26
18	218	640	155	88	44	1,700	375	146	293	97	35	26
19	198	630	154	86	44	1,700	355	187	283	85	38	26
20	185	610	150	83	44	1,700	334	242	507	77	37	25
21	174	600	149	81	45	1,550	336	249	386	71	35	26
22	166	580	148	78	45	1,430	327	210	304	66	33	29
23	158	560	145	76	46	1,350	303	221	243	62	31	31
24	162	520	144	73	46	1,300	284	635	352	84	31	29
25	157	490	140	70	47	1,250	256	619	640	92	31	29
26	199	460	138	67	47	1,200	232	508	376	69	31	30
27	386	430	135	64	47	1,200	251	409	283	65	29	29
28	478	400	133	62	48	1,700	315	336	219	88	29	32
29	441	350	130	59	------	2,200	339	284	234	65	28	33
30	381	310	128	56	------	2,100	323	241	265	63	28	33
31	354	------	125	54	------	2,300	------	212	------	57	30	------
TOTAL	10,307	17,857	5,345	2,794	1,282	28,344	20,898	7,883	12,635	3,870	1,168	884
MEAN	332	595	172	90.1	45.8	914	697	254	421	125	37.7	29.5
MAX	1,290	946	270	122	52	2,300	2,400	635	2,020	247	53	34
MIN	54	310	125	54	44	49	232	144	148	57	28	25

CAL YR 1970 TOTAL 81,203 MEAN 222 MAX 1,290 MIN 25
WTR YR 1971 TOTAL 113,267 MEAN 310 MAX 2,400 MIN 25

PEAK DISCHARGE (BASE, 1,500 CFS).--Apr. 1 (1230) 2,520 cfs (8.35 ft); June 12 (1000) 2,240 cfs (8.01 ft).

05355200 Cannon River at Welch, Minn.

LOCATION.--Lat 44°33'50", long 92°43'55", in NW¼SW¼ sec.27, T.113 N., R.16 W., Goodhue County, on right bank 0.3 mile downstream from highway bridge at Welch and 1.8 miles upstream from Belle Creek.

DRAINAGE AREA.--1,320 sq mi, approximately.

PERIOD OF RECORD.--June 1909 to January 1914 (no winter records 1909-11), November 1930 to September 1971 (discontinued).

GAGE.--Water-stage recorder. Datum of gage is 699.16 ft above mean sea level, datum of 1929. Prior to Nov. 11, 1930, nonrecording gage on highway bridge at site 0.3 mile upstream at datum 3.00 ft lower. Nov. 11, 1930, to Oct. 11, 1938, water-stage recorder at site 0.3 mile upstream at present datum.

AVERAGE DISCHARGE.--42 years (1911-13, 1931-71), 501 cfs (5.15 inches per year).

EXTREMES.--Current year: Maximum discharge, 6,700 cfs Apr. 1 (gage height, 9.03 ft); minimum, 194 cfs Oct. 4 (gage height, 1.79 ft); minimum gage height, 1.72 ft Aug. 30.
Period of record: Maximum discharge, 36,100 cfs Apr. 8, 1965 (gage height, 14.01 ft); minimum, 2.5 cfs Jan. 3, 1950 (gage height, 0.06 ft, backwater from ice).
Maximum stage known, 17.1 ft, present datum, in April 1888, from floodmark at mill about 2,400 ft upstream.

REMARKS.--Records good except those for winter periods, which are fair.

REVISIONS (WATER YEARS).--WSP 1308: 1912(M). WSP 1508: 1933. WSP 1914: 1960.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	277	931	1,030	560	390	375	6,440	1,120	771	656	253	245
2	275	951	1,080	570	390	370	6,020	1,040	769	625	247	237
3	245	1,200	1,050	560	390	370	4,100	976	925	575	241	222
4	203	1,810	1,030	535	390	370	3,440	987	768	538	241	228
5	204	1,910	940	540	395	380	3,220	1,010	668	490	241	234
6	211	1,710	813	525	395	390	3,050	952	637	461	241	225
7	249	1,480	797	515	400	395	2,960	915	663	428	237	216
8	410	1,340	780	500	400	400	2,940	859	714	446	241	212
9	1,100	1,670	750	500	400	410	2,910	787	758	446	247	225
10	1,850	3,200	730	490	400	410	2,690	691	781	441	246	225
11	1,850	3,370	687	480	400	415	2,490	637	917	441	237	216
12	1,610	3,130	628	475	400	430	2,330	598	1,150	764	237	266
13	1,330	2,350	680	470	400	535	2,150	575	2,000	842	228	710
14	1,100	2,530	650	460	410	1,280	2,030	565	1,950	590	225	315
15	941	2,300	624	450	410	4,240	1,900	555	1,520	610	222	247
16	839	2,080	683	450	415	4,270	1,820	541	1,240	525	222	225
17	790	1,970	740	440	420	3,840	1,740	495	1,060	450	219	219
18	730	1,890	741	430	425	3,750	1,640	528	945	426	222	206
19	680	1,790	693	430	430	3,480	1,590	609	891	341	234	302
20	651	1,760	624	420	430	3,530	1,560	668	861	357	231	474
21	627	1,650	605	415	435	3,210	1,550	699	924	339	222	259
22	606	1,710	585	410	440	3,060	1,540	713	1,020	321	222	231
23	592	1,180	563	405	447	2,950	1,490	698	864	302	228	266
24	603	792	580	400	445	2,910	1,390	983	766	292	216	247
25	591	880	580	395	425	2,790	1,310	1,240	703	265	219	234
26	645	1,080	580	390	405	2,670	1,250	1,250	1,010	274	212	237
27	658	1,020	580	390	400	2,760	1,250	1,190	921	257	219	237
28	961	1,010	580	390	390	5,150	1,260	1,060	292	232	206	241
29	992	1,020	580	390	------	4,930	1,300	975	284	260	203	237
30	994	1,020	580	390	------	5,640	1,250	890	555	269	200	263
31	988	------	580	390	------	5,560	------	817	------	253	219	------
TOTAL	24,022	51,234	22,333	14,205	11,477	71,470	70,610	25,633	27,421	13,635	7,071	7,963
MEAN	775	1,708	720	458	410	2,305	2,354	827	914	440	228	265
MAX	1,850	3,370	1,080	580	447	5,860	6,440	1,250	2,000	842	253	710
MIN	203	792	580	390	390	370	1,250	495	284	257	200	206
CFSM	.59	1.29	.55	.35	.31	1.75	1.78	.63	.69	.33	.17	.20
IN.	.68	1.44	.63	.40	.32	2.01	1.99	.72	.77	.38	.20	.22

CAL YR 1970 TOTAL 237,684 MEAN 651 MAX 4,270 MIN 137 CFSM .49 IN 6.70
WTR YR 1971 TOTAL 347,073 MEAN 951 MAX 6,440 MIN 200 CFSM .72 IN 9.78

05373000 South Fork Zumbro River near Rochester, Minn.

LOCATION.--Lat 44°04'00", long 92°27'55", in SE¼ sec.14, T.107 N., R.14 W., Olmsted County, on left bank 30 ft upstream from ford, a quarter of a mile downstream from sewage plant, 1.6 miles north of Rochester, 2 miles downstream from Cascade Creek, and 2.5 miles downstream from Silver Lake Dam.

DRAINAGE AREA.--304 sq mi.

PERIOD OF RECORD.--January 1952 to current year.

GAGE.--Water-stage recorder. Datum of gage is 949.56 ft above mean sea level, datum of 1929.

AVERAGE DISCHARGE.--19 years, 127 cfs (5.67 inches per year).

EXTREMES.--Current year: Maximum discharge, 3,660 cfs Apr. 1 (gage height, 11.00 ft); minimum, 42 cfs Oct. 1, 2 (gage height, 2.00 ft)

Period of record: Maximum discharge, 19,600 cfs Mar. 1, 1965 (gage height, 19.12 ft, from floodmark); minimum, 8.4 cfs Dec. 7, 1955.

Flood of July 21, 1951 reached a stage of about 17.5 ft, from information by sewage plant superintendent. This is the highest known stage outside the period of record since at least 1908.

REMARKS.--Records good. Slight regulation at times from Silver Lake and at very low flows from sewage-plant effluent. Records of chemical analyses for the current year are published in Part 2 of this report.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	46	225	196	104	72	117	2,880	222	201	198	118	98
2	48	232	232	105	68	121	862	195	192	142	113	84
3	49	328	185	103	68	124	529	157	180	96	109	81
4	48	492	170	87	70	128	431	265	163	121	105	96
5	50	395	132	87	68	132	424	240	149	99	102	87
6	49	308	84	90	66	124	438	172	135	84	101	83
7	89	262	115	92	65	113	466	142	746	84	102	83
8	204	239	180	95	65	104	519	129	838	260	97	80
9	1,660	329	153	96	64	100	487	119	374	139	98	594
10	984	630	131	101	65	101	398	112	299	104	100	268
11	415	464	112	100	65	97	338	109	1,550	99	97	116
12	275	354	159	92	66	100	285	102	1,290	718	91	96
13	215	336	145	92	64	113	263	100	862	838	89	91
14	178	317	110	92	64	714	329	97	666	299	85	85
15	149	281	121	87	68	1,740	392	92	347	311	82	81
16	117	253	157	87	70	1,220	338	88	114	243	83	80
17	99	239	151	84	75	832	299	107	102	175	83	76
18	94	230	147	86	74	903	265	126	103	145	83	74
19	91	239	119	84	104	625	250	149	114	137	88	74
20	93	298	97	84	88	449	233	122	114	122	85	76
21	89	268	119	84	90	389	377	100	99	118	428	74
22	85	253	128	86	99	299	442	92	86	622	494	82
23	87	100	122	84	101	201	278	344	79	1,150	122	84
24	153	134	104	83	104	160	205	737	245	834	90	74
25	140	152	106	86	111	122	166	645	674	347	88	76
26	180	144	110	78	144	95	151	404	383	233	84	72
27	498	128	107	78	107	104	228	311	273	188	83	73
28	592	117	103	78	98	548	334	266	230	145	80	72
29	319	123	99	77	------	723	308	225	278	145	77	72
30	267	133	99	73	------	993	238	197	280	161	78	76
31	237	------	103	73	------	2,400	------	191	------	134	89	------
TOTAL	7,600	8,003	4,096	2,728	2,263	13,991	13,153	6,357	11,166	8,491	3,624	3,158
MEAN	245	267	132	88.0	80.8	451	438	205	372	274	117	105
MAX	1,660	630	232	105	144	2,400	2,880	737	1,550	1,150	494	594
MIN	46	100	84	73	64	95	151	88	79	84	77	72
CFSM	.81	.88	.43	.29	.27	1.48	1.44	.67	1.22	.90	.38	.35
IN.	.93	.98	.50	.33	.28	1.71	1.61	.78	1.37	1.04	.44	.39

CAL YR 1970 TOTAL 64,976 MEAN 178 MAX 1,780 MIN 35 CFSM .59 IN 7.95
WTR YR 1971 TOTAL 84,630 MEAN 232 MAX 2,880 MIN 46 CFSM .76 IN 10.36

PEAK DISCHARGE (BASE, 1,000 CFS)

DATE	TIME	G. H.	DISCHARGE	DATE	TIME	G. H.	DISCHARGE
10-9	1745	7.56	1,850	7-12	1200	7.19	1,560
3-15	1715	8.90	1,970	7-22	2015	9.18	3,120
4-1	0715	11.00	3,660	8-21	2015	8.47	2,560
6-7	1930	6.78	1,380	9-9	0900	6.06	1,240
6-11	1830	8.31	2,150				

05374000 Zumbro River at Zumbro Falls, Minn.

LOCATION.--Lat 44°17'12", long 92°25'56", in sec.36, T.110 N., R.14 W., Wabasha County, on left bank in Zumbro Falls, 1,000 ft downstream from Cold Creek, 0.7 mile upstream from bridge on U.S. Highway 63, and 6.3 miles downstream from North Fork.

DRAINAGE AREA.--1,130 sq mi, approximately.

PERIOD OF RECORD.--June 1909 to September 1917, April to November 1929, March 1930 to current year. Monthly discharge only for some periods, published in WSP 1308.

GAGE.--Water-stage recorder. Datum of gage is 811.26 ft above mean sea level, datum of 1929. Prior to Nov. 11, 1933, nonrecording gage on bridge 800 ft downstream at same datum.

AVERAGE DISCHARGE.--49 years (1909-17, 1930-71), 488 cfs (5.86 inches per year).

EXTREMES.--Current year: Maximum discharge, 10,800 cfs Apr. 1 (gage height, 17.55 ft); minimum, 105 cfs Jan. 4 (gage height, 6.43 ft).
Period of record: Maximum discharge, 35,900 cfs July 22, 1951 (gage height, 30.80 ft, from floodmark); minimum, 27 cfs Jan. 12, 1935; minimum gage height, 5.96 ft Nov. 27, 1967
Flood of April 1888 reached stage of about 30.5 ft at present site or 29.7 ft original site. Flood in 1859 is known to have exceeded that of 1888 (gage height, not determined).

REMARKS.--Records good except those for winter periods, which are fair. Diurnal fluctuation caused by power-plant above station. Records of suspended-sediment loads for the current year are published in Part 2 of this report.

REVISIONS (WATER YEARS).--WSP 355: 1912. WSP 895: Drainage area. WSP 1508: 1911, 1917, 1930-31(M). WSP 1728: 1951(M).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	280	967	681	224	254	410	10,400	762	784	637	398	330
2	276	984	783	280	215	515	6,080	875	605	553	384	413
3	252	1,280	607	413	258	535	3,280	823	271	580	410	292
4	200	1,630	645	600	339	536	2,840	720	460	525	359	301
5	234	1,730	581	1,090	214	555	2,540	1,010	950	516	350	330
6	243	1,460	369	921	264	623	2,740	965	564	521	354	343
7	280	1,210	508	703	190	330	2,790	940	744	556	357	308
8	384	1,070	552	490	278	497	2,900	680	1,030	505	294	307
9	1,480	1,310	563	383	323	499	2,870	431	1,030	615	310	654
10	2,450	2,400	504	289	226	517	2,610	522	1,020	568	332	597
11	1,770	2,360	312	399	365	752	2,320	568	1,010	570	333	275
12	1,260	1,820	413	321	205	384	2,090	487	3,870	727	345	254
13	1,040	1,570	361	318	207	484	1,910	562	2,780	1,160	361	343
14	951	1,400	440	347	209	1,070	1,720	556	1,830	985	248	361
15	916	1,260	391	303	204	2,230	1,560	339	1,290	1,080	265	347
16	593	1,130	559	390	321	3,320	1,430	435	1,120	862	294	334
17	496	1,040	480	171	340	2,670	1,330	626	1,010	544	286	308
18	538	1,010	543	271	345	2,660	1,150	617	957	357	282	198
19	390	998	311	312	350	2,510	1,160	872	790	652	289	255
20	487	989	231	324	348	2,010	1,100	277	981	543	288	287
21	543	985	436	346	300	1,840	1,060	460	838	450	180	312
22	536	967	491	373	311	1,620	948	619	531	404	560	203
23	544	881	475	280	387	1,420	1,020	503	836	841	662	150
24	753	557	465	227	390	1,290	969	1,120	738	888	304	280
25	291	583	244	375	423	1,200	942	1,190	973	723	255	323
26	358	777	381	366	350	1,120	932	1,100	1,460	589	310	273
27	1,260	636	305	209	484	1,080	895	1,060	1,060	479	309	338
28	1,520	612	498	216	261	2,530	982	1,030	870	550	294	341
29	1,400	614	260	256	------	3,880	881	878	846	548	194	331
30	1,120	645	365	235	------	4,810	856	666	893	537	237	335
31	1,020	------	350	219	------	7,840	------	867	------	418	303	------
TOTAL	23,865	34,875	14,104	11,651	8,361	51,737	64,305	22,560	32,141	19,483	10,147	9,723
MEAN	770	1,163	455	376	299	1,669	2,144	728	1,071	628	327	324
MAX	2,450	2,400	783	1,090	484	7,840	10,400	1,190	3,870	1,160	662	654
MIN	200	557	231	171	190	330	856	277	271	357	180	150
CFSM	.68	1.03	.40	.33	.26	1.48	1.90	.64	.95	.56	.29	.29
IN.	.79	1.15	.46	.38	.28	1.70	2.12	.74	1.06	.64	.33	.32

CAL YR 1970 TOTAL 222,801 MEAN 610 MAX 6,410 MIN 92 CFSM .54 IN 7.33
WTR YR 1971 TOTAL 302,952 MEAN 830 MAX 10,400 MIN 150 CFSM .73 IN 9.97

05376000 North Fork Whitewater River near Elba, Minn.

(Hydrologic bench-mark station)

LOCATION.--Lat 44°05'30", long 92°03'57", in sec.7, T.107 N., R.10 W., Winona County, on left bank 2.3 mile upstream from Middle Fork, 2.4 miles west of Elba, and 3.5 miles upstream from confluence with South Fork.

DRAINAGE AREA.--101 sq mi.

PERIOD OF RECORD.--May 1939 to September 1941, July 1967 to current year.

GAGE.--Water-stage recorder. Datum of gage is 769.60 ft above mean sea level, datum of 1929. Oct. 12, 1939, to Sept. 30, 1941, water-stage recorder at site 600 ft downstream at same datum. Prior to Oct. 12, 1939, nonrecording gage at site 2 miles downstream at different datum.

AVERAGE DISCHARGE.--6 years (1939-41, 1967-71), 28.5 cfs (3.83 inches per year).

EXTREMES.--Current year: Maximum discharge, 1,270 cfs Mar. 31 (gage height, 6.99 ft); minimum, 14 cfs Feb. 6 (2.40 ft).
Period of record: Maximum discharge, 2,730 cfs July 11, 1940 (gage height, 6.13 ft), may have been exceeded Sept. 15, 1941; minimum, 11 cfs Feb. 21, 1968.
Flood of June 15, 1967 reached a stage of 8.56 ft from highwater mark in well (discharge, 2,850 cfs).

REMARKS.--Records good. Records of chemical analyses and suspended sediment loads for the current year are published in Part 2 of this report.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	20	38	39	28	24	24	545	47	43	36	37	33
2	19	39	40	27	24	23	137	46	45	35	35	32
3	19	48	38	27	24	23	107	44	44	34	34	30
4	19	60	37	27	24	24	103	50	41	35	33	34
5	20	52	32	27	23	24	102	59	40	35	33	32
6	20	47	31	26	23	25	107	51	40	34	33	32
7	26	44	32	26	23	25	115	47	52	34	33	30
8	42	42	33	27	23	24	126	46	79	41	33	29
9	175	51	33	27	23	24	120	45	53	40	32	40
10	98	68	32	27	23	25	101	44	48	36	33	51
11	49	55	31	26	23	25	85	44	61	36	33	33
12	39	49	32	26	22	25	76	43	59	107	33	30
13	35	47	32	26	22	26	68	43	49	117	33	29
14	32	45	29	26	22	77	62	42	45	52	32	29
15	29	43	30	25	22	123	59	42	45	65	31	28
16	28	43	32	25	22	61	57	41	42	43	30	26
17	28	42	31	26	22	47	54	42	41	39	32	26
18	28	42	31	26	23	51	51	46	40	37	32	26
19	26	42	30	26	26	48	50	47	41	36	33	27
20	26	44	28	26	25	41	48	45	42	35	32	27
21	26	42	28	26	24	40	54	42	41	34	32	27
22	25	39	29	26	24	37	61	41	40	35	31	27
23	26	32	29	25	25	35	53	45	39	91	30	28
24	29	35	29	25	24	34	49	66	40	58	30	27
25	30	37	28	25	25	33	47	66	56	42	30	27
26	30	37	28	24	26	33	45	56	45	38	29	27
27	75	35	28	24	27	34	48	50	41	40	29	28
28	55	34	27	24	25	41	51	47	38	63	29	27
29	44	35	27	24	------	50	48	45	37	41	29	26
30	42	35	27	24	------	166	46	44	37	41	29	27
31	40	------	27	24	------	628	------	43	------	40	30	------
TOTAL	1,200	1,302	960	798	663	1,896	2,675	1,459	1,364	1,450	985	895
MEAN	38.7	43.4	31.0	25.7	23.7	61.2	89.2	47.1	45.5	46.8	31.8	29.8
MAX	175	68	40	28	27	628	545	66	79	117	37	51
MIN	19	32	27	24	22	23	45	41	37	34	29	26
CFSM	.38	.43	.31	.25	.23	.61	.88	.47	.45	.46	.31	.30
IN.	.44	.48	.35	.29	.24	.70	.99	.54	.50	.53	.36	.33

CAL YR 1970 TOTAL 11,005 MEAN 30.2 MAX 175 MIN 16 CFSM .30 IN 4.05
WTR YR 1971 TOTAL 15,647 MEAN 42.9 MAX 628 MIN 19 CFSM .42 IN 5.76

05376500 South Fork Whitewater River near Altura, Minn.

LOCATION.--Lat 44°04'10", long 91°58'49", in SE¼ sec.14, T.107 N., R.10 W., Winona County, on left bank 500 ft upstream from highway bridge, 1.4 miles upstream from small tributary entering from the west, 2 miles west of Altura, and 2.4 miles upstream from Keefer Creek.

DRAINAGE AREA.--76.8 sq mi.

PERIOD OF RECORD.--October 1939 to September 1971 (discontinued).

GAGE.--Water-stage recorder. Datum of gage is 761.80 ft above mean sea level, adjustment of 1912 (levels by Corps of Engineers).

AVERAGE DISCHARGE.--32 years, 27.6 cfs (4.88 inches per year).

EXTREMES.--Current year: Maximum discharge, 1,060 cfs Mar. 31 (gage height, 5.29 ft); minimum daily, 12 cfs Feb. 13-16.
Period of record: Maximum discharge, 5,460 cfs Aug. 31, 1947 (gage height, 10.61 ft); minimum, 3.8 cfs Mar. 24, 1940; minimum gage height, 0.23 ft Mar. 12, 1965.

REMARKS.--Records fair.

REVISIONS (WATER YEARS).--WSP 1278: 1940(M), 1942(M), 1945(M), 1947(M), 1949(M), 1950(P). WSP 1508: 1950(M).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	18	40	40	20	13	19	386	40	49	35	23	21
2	19	42	45	20	13	19	130	41	48	33	22	21
3	19	55	37	19	13	20	109	39	45	31	22	19
4	19	70	37	19	13	20	92	47	42	31	22	22
5	19	52	36	19	13	21	91	60	41	31	21	33
6	18	48	36	19	13	22	92	45	41	30	21	23
7	23	45	36	19	13	23	99	41	61	29	21	21
8	33	42	36	19	13	23	108	39	85	40	21	20
9	58	50	35	19	13	24	101	38	56	31	20	24
10	53	78	33	19	13	25	87	37	50	31	23	31
11	30	53	32	19	13	26	79	37	48	31	23	25
12	26	47	32	19	13	27	73	37	46	129	21	22
13	24	48	32	19	12	30	65	37	41	135	20	21
14	23	46	31	19	12	72	60	35	38	52	20	21
15	22	42	31	19	12	221	56	34	37	59	20	20
16	21	40	30	18	12	132	53	34	36	39	20	19
17	21	40	28	18	13	103	53	34	54	36	20	19
18	21	39	27	18	13	100	49	54	40	33	19	19
19	21	39	26	18	13	74	47	58	38	33	21	20
20	21	44	25	17	13	57	45	48	45	30	21	20
21	21	42	24	16	13	69	53	41	38	29	20	19
22	21	43	23	16	13	65	65	39	37	28	39	20
23	21	43	23	15	14	57	49	39	35	37	26	21
24	24	42	22	15	14	50	45	108	38	29	22	21
25	27	40	22	15	15	49	42	95	87	26	21	20
26	28	33	22	15	16	47	41	71	55	25	20	20
27	69	31	21	14	17	49	46	62	43	25	20	21
28	66	29	21	14	18	93	49	56	38	25	19	21
29	47	30	21	14	------	133	44	53	36	25	19	22
30	44	31	20	14	------	175	42	50	43	24	19	23
31	45	------	20	14	------	500	------	49	------	24	19	------
TOTAL	922	1,324	904	538	376	2,345	2,351	1,498	1,391	1,196	665	649
MEAN	29.7	44.1	29.2	17.4	13.4	75.6	78.4	48.3	46.4	38.6	21.5	21.6
MAX	69	78	45	20	18	500	386	108	87	135	39	33
MIN	18	29	20	14	12	19	41	34	35	24	19	19
CFSM	.39	.57	.38	.23	.17	.98	1.02	.63	.60	.50	.28	.28
IN.	.45	.64	.44	.26	.18	1.14	1.14	.73	.67	.58	.32	.31

CAL YR 1970 TOTAL 11,150 MEAN 30.5 MAX 239 MIN 11 CFSM .40 IN 5.40
WTR YR 1971 TOTAL 14,159 MEAN 38.8 MAX 500 MIN 12 CFSM .51 IN 6.86

PEAK DISCHARGE (BASE, 400 CFS).--Mar. 31 (1915) 1,060 cfs (5.29 ft); July 12 (1545) 405 cfs (3.52 ft).

05378300 Straight Valley Creek near Rollingstone, Minn.

LOCATION.--Lat 44°05'09", long 91°50'34", in SE¼NE¼ sec.12, T.107 N., R.9 W., Winona County, at bridge on county highway, 0.2 mile above mouth, and 1.5 miles southwest of Rollingstone.

DRAINAGE AREA.--5.16 sq mi.

PERIOD OF RECORD.--Annual maximums, water years 1959-70. October 1970 to current year.

GAGE.--Water-stage recorder and crest-stage gage. Nov. 6, 1958, to Oct. 20, 1966, crest-stage gage at present site and datum.

EXTREMES.--Current year: Maximum discharge, 29 cfs Mar. 31 (gage height, 9.89 ft); minimum daily, 0.8 cfs Aug. 26-30; minimum gage height, 8.78 ft June 29, Aug. 28-31, Sept. 2-4.
Period of record: Maximum discharge, 1,200 cfs June 26, 1959 (gage height, 17.28 ft); minimum observed, 0.12 cfs Aug. 5, 1960.

REMARKS.--Records fair.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.8	1.4	1.7	1.4	1.1	2.1	4.1	3.0	1.7	1.3	1.4	1.0
2	1.7	1.7	1.4	1.3	1.1	2.2	3.2	3.0	1.7	1.5	1.4	1.0
3	1.7	3.2	1.5	1.3	1.2	2.3	3.0	3.0	1.7	1.7	1.4	1.0
4	1.5	2.1	1.5	1.4	1.2	2.4	3.0	4.1	1.7	1.7	1.0	1.3
5	1.5	1.8	1.5	1.2	1.2	2.5	3.0	3.7	1.7	1.7	1.0	1.2
6	1.3	1.8	1.5	1.2	1.2	2.6	3.0	3.5	1.5	1.7	1.0	1.2
7	1.8	1.7	1.5	1.0	1.2	2.7	3.4	3.5	2.4	2.8	1.0	1.2
8	3.2	1.7	1.5	1.2	1.2	2.8	3.4	3.5	1.7	4.2	1.0	1.2
9	3.5	2.8	1.5	1.2	1.2	2.9	3.4	3.5	1.5	1.5	1.0	2.0
10	1.7	2.1	1.5	1.2	1.3	3.0	3.2	3.7	1.5	1.5	1.3	1.4
11	1.5	1.8	1.4	1.2	1.3	3.1	3.0	4.1	1.5	1.4	1.2	1.4
12	1.5	1.8	1.3	1.2	1.3	3.1	3.0	4.3	1.5	1.8	1.2	1.4
13	1.4	1.8	1.3	1.0	1.3	3.1	3.0	4.3	1.7	1.4	1.2	1.4
14	1.4	1.7	1.0	1.2	1.4	3.1	3.0	4.3	1.7	1.4	1.2	1.4
15	1.4	1.7	1.4	1.0	1.4	3.1	2.8	4.3	1.5	1.3	1.2	1.4
16	1.3	1.7	1.4	1.0	1.4	2.7	2.8	4.3	1.5	1.3	1.2	1.4
17	1.3	1.7	1.5	1.0	1.4	2.3	2.0	4.7	1.5	1.3	1.2	1.4
18	1.2	1.7	1.5	1.0	1.5	2.3	1.8	5.6	1.7	1.3	1.2	1.3
19	1.2	1.8	1.5	1.0	1.5	2.3	1.8	5.4	1.7	1.3	1.2	1.3
20	1.2	2.3	1.4	1.1	1.6	2.1	1.8	4.7	1.7	1.3	1.0	1.4
21	1.2	2.0	1.5	1.1	1.6	2.1	2.3	4.1	1.5	1.3	1.0	1.4
22	1.2	1.5	1.7	1.1	1.6	2.0	1.8	3.4	1.3	1.3	1.0	1.5
23	1.3	1.5	1.7	1.1	1.7	2.3	1.8	2.1	1.0	1.3	1.0	1.4
24	1.8	1.5	2.0	1.1	1.7	2.1	1.8	4.7	1.4	1.3	1.0	1.3
25	1.5	1.5	2.1	1.1	1.8	2.3	1.8	2.4	1.2	1.2	.90	1.2
26	2.3	1.5	2.3	1.1	1.8	2.1	1.8	2.1	1.0	1.3	.80	1.3
27	3.4	1.5	1.5	1.1	1.9	2.1	2.3	1.8	1.0	1.7	.80	1.7
28	2.1	1.5	1.4	1.1	2.0	3.4	3.0	1.8	1.0	1.7	.80	1.4
29	1.5	1.5	1.4	1.1	------	3.5	2.8	1.7	1.0	1.3	.80	1.7
30	1.5	1.5	1.4	1.1	------	3.5	2.8	1.7	1.0	1.4	.80	1.5
31	1.4	------	1.4	1.1	------	7.4	------	1.7	------	1.5	.90	------
TOTAL	52.3	53.8	47.2	35.2	40.1	85.5	79.9	108.0	44.5	48.7	33.10	40.7
MEAN	1.69	1.79	1.52	1.14	1.43	2.76	2.66	3.48	1.48	1.57	1.07	1.36
MAX	3.5	3.2	2.3	1.4	2.0	7.4	4.1	5.6	2.4	4.2	1.4	2.0
MIN	1.2	1.4	1.0	1.0	1.1	2.0	1.8	1.7	1.0	1.2	.80	1.0
CFSM	.33	.35	.29	.22	.28	.53	.52	.67	.29	.30	.21	.26
IN.	.38	.39	.34	.25	.29	.62	.58	.78	.32	.35	.24	.29

CAL YR 1970 TOTAL 153.30 MEAN .42 MAX 3.5 MIN 0 CFSM .08 IN 1.11
WTR YR 1971 TOTAL 669.00 MEAN 1.83 MAX 7.4 MIN .80 CFSM .35 IN 4.82

05378500 Mississippi River at Winona, Minn.

LOCATION.--Lat 44°03'20", long 91°38'15", in sec.23, T.107 N., R.7 W., Winona County, on right bank at Winona pumping station in Winona, 9.5 miles upstream from Trempealeau River and at mile 725.7 upstream from the Ohio River.

DRAINAGE AREA.--59,200 sq mi, approximately.

PERIOD OF RECORD.--June 1928 to current year. Gage-height records collected in this vicinity since 1878 are contained in reports of Mississippi River Commission.

GAGE.--Water-stage recorder. Datum of gage is 639.64 ft above mean sea level, datum of 1929. June 10, 1928, to Apr. 15, 1931, nonrecording gage at site 800 ft upstream. Prior to Oct. 1, 1929, at datum 0.20 ft higher and Oct. 1, 1929, to Apr. 15, 1931, at datum 0.12 ft lower. Apr. 16, 1931, to Nov. 12, 1934, nonrecording gage at present site and datum. Since Mar. 31, 1937, auxiliary water-stage recorder 2.7 miles upstream at tailwater of navigation dam 5A.

AVERAGE DISCHARGE.--43 years, 25,420 cfs (5.83 inches per year).

EXTREMES.--Current year: Maximum discharge, 133,000 cfs Apr. 17 (gage height, 14.35 ft); minimum daily, 8,100 cfs Oct. 2.
Period of record: Maximum discharge, 268,000 cfs Apr. 19, 1965 (gage height, 20.77 ft, from floodmark); minimum, 2,250 cfs Dec. 29, 1933 (gage height, -1.18 ft); minimum gage height, -3.38 ft Aug. 31, 1934.

REMARKS.--Records good. Records of chemical analyses for the current year are published in Part 2 of this report. Some regulation by reservoirs, navigation dams, and powerplants at low and medium stages. Flood flow not materially affected by artificial storage.

REVISIONS.--WSP 700: Drainage area.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9,280	36,900	30,400	19,200	16,400	21,100	64,900	58,400	56,400	30,000	17,500	12,000
2	8,100	39,400	35,600	20,700	15,100	22,000	69,900	58,100	54,700	28,700	18,400	14,000
3	8,810	41,100	36,800	21,200	14,100	21,700	74,300	57,500	52,300	28,500	16,900	14,900
4	9,740	40,200	32,500	21,000	14,300	20,500	76,200	57,300	49,900	30,200	17,000	15,600
5	10,500	39,200	32,500	20,600	15,200	22,200	74,000	57,400	46,600	31,700	15,000	16,700
6	11,200	39,000	23,900	17,200	15,000	23,000	73,400	57,000	46,300	30,800	13,800	14,400
7	10,800	39,600	21,200	17,000	14,800	23,000	73,200	54,900	46,000	31,200	14,000	13,300
8	12,600	39,300	14,500	16,700	14,800	21,900	73,200	54,200	45,900	33,000	14,500	12,600
9	20,900	40,800	18,500	16,800	14,700	19,400	74,300	52,800	42,800	35,100	14,200	16,600
10	31,000	41,700	21,100	16,900	14,700	18,600	75,900	50,800	42,000	34,900	12,700	16,600
11	29,000	40,900	25,600	16,900	15,000	18,400	79,200	48,600	41,600	33,400	12,300	17,700
12	22,000	45,000	29,100	16,600	16,400	19,500	84,000	45,600	41,400	32,200	12,500	17,200
13	25,200	48,900	29,400	15,500	16,500	21,200	92,700	43,500	42,100	31,700	12,400	13,300
14	25,400	49,200	31,000	15,700	16,500	24,500	107,000	42,000	45,200	32,300	13,200	11,400
15	25,300	50,900	31,600	15,800	16,400	27,100	120,000	37,800	44,100	32,000	14,400	11,900
16	24,400	52,100	32,000	15,900	16,300	33,200	128,000	34,700	40,400	29,500	12,900	12,700
17	22,500	52,900	32,100	15,900	17,600	39,000	132,000	33,200	39,800	28,900	13,300	13,000
18	22,600	54,100	35,100	15,900	18,500	38,500	129,000	32,500	40,400	29,100	14,600	12,100
19	20,500	53,200	33,500	16,000	20,200	42,000	123,000	32,100	39,300	28,100	15,900	11,400
20	17,700	51,900	29,000	16,000	20,600	42,800	114,000	30,500	40,200	26,700	17,300	11,600
21	17,900	48,600	26,400	16,000	19,800	44,100	106,000	28,800	39,800	26,300	16,900	9,580
22	18,000	46,100	21,500	16,100	16,600	45,400	98,800	28,500	38,800	26,300	16,900	8,900
23	16,200	43,000	20,700	16,000	16,600	44,500	91,000	29,000	36,900	25,800	17,000	9,290
24	17,400	36,600	20,600	16,100	17,300	46,700	84,000	35,200	34,500	24,800	16,900	11,400
25	21,500	39,800	20,000	16,200	18,400	48,800	79,200	39,500	35,100	24,600	16,800	11,900
26	19,300	34,200	18,500	16,200	18,000	49,400	72,700	40,700	35,200	23,500	16,500	11,500
27	20,200	27,700	17,900	16,300	19,800	55,500	67,000	45,800	32,700	19,400	16,200	12,700
28	23,100	25,600	17,700	16,800	20,000	54,800	65,400	52,300	31,100	19,300	14,500	13,100
29	33,000	27,100	16,200	16,600	------	54,300	63,000	56,200	30,100	21,100	12,900	14,700
30	31,200	29,100	15,300	16,500	------	57,600	60,400	57,200	30,000	20,500	12,500	16,300
31	33,300	------	17,200	16,600	------	61,400	------	57,300	------	18,300	10,400	------
TOTAL	618,630	1,254.1M	787,400	526,900	469,600	1,082.1M	2,625.7M	1,409.4M	1,241.6M	867,900	460,300	398,370
MEAN	19,960	41,800	25,400	17,000	16,770	34,910	87,520	45,460	41,390	28,000	14,850	13,280
MAX	33,300	54,100	36,800	21,200	20,600	61,400	132,000	58,400	56,400	35,100	18,400	17,700
MIN	8,100	25,600	14,500	15,500	14,100	18,400	60,400	28,500	30,000	18,300	10,400	8,900
CFSM	.34	.71	.43	.29	.28	.59	1.48	.77	.70	.47	.25	.22
IN.	.39	.79	.49	.33	.30	.68	1.65	.89	.78	.55	.29	.25

CAL YR 1970 TOTAL 9,289,840 MEAN 25,450 MAX 63,600 MIN 6,700 CFSM .43 IN 5.84
WTR YR 1971 TOTAL 11,742,000 MEAN 32,170 MAX 132,000 MIN 8,100 CFSM .54 IN 7.38

M Expressed in thousands.

05384000 Root River near Lanesboro, Minn.

LOCATION.--Lat 43°44'58", long 91°58'43", in sec.1, T.103 N., R.10 W., Fillmore County, on left bank half a mile upstream from highway bridge, 1.2 miles upstream from South Branch, and 2.5 miles northeast of Lanesboro.

DRAINAGE AREA.--615 sq mi.

PERIOD OF RECORD.--February to November 1910, February 1911 to September 1914, July 1915 to September 1917, August 1940 to current year. Published as North Branch Root River near Lanesboro, 1910-17.

GAGE.--Water-stage recorder. Datum of gage is 791.84 ft above mean sea level, adjustment of 1912. Prior to Oct. 1, 1917, nonrecording gage at site half a mile downstream at datum about 1.5 ft higher.

AVERAGE DISCHARGE.--36 years (1911-14, 1915-17, 1940-71), 316 cfs (6.98 inches per year).

EXTREMES.--Current year: Maximum discharge, 7,650 cfs Apr. 1 (gage height, 11.13 ft); minimum, 129 cfs Oct. 4, 5, 6, 7 (gage height, 1.24 ft), minimum gage height, 1.15 ft Dec. 6.
Period of record: Maximum discharge 22,100 cfs Mar. 29, 1962 (gage height, 16.11 ft); maximum gage height, 17.83 ft Mar. 1, 1965 (from floodmark, backwater from ice); minimum discharge, 29 cfs Aug. 27, 1949 (gage height, 1.08 ft); minimum gage height, 0.80 ft Dec. 15, 1967.

REMARKS.--Records good except those for winter periods, which are fair. Diurnal fluctuation at times during medium and low flow caused by powerplant above station. Records of chemical analyses and suspended-sediment loads for the current year are published in Part 2 of this report.

REVISIONS (WATER YEARS).--WSP 355: 1912. WSP 1308: 1911(M).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	141	472	359	180	155	190	6,890	432	348	247	182	146
2	138	452	381	180	155	190	3,040	414	337	235	175	150
3	133	456	465	175	155	190	1,470	390	324	227	173	142
4	131	648	440	170	155	190	1,150	400	312	227	169	146
5	129	917	386	170	155	190	1,060	418	306	233	167	167
6	131	691	190	170	155	195	1,140	386	300	227	165	152
7	131	552	210	170	155	195	1,250	365	351	221	163	145
8	152	479	210	170	155	200	1,410	351	526	216	163	140
9	959	468	210	170	155	200	1,420	341	559	221	162	173
10	1,730	643	205	170	155	200	1,230	330	453	213	162	245
11	1,150	928	180	170	155	200	1,020	324	400	219	169	229
12	686	689	190	165	155	205	889	321	369	482	161	184
13	498	566	200	165	160	210	793	315	348	775	157	164
14	414	514	200	160	160	450	710	309	324	334	153	154
15	360	491	200	160	160	2,300	635	303	309	315	150	147
16	323	464	195	160	160	3,000	595	300	294	285	148	139
17	300	424	190	160	160	1,800	570	300	324	261	145	136
18	283	399	190	160	160	1,760	537	348	294	241	144	134
19	266	395	190	160	165	1,590	513	407	285	230	145	137
20	253	425	185	162	170	1,190	495	407	306	224	147	137
21	245	440	185	160	170	1,000	506	376	291	210	148	136
22	236	437	185	160	175	853	600	355	276	205	404	136
23	232	270	185	160	175	731	573	341	267	256	262	142
24	245	210	185	155	180	668	502	418	261	230	188	141
25	263	350	185	155	180	625	456	522	376	205	168	139
26	279	360	185	155	180	585	428	542	312	197	159	138
27	393	355	180	155	185	536	425	474	276	192	153	141
28	1,190	350	180	155	185	873	446	425	261	192	151	141
29	935	340	180	155	------	1,450	456	386	247	190	146	185
30	620	340	180	155	------	2,210	449	362	250	185	143	195
31	521	------	180	155	------	5,040	------	348	------	187	142	------
TOTAL	13,467	14,525	6,986	5,067	4,585	29,216	31,658	11,710	9,886	7,882	5,264	4,661
MEAN	434	484	225	163	164	942	1,055	378	330	254	170	155
MAX	1,730	928	465	180	185	5,040	6,890	542	559	775	404	245
MIN	129	210	180	155	155	190	425	300	247	185	142	134
CFSM	.71	.79	.37	.27	.27	1.53	1.72	.61	.54	.41	.28	.25
IN.	.81	.88	.42	.31	.28	1.77	1.91	.71	.60	.48	.32	.28

CAL YR 1970 TOTAL 111,370 MEAN 305 MAX 1,830 MIN 105 CFSM .50 IN 6.74
WTR YR 1971 TOTAL 144,907 MEAN 397 MAX 6,890 MIN 129 CFSM .65 IN 8.77

PEAK DISCHARGE (BASE, 3,500 CFS).--Apr. 1 (1645) 7,650 cfs (11.13 ft).

05384500 Rush Creek near Rushford, Minn.

LOCATION.--Lat 43°50'00", long 91°46'40", on line between secs. 3 and 10, T.104 N., R.8 W., Fillmore County, on downstream side near center of span of highway bridge, 1.5 miles northwest of Rushford and 3 miles upstream from mouth.

DRAINAGE AREA.--129 sq mi.

PERIOD OF RECORD.--August 1942 to current year.

GAGE.--Nonrecording gage read twice daily and crest-stage gage. Datum of gage is 734.56 ft above mean sea level, datum of 1929. Prior to June 14, 1950, water-stage recorder at site 100 ft upstream; at datum 5 ft higher, Aug. 5, 1942, to Oct. 27, 1945; at datum 3 ft higher, Oct. 28, 1945, to Aug. 3, 1949; at present datum, Aug. 4, 1949, to June 13, 1950.

AVERAGE DISCHARGE.--29 years, 52.6 cfs (5.54 inches per year).

EXTREMES.--Current year: Maximum discharge, 1,290 cfs Mar. 31 (gage height, 4.85 ft, from crest-stage gage); minimum daily, 30 cfs Feb. 4-14; minimum gage height, 0.97 ft Mar. 11, 12, 13.
Period of record: Maximum discharge, 11,600 cfs Mar. 26, 1950 (gage height 13.54 ft, from floodmark), from rating curve extended above 1,400 cfs on basis of contracted-opening measurements at gage heights 11.0 ft and 13.5 ft; minimum, 17 cfs May 22, 1959; minimum gage height, 0.93 ft June 16, 17, 18, 1965.
Flood of June 28, 29, 1942, reached a discharge of 11,000 cfs (by slope-area measurement of peak flow).

REMARKS.--Records fair.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	39	41	40	37	31	37	296	54	60	42	40	42
2	39	42	38	38	31	37	85	54	58	43	39	41
3	38	43	40	37	31	37	67	53	55	42	40	41
4	39	43	40	37	30	37	63	61	53	44	40	47
5	39	41	39	37	30	37	61	58	51	43	40	44
6	39	41	38	37	30	36	61	55	52	43	41	41
7	39	41	38	37	30	36	60	55	63	43	42	41
8	40	40	37	37	30	36	63	53	55	43	40	41
9	42	43	37	37	30	38	61	54	52	43	40	46
10	42	43	37	37	30	39	59	55	52	44	41	44
11	40	41	37	37	30	39	58	53	51	44	41	42
12	40	41	37	37	30	39	55	53	50	101	41	41
13	40	41	37	37	30	40	56	53	48	55	39	41
14	40	40	37	37	30	88	55	53	48	47	39	41
15	39	40	37	37	33	151	56	52	45	47	39	40
16	38	40	37	37	36	71	56	51	45	44	39	40
17	39	40	37	37	36	66	56	55	53	43	39	40
18	39	40	37	37	37	57	54	60	47	43	39	41
19	39	40	37	37	37	57	54	62	47	46	40	44
20	39	41	37	37	37	56	54	58	50	44	39	42
21	39	41	37	39	37	55	59	56	46	44	40	44
22	39	41	37	37	37	54	58	56	46	43	41	40
23	39	40	37	37	37	51	54	56	45	80	41	43
24	41	40	37	36	38	50	54	72	49	50	40	43
25	39	40	37	36	38	48	54	69	81	44	40	40
26	41	40	37	35	37	44	52	64	48	42	40	40
27	47	39	37	34	38	44	56	62	45	41	40	42
28	44	39	37	33	37	48	56	61	44	49	40	40
29	43	39	37	33	------	55	55	60	43	39	39	39
30	43	38	37	32	------	120	54	59	44	41	39	44
31	41	------	37	32	------	346	------	57	------	41	40	------
TOTAL	1,245	1,219	1,160	1,125	938	1,949	1,982	1,774	1,526	1,458	1,238	1,255
MEAN	40.2	40.6	37.4	36.3	33.5	62.9	66.1	57.2	50.9	47.0	39.9	41.8
MAX	47	43	40	39	38	346	296	72	81	101	42	47
MIN	38	38	37	32	30	36	52	51	43	39	39	39
CFSM	.31	.31	.29	.28	.26	.49	.51	.44	.39	.36	.31	.32
IN.	.36	.35	.33	.32	.27	.56	.57	.51	.44	.42	.36	.36

CAL YR 1970 TOTAL 15,191 MEAN 41.6 MAX 457 MIN 31 CFSM .32 IN 4.38
WTR YR 1971 TOTAL 16,869 MEAN 46.2 MAX 346 MIN 30 CFSM .36 IN 4.86

05385000 Root River near Houston, Minn.

LOCATION.--Lat 43°46'05", long 91°35'11", in sec.32, T.104 N., R.6 W., Houston County, on right bank 1 mile west of Houston and 2.5 miles upstream from South Fork.

DRAINAGE AREA.--1,270 sq mi, approximately.

PERIOD OF RECORD.--May 1909 to September 1917, May to November 1929, March 1930 to current year. Monthly discharge only for some periods, published in WSP 1308.

GAGE.--Water-stage recorder. Datum of gage is 671.86 ft above mean sea level, datum of 1929. May 28, 1909, to Sept. 30, 1917, nonrecording gage at site 1.5 miles downstream at different datum. May 4, 1929, to Sept. 27, 1933, nonrecording gage at present site and datum.

AVERAGE DISCHARGE.--49 years (1909-17, 1930-71), 638 cfs (6.82 inches per year).

EXTREMES.--Current year: Maximum discharge, 8,970 cfs Apr. 2 (gage height, about 10.19 ft); minimum, 306 cfs Oct. 4 (gage height, 1.09 ft).
Period of record: Maximum discharge, 37,000 cfs Apr. 1, 1952 (gage height, 13.90 ft); maximum gage height, 18.32 ft Mar. 2, 1965 (backwater from ice); minimum discharge, 65 cfs Dec. 26, 1933, Feb. 25, 1935.

REMARKS.--Records good except those for periods of no gage-height record and those for winter periods, which are fair. Slight diurnal fluctuation at low flows caused by powerplants above station. Records of chemical analyses and suspended-sediment loads for the current year are published in Part 2 of this report.

REVISIONS (WATER YEARS).--WSP 895: Drainage area. WSP 1508: 1911-12. WSP 1628: 1948(P)

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	334	788	622	430	320	345	7,910	859	803	565	439	371
2	330	753	622	420	315	350	6,580	849	808	552	426	379
3	326	788	651	420	310	350	2,900	828	763	538	426	379
4	314	778	714	420	310	350	2,190	849	738	538	418	371
5	318	1,020	680	410	310	350	1,850	869	709	533	414	392
6	322	1,080	530	410	310	350	1,790	833	699	520	409	396
7	322	926	440	410	310	350	1,860	803	818	515	405	379
8	350	823	470	400	310	350	1,980	768	823	542	405	379
9	444	793	500	400	310	350	2,120	724	937	506	401	379
10	1,460	808	490	400	310	350	2,000	734	906	488	414	444
11	1,590	1,030	470	400	310	350	1,780	724	833	488	418	475
12	1,200	1,080	450	390	310	350	1,610	709	788	561	414	439
13	937	926	440	390	310	355	1,490	699	753	1,130	405	401
14	783	844	440	380	310	640	1,370	694	734	803	409	384
15	699	793	450	380	310	3,580	1,280	685	690	699	401	363
16	641	773	450	380	310	3,900	1,210	670	675	631	396	354
17	594	738	460	370	310	2,990	1,160	665	709	575	405	350
18	561	699	460	360	310	2,440	1,110	704	670	533	405	346
19	538	685	460	360	310	2,400	1,060	793	641	547	405	354
20	520	734	460	350	315	1,860	1,020	803	655	502	405	358
21	502	729	450	350	320	1,600	1,030	803	675	506	405	354
22	488	738	450	350	320	1,430	1,020	763	651	475	435	350
23	475	719	450	340	325	1,270	1,030	748	660	552	627	371
24	488	510	450	340	330	1,130	989	963	651	570	502	358
25	492	570	450	330	335	1,070	926	1,080	818	497	435	358
26	497	630	440	330	340	1,030	890	978	758	475	409	363
27	565	620	440	330	340	962	885	968	680	457	392	367
28	818	610	440	330	340	1,040	880	900	646	457	375	363
29	1,360	600	430	320	------	1,630	874	859	617	448	363	367
30	1,040	610	430	320	------	2,630	869	828	589	444	363	529
31	869	------	430	320	------	4,780	------	798	------	439	371	------
TOTAL	20,177	23,195	15,119	11,540	8,870	40,932	53,663	24,950	21,897	17,086	12,897	11,473
MEAN	651	773	488	372	317	1,320	1,789	805	730	551	416	382
MAX	1,590	1,080	714	430	340	4,780	7,910	1,080	937	1,130	627	529
MIN	314	510	430	320	310	345	869	665	589	439	363	346
CFSM	.51	.61	.38	.29	.25	1.04	1.41	.63	.57	.43	.33	.30
IN.	.59	.68	.44	.34	.26	1.20	1.57	.73	.64	.50	.38	.34

CAL YR 1970 TOTAL 199,486 MEAN 547 MAX 1,810 MIN 260 CFSM .43 IN 5.84
WTR YR 1971 TOTAL 261,799 MEAN 717 MAX 7,910 MIN 310 CFSM .56 IN 7.67

PEAK DISCHARGE (BASE, 5,000 CFS).--Apr. 2 (about 0430) 8,970 cfs (about 10.19 ft).

NOTE.--No gage-height record Feb. 28 to Apr. 5.

05385500 South Fork Root River near Houston, Minn.

LOCATION.--Lat 43°44'19", long 91°33'50", in NE¼SW¼ sec.9, T.103 N., R.6 W., Houston County, on left bank 50 ft downstream from bridge on State Highway 76, half a mile upstream from Badger Creek and 1.5 miles south of Houston.

DRAINAGE AREA.--275 sq mi.

PERIOD OF RECORD.--January 1953 to current year.

GAGE.--Water-stage recorder. Datum of gage is 680.41 ft above mean sea level, datum of 1929.

AVERAGE DISCHARGE.--18 years, 119 cfs (5.88 inches per year).

EXTREMES.--Current year: Maximum discharge, 1,010 cfs Apr. 1 (gage height, 7.47 ft); minimum daily, 77 cfs Feb. 4-15; minimum gage height, 1.50 ft Dec. 14.
Period of record: Maximum discharge, 8,420 cfs Mar. 29, 1962 (gage height, 13.35 ft); maximum gage height, 13.74 ft Mar. 26, 1961 (backwater from ice); minimum discharge, 11 cfs Nov. 28, 1961 (gage height, 1.47 ft); minimum gage height, 0.85 ft Aug. 17, 1967.
Flood of Mar. 26, 1950, reached a stage of 12.81 ft, from floodmark.

REMARKS.--Records good except those for winter periods, which are fair.

REVISIONS (WATER YEARS).--WSP 1388: 1953. WSP 1914: 1956(M), 1959(P), 1960.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	87	106	118	89	78	90	722	149	159	126	114	100
2	87	105	118	88	78	90	394	148	157	123	112	99
3	87	112	115	88	78	90	311	143	154	122	110	98
4	85	111	113	87	77	90	272	155	151	123	109	99
5	85	109	111	86	77	90	252	158	148	124	108	100
6	85	107	111	85	77	90	246	149	146	122	107	100
7	85	106	110	85	77	90	250	144	254	121	107	99
8	88	106	110	84	77	90	268	141	210	120	107	97
9	106	111	109	84	77	90	273	140	165	118	107	100
10	118	115	108	83	77	90	258	138	156	117	111	101
11	108	112	107	82	77	90	234	137	153	120	109	99
12	99	111	106	82	77	90	229	137	150	225	105	98
13	96	112	105	81	77	92	219	135	147	382	104	97
14	93	113	104	80	77	110	202	133	145	154	104	97
15	92	112	104	80	77	361	193	133	142	247	102	96
16	91	112	103	80	78	292	189	132	138	145	101	96
17	89	109	102	80	80	225	187	131	138	130	100	96
18	89	109	101	80	82	218	178	145	136	123	99	96
19	87	113	100	80	82	220	174	173	135	121	101	99
20	87	125	99	80	82	190	174	152	141	119	102	104
21	86	129	98	79	82	184	177	140	139	120	103	99
22	86	124	97	79	82	176	174	136	134	119	117	100
23	85	126	97	79	82	169	163	138	133	191	103	102
24	91	140	96	79	82	165	158	199	134	133	100	101
25	89	150	95	78	84	160	154	341	139	121	100	99
26	88	135	94	78	86	157	151	200	142	117	100	101
27	99	123	93	78	90	158	156	181	133	117	101	106
28	108	119	93	78	90	173	159	172	130	122	100	102
29	104	117	92	78	------	216	155	167	129	119	98	99
30	106	116	91	78	------	239	151	163	129	118	98	102
31	106	------	90	78	------	361	------	160	------	116	99	------
TOTAL	2,892	3,495	3,190	2,526	2,240	4,946	6,823	4,870	4,467	4,375	3,238	2,982
MEAN	93.3	117	103	81.5	80.0	160	227	157	149	141	104	99.4
MAX	118	150	118	89	90	361	722	341	254	382	117	106
MIN	85	105	90	78	77	90	151	131	129	116	98	96
CFSM	.34	.43	.37	.30	.29	.58	.83	.57	.54	.51	.38	.36
IN.	.39	.47	.43	.34	.30	.67	.92	.66	.60	.59	.44	.40

CAL YR 1970 TOTAL 37,085 MEAN 102 MAX 725 MIN 73 CFSM .37 IN 5.02
WTR YR 1971 TOTAL 46,044 MEAN 126 MAX 722 MIN 77 CFSM .46 IN 6.23

PEAK DISCHARGE (BASE, 900 CFS).--Apr. 1 (0800) 1010 cfs (7.47 ft).

05457000 Cedar River near Austin, Minn.

LOCATION.--Lat 43°38'10", long 92°58'20", in NE¼SE¼ sec.15, T.102 N., R.18 W., Freeborn County, on left bank 200 ft upstream from abandoned powerhouse, 500 ft downstream from highway bridge, 1.1 miles downstream from Turtle Creek, and 1.1 miles south of Austin.

DRAINAGE AREA.--425 sq mi.

PERIOD OF RECORD.--May 1909 to September 1914, October 1944 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,162,10 ft above mean sea level, datum of 1929. May 1909 to April 1912, nonrecording gage in tailwater of powerplant 200 ft downstream at datum 3.1 ft lower. May 1912 to September 1914, nonrecording gage on highway bridge 500 ft downstream at datum 1.1 ft lower.

AVERAGE DISCHARGE.--32 years, 175 cfs (5.59 inches per year).

EXTREMES.--Current year: Maximum discharge, 3,880 cfs Apr. 1 (gage height, 10.29 ft); minimum, 43 cfs Oct. 4 (gage height, 2.42 ft); minimum gage height, 2.28 ft Sept. 15, 18.
Period of record: Maximum discharge, 9,530 cfs Mar. 29, 1962 (gage height, 17.18 ft): maximum gage height, 18.87 ft Mar. 1, 1965 (from floodmark, backwater from ice); no flow for several days in 1911.

REMARKS.--Records good. Records of chemical analyses for the current year are published in Part 2 of this report.

REVISIONS (WATER YEARS).--WSP 1145: 1945, 1948.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	54	215	177	88	72	120	3,390	190	143	147	73	56
2	54	214	184	88	72	121	1,350	181	121	124	73	55
3	49	257	179	86	70	125	666	169	114	111	68	53
4	45	431	162	94	72	125	626	164	109	136	63	55
5	50	457	114	94	70	128	641	161	110	115	61	51
6	54	342	110	74	63	129	651	154	99	112	59	51
7	87	258	118	68	63	125	661	147	185	110	59	51
8	177	215	128	70	66	130	693	138	204	149	56	55
9	450	269	128	70	66	131	655	130	204	138	59	134
10	807	600	107	70	68	126	528	131	180	123	63	72
11	500	690	108	74	66	125	435	139	198	120	59	59
12	299	467	121	74	66	128	373	137	459	129	55	52
13	216	368	118	76	61	159	338	132	414	126	59	52
14	171	338	109	76	61	915	296	128	224	110	55	53
15	141	301	111	76	61	2,680	262	126	168	108	51	48
16	122	260	113	72	66	2,120	252	119	140	103	53	48
17	111	232	116	74	70	1,610	243	141	123	97	55	48
18	100	222	118	78	88	1,930	231	161	121	93	53	47
19	94	223	100	78	108	1,490	229	162	132	93	64	47
20	90	234	94	78	113	940	225	171	147	89	58	50
21	88	230	94	81	110	810	216	159	217	86	55	51
22	85	240	100	81	107	710	209	138	167	85	53	59
23	85	144	98	81	124	600	205	172	131	110	53	65
24	94	211	92	76	117	530	183	193	135	147	53	55
25	88	189	88	81	115	490	165	240	153	142	52	55
26	119	176	93	76	114	466	156	219	120	110	49	53
27	349	164	88	76	108	546	168	190	109	97	50	54
28	615	151	81	74	110	2,080	192	167	100	99	50	55
29	446	147	83	74	------	2,120	197	143	129	82	49	55
30	286	153	83	72	------	2,310	199	130	166	80	51	55
31	234	------	86	72	------	3,380	------	137	------	75	60	------
TOTAL	6,160	8,398	3,501	2,402	2,347	27,399	14,635	4,869	5,022	3,446	1,771	1,694
MEAN	199	280	113	77.5	83.8	884	488	157	167	111	57.1	56.5
MAX	807	690	184	94	124	3,380	3,390	240	459	149	73	134
MIN	45	144	81	68	61	120	156	119	99	75	49	47
CFSM	.47	.66	.27	.18	.20	2.08	1.15	.37	.39	.26	.13	.13
IN.	.54	.74	.31	.21	.21	2.40	1.28	.43	.44	.30	.16	.15

CAL YR 1970 TOTAL 57,863 MEAN 159 MAX 1,150 MIN 45 CFSM .37 IN 5.06
WTR YR 1971 TOTAL 81,644 MEAN 224 MAX 3,390 MIN 45 CFSM .53 IN 7.15

PEAK DISCHARGE (BASE, 1,400 CFS).--Mar. 15 (1915) 3,140 cfs (9.15 ft); Apr. 1 (0245) 3,880 cfs (10.29 ft).

05476000 Des Moines River at Jackson, Minn.

LOCATION.--Lat 43°37'10", long 94°59'10", in SE¼SW¼ sec.24, T.102 N., R.35 W., Jackson County, on right bank in storage room of city powerplant in Jackson.

DRAINAGE AREA.--1,220 sq mi, approximately.

PERIOD OF RECORD.--May 1909 to December 1913, August 1930 to current year (winter records incomplete prior to 1936). Published as Des Moines River near Jackson, 1930-35, as West Fork Des Moines River near Jackson, 1936-44, and as West Fork Des Moines River at Jackson, 1945-69.

GAGE.--Water-stage recorder. Datum of gage is 1,287.75 ft above mean sea level, datum of 1929. May 31, 1909, to Dec. 20, 1913, nonrecording gage at site 0.6 mile downstream at datum 0.99 ft lower. Aug. 22, 1930, to Sept. 30, 1944, nonrecording gage at site 7 miles upstream at datum 17.10 ft higher. Oct. 1, 1944, to Oct. 26, 1949, nonrecording gage at site 600 ft upstream at datum 10.64 ft higher. Oct. 27, 1949 to Dec. 15, 1965, water-stage recorder 200 ft downstream at same datum.

AVERAGE DISCHARGE.--36 years (1935-71), 284 cfs (3.16 inches per year).

EXTREMES.--Current year: Maximum discharge, 4,640 cfs Mar. 31 (gage height, 14.15 ft); minimum, 6.0 cfs Sept. 22, 29.
Period of record: Maximum discharge 15,700 cfs Apr. 11, 1969 (gage height, 19.45 ft); no flow at times.

REMARKS.--Records good except those for winter periods, which are fair. Regulation at times by Yankton, Long, Shetek, and Heron Lakes. Records of water temperatures, and suspended sediment loads for the current year are published in Part 2 of this report.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	33	157	270	190	38	225	2,780	406	254	1,070	182	36
2	35	161	280	170	36	220	2,280	376	232	1,030	172	35
3	33	175	270	150	35	218	1,950	345	231	988	159	35
4	30	205	260	130	33	215	1,910	342	244	1,030	139	35
5	28	242	250	110	32	210	1,850	334	271	958	130	35
6	28	258	230	98	30	210	1,760	305	314	975	125	34
7	38	258	240	90	28	210	1,630	284	442	934	117	32
8	92	271	280	86	26	210	1,530	279	536	893	112	30
9	157	450	310	84	23	210	1,430	264	660	813	107	29
10	173	633	266	82	21	210	1,320	254	753	759	94	28
11	177	682	250	80	20	215	1,240	244	841	750	71	26
12	177	682	240	79	18	230	1,160	221	915	780	65	25
13	183	676	230	77	17	520	1,040	216	939	800	58	23
14	181	659	260	75	17	1,350	947	207	911	795	43	22
15	173	603	290	72	16	1,350	884	201	859	752	35	22
16	163	574	290	70	16	1,250	838	191	804	699	35	22
17	159	550	285	67	16	1,240	795	173	735	635	37	21
18	145	512	275	65	16	1,200	729	167	737	573	38	20
19	140	493	265	63	275	1,120	699	177	786	531	43	19
20	128	487	245	60	274	1,070	682	179	888	486	43	19
21	126	570	230	57	250	1,040	650	190	873	443	43	17
22	126	447	245	55	230	1,000	617	179	824	408	42	11
23	125	181	265	54	220	960	590	193	770	374	43	21
24	125	190	250	52	215	930	554	215	740	338	56	19
25	126	240	240	50	215	920	505	245	690	308	77	14
26	133	290	230	48	220	920	471	256	647	286	57	11
27	142	280	225	46	240	940	459	249	599	259	42	9.1
28	143	270	220	44	230	1,100	450	246	547	237	40	9.1
29	143	260	210	43	------	1,700	444	232	525	220	36	7.0
30	147	260	205	41	------	2,820	418	209	805	204	36	8.5
31	155	------	200	39	------	3,250	------	294	------	193	36	------
TOTAL	3,764	11,716	7,806	2,427	2,807	27,263	32,612	7,673	19,372	19,521	2,313	674.7
MEAN	121	391	252	78.3	100	879	1,087	248	646	630	74.6	22.5
MAX	183	682	310	190	275	3,250	2,780	406	939	1,070	182	36
MIN	28	157	200	39	16	210	418	167	231	193	35	7.0
CFSM	.10	.32	.21	.06	.08	.72	.89	.20	.53	.52	.06	.02
IN.	.11	.36	.24	.07	.09	.83	.99	.23	.59	.60	.07	.02

CAL YR 1970 TOTAL 90,642.0 MEAN 248 MAX 1,400 MIN 18 CFSM .20 IN 2.76
WTR YR 1971 TOTAL 137,948.7 MEAN 378 MAX 3,250 MIN 7.0 CFSM .31 IN 4.21

PEAK DISCHARGE (BASE, 500 CFS)

DATE	TIME	G. H.	DISCHARGE	DATE	TIME	G. H.	DISCHARGE
11-11	0900	6.07	689	5-31	1800	6.26	772
3-14	2300	11.43	1,470	6-19	1600	7.12	1,040
3-31	1800	14.15	4,640	7-4	0730	7.89	1,290

As the number of streams on which streamflow information is likely to be desired far exceeds the number of stream-gaging stations feasible to operate at one time, the Geological Survey collects limited streamflow data at sites other than stream-gaging stations. When limited streamflow data are collected on a systematic basis over a period of years for use in hydrologic analyses, the site at which the data are collected is called a partial-record station. Data collected at these partial-record stations are usable in low-flow or flood-flow analyses, depending on the type of data collected. In addition, discharge measurements are made at other sites not included in the partial-record program. These measurements are generally made in times of drought or flood to give better areal coverage to those events. Those measurements and others collected for some special reason are called measurements at miscellaneous sites.

Records collected at partial-record stations are presented in two tables. The first is a table of discharge measurements at low-flow partial-record stations and the second is a table of annual maximum stage and discharge at crest-stage stations. Discharge measurements made at miscellaneous sites for both low flow and high flow are given in a third table.

Low-flow partial-record stations

Measurements of streamflow in the area covered by this report made at low-flow partial-record stations are given in the following table. Most of these measurements were made during periods of base flow when streamflow is primarily from ground-water storage. These measurements, when correlated with the simultaneous discharge of a nearby stream when continuous records are available, will give a picture of the low-flow potentiality of the stream. The column headed "Period of record" shows the water years in which measurements were made at the same, or practically the same, site.

Discharge measurements made at low-flow partial-record stations during water year 1971

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Measurements	
					Date	Discharge (cfs)
		Streams tributary to Lake Superior				
04010850	Brule River near Grand Marais, Minn.	SE¼SW¼ sec.15, T.63 N., R.1 E., Cook County, at bridge on National Forest Development Road 309, 0.5 mile upstream from South Brule River and 12.5 miles north of Grand Marais.	-	1970-71	9-28-71	13.2
04010900	South Brule River near Grand Marais, Minn.	SW¼NE¼ sec.22, T.63 N., R.1 E., Cook County, at bridge on County Highway 12 (Gunflint Trail), 300 feet upstream from mouth, and 12 miles north of Grand Marais.	-	1970-71	9-28-71	22.1
04011000	Brule River near Hovland, Minn.	SE¼SW¼ sec.27, T.62 N., R.3 E., Cook County, at bridge on U.S. Highway 61, 0.3 mile upstream from mouth, and 4.5 miles southwest of Hovland.	248	1912, 1970-71	9-28-71	51.3
04011500	Devil Track River near Grand Marais, Minn.	SW¼NE¼ sec.13, T.61 N., R.1 E., Cook County, at bridge on U.S. Highway 61, 400 ft upstream from mouth, and 3.9 miles northeast of Grand Marais.	a77	1911-12, 1970-71	9-28-71	18.3
04012000	Cascade River near Grand Marais, Minn.	NE¼SW¼ sec.1, T.60 N., R.2 W., Cook County, at U.S. Highway 61, at mouth, and 9.2 miles southwest of Grand Marais.	111	1911-12, 1970-71	9-28-71	21.4
04012500	Poplar River at Lutsen, Minn.	SW¼NE¼ sec.33, T.60 N., R.3 W., Cook County, 350 feet upstream from bridge on U.S. Highway 61 at Lutsen, and 1,650 feet upstream from mouth.	114	1911, 1912-17≠, 1928-47≠, 1952-61≠, 1962-63, 1970-71	9-29-71	48.0
04012600	Temperance River near Tofte, Minn.	NE¼NW¼ sec.4, T.61 N., R.4 W., Cook County, at bridge on Forest Service Road 165, 1.8 miles downstream from Sawbill Creek, and 15.5 miles north of Tofte.	-	1970-71	9-28-71	20.0
04012700	Temperance River near Schroeder, Minn.	SE¼NE¼ sec.31, T.59 N., R.4 W., Cook County, at bridge on U.S. Highway 61, 500 feet upstream from mouth, and 1.2 miles northeast of Schroeder.	a189	1911-12, 1970-71	9-28-71	48.7
04013300	Manitou River near Little Marais, Minn.	SE¼SE¼ sec.3, T.57 N., R.6 W., Lake County, at bridge on U.S. Highway 61, 0.3 mile upstream from mouth, and 3 miles northeast of Little Marais.	a94	1911-12, 1970-71	9-27-71	21.3
04015000	Beaver River at Beaver Bay, Minn.	SE¼SW¼ sec.12, T.55 N., R.8 W., Lake County, at bridge on U.S. Highway 61, 800 feet upstream from mouth, at Beaver Bay.	126	1911-14≠, 1928-31≠, 1968, 1970-71	9-27-71	3.88

≠ Operated as a continuous-record gaging station.
a Approximately.

Discharge measurements made at low-flow partial-record stations during water year 1971--Continued

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Measurements	
					Date	Discharge (cfs)
		Streams tributary to Lake Superior--Continued				
04015140	Gooseberry River near Two Harbors, Minn.	SW¼SW¼ sec.22, T.154 N., R.9 W., Lake County, at bridge on U.S. Highway 61, in Gooseberry Falls State Park, about one mile upstream from mouth, 2.5 miles northeast of Castle Danger, and 12.5 miles northeast of Two Harbors.	a77	1911, 1963, 1970-71	9-27-71	6.36
04015330	Knife River near Two Harbors, Minn.	SE¼NE¼ sec.36, T.52 N., R.12 W., St. Louis County, at north bridge on U.S. Highway 61, 0.8 mile upstream from mouth, and 8 miles southwest of Two Harbors.	a90	1970-71	9-22-71	3.50
04015340	Sucker River near Duluth, Minn.	SE¼SW¼ sec.3, T.51 N., R.12 W., St. Louis County, at culvert on County Highway 61, 0.2 mile upstream from mouth, and 15.3 miles northeast of aerial bridge in Duluth.	a34	1970-71	9-22-71	4.11
04015350	French River near Duluth, Minn.	NE¼SW¼ sec.17, T.51 N., R.12 W., St. Louis County, at bridge on County Highway 61 at mouth, and 12.7 miles northeast of aerial bridge in Duluth.	-	1970-71	9-22-71	.71
04015387	Amity Creek at Duluth, Minn.	SE¼NE¼ sec.5, T.50 N., R.13 W., St. Louis County, at bridge on Parkway Road, 0.4 mile upstream from Lester River, and 6 miles northeast of aerial bridge in Duluth.	-	1970-71	9-22-71	.36
04015390	Lester River at Duluth, Minn.	NE¼NE¼ sec.8, T.50 N., R.13 W., St. Louis County, at bridge on U.S. Highway 61 at mouth, and 5.7 miles northeast of aerial bridge in Duluth.	a56	1970-71	9-22-71	3.65
04018710	Mud Hen Creek near Forbes, Minn.	SE¼SE¼ sec.3, T.56 N., R.17 W., St. Louis County, at bridge on County Highway 16, 0.9 mile upstream from mouth, 4.5 miles north of Central Lakes, and 6 miles southeast of Forbes.	a118	1970-71	10- 7-70 9-24-71	2.07 9.27
04020800	Paleface River near Cotton, Minn.	NW¼NW¼ sec.34, T.55 N., R.17 W., St. Louis County, at bridge on U.S. Highway 53, about two miles upstream from mouth, and 2.9 miles north of Cotton.	a60	1970-71	9-24-71	2.53
04021200	Floodwood River near Floodwood, Minn.	SW¼SW¼ sec.20, T.52 N., R.20 W., St. Louis County, at bridge on farm driveway, 3.8 miles upstream from mouth, and 2.8 miles north of Floodwood.	-	1970-71	9-13-71 9-22-71	71.5 27.8
04021250	East Savanna River at Floodwood, Minn.	SE¼NE¼ sec.7, T.51 N., R.20 W., St. Louis County, at bridge on U.S. Highway 2, 0.4 mile upstream from mouth, at Floodwood.	-	1970-71	9-13-71 9-22-71	13.7 4.78
04021530	Stoney Brook at Brookston, Minn.	NW¼SE¼ sec.34, T.51 N., R.18 W., St. Louis County, at bridge on County Highway 31, 0.8 mile upstream from mouth, at Brookston.	a105	1970-71	9-13-71 9-22-71	46.9 29.5
04021700	Cloquet River near Brimson, Minn.	SE¼SW¼ sec.9, T.55 N., R.12 W., St. Louis County, at bridge on County Highway 52 (Forest Service Road 6202), about one mile upstream from Pine Creek, and 1.5 miles south of Brimson.	-	1970-71	9-23-71	18.8
04021960	Cloquet River near Island Lake, Minn.	SW¼SW¼ sec.32, T.54 N., R.13 W., St. Louis County, at boat launching site on State Forest Road (Carroll Forest Road), 1.7 miles upstream from Little Cloquet River, and 7.5 miles northeast of village of Island Lake.	-	1970-71	9-23-71	44.8
04022970	Us-Kab-Wan-Ka River near Twig, Minn.	SE¼SW¼ sec.14, T.52 N., R.16 W., St. Louis County, at bridge on trail, 0.8 mile upstream from mouth, and 6.2 miles north of Twig.	-	1970-71	9-23-71	6.15

a Approximately.

Discharge measurements made at low-flow partial-record stations during water year 1971--Continued

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Measurements	
					Date	Discharge (cfs)
		Streams tributary to Lake Superior--Continued				
04023400	Pine River near Cloquet, Minn.	On line between secs.23 and 24, T.50 N., R.17 W., St. Louis County, at concrete box culvert on State Highway 33, 0.9 mile upstream from mouth, and 5.2 miles north of Cloquet.	-	1970-71	9-13-71 9-22-71	14.5 9.68
04024010	Midway River at Thomson, Minn.	NE¼SE¼ sec.32, T.49 N., R.16 W., Carlton County, at bridge on county road, 0.9 mile upstream from mouth, at Thomson Reservoir, and 0.2 mile north of city limits of Thomson.	a66	1968, 1970-71	9-13-71 9-22-71	22.2 8.22
04024092	Blackhoof River near Holyoke, Minn.	SW¼NW¼ sec.26, T.47 N., R.17 W., Carlton County, at bridge on County Highway 6, 3.5 miles upstream from Nemadji River, 5.6 miles northwest of Holyoke, and 11 miles northeast of Barnum.	-	1970-71	9-23-71	23.2
04024095	Nemadji River near Holyoke, Minn.	NE¼NE¼ sec.32, T.47 N., R.16 W., Carlton County, at bridge on State Highway 23, 3.5 miles north of Holyoke, about five miles upstream from Minnesota-Wisconsin boundary, and 7 miles south of Wrenshall.	-	1970-71	9-23-71	31.0
		Red River of the North basin				
05030140	Otter Tail River northwest of Luce, Minn.	Lat 46°40'20", long 93°39'51", in NW¼ sec.19, T.137 N., R.39 W., Otter Tail County, at bridge on U.S. Highway 10, 1 mile northwest of Luce.	-	1968, 1970-71	5-11-71	91.8
05030260	Toad River above Big Pine Lake, near Perham, Minn.	Lat 46°38'38", long 95°30'33", on line between secs.29 and 30, T.137 N., R.39 W., Otter Tail County, at bridge on County Highway 13, 0.8 mile upstream from Big Pine Lake, and 4.2 miles northeast of Perham.	a110	1964-68, 1970-71	5-11-71	32.8
05030300	Otter Tail River near Richville, Minn.	Lat 46°30'50", long 95°31'03", on line between secs.7 and 8, T.135 N., R.38 W., Otter Tail County, at bridge on County Highway 14, 5 miles east of Richville.	-	1967-68, 1970-71	5-11-71	206
05030401	Otter Tail River at Otter Tail Lake outlet, near Amor, Minn.	Lat 46°21'35", long 95°43'57", in SW¼ sec.4, T.133 N., R.40 W., Otter Tail County, at Otter Tail Lake outlet, at bridge and dam on County Highway 72, 4 miles south of Amor.	a1,160	1933, 1935-36, 1968, 1970-71	5-11-71	224
05040000	Pelican River near Detroit Lakes, Minn.	Lat 46°43'26", long 95°54'56", in NE¼SW¼ sec.31, T.138 N., R.41 W., at highway crossing at Buck's Mill, 200 ft downstream from concrete millpond dam on Buck Lake, and 6.5 miles southwest of city of Detroit Lakes.	123	1942-53≠, 1968-71	10- 6-70 5-12-71 6-18-71	.07 33.8 15.2
05051520	Whiskey Creek near Kent, Minn.	On line between secs.13 and 24, T.134 N., R.48 W., Wilkin County, at double pipe-arch culvert on County Highway 20, 1.7 miles southeast of Kent.	a80	1964-66, 1970-71	9-17-71	.004
05051525	Wolverton Creek at Comstock, Minn.	Lat 46°39'55", long 96°44'20", on line between secs.21 and 22, T.137 N., R.48 W., Clay County, at bridge on county road, 1 mile northeast of Comstock.	a70	1964-66, 1970-71	9-17-71	.58
05060820	Buffalo River near Ogema, Minn.	NW¼NW¼ sec.32, T.141 N., R.42 W., Becker County, at County Highway 14, 6 miles west of Callaway, and about 9.5 miles southwest of Ogema.	-	1970-71	9-16-71	23.2
05061080	Deerhorn Creek near Lawndale, Minn.	NW¼SW¼ sec.21, T.136 N., R.46 W., Wilkin County, at county road, 1.2 miles west of State Highway 82, 6.4 miles northwest of Lawndale, and about 6 miles southwest of barnesville.	-	1970-71	9-16-71	4.37

≠ Operated as a continuous-record gaging station.
a Approximately.

Discharge measurements made at low-flow partial-record stations during water year 1971--Continued

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Measurements	
					Date	Discharge (cfs)
		Red River of the North basin--Continued				
05061100	South Branch Buffalo River near Barnesville, Minn.	Lat 46°39'29", long 96°34'57", on line between secs.23 and 26, T.137 N., R.47 W., Clay County, at County Highway 2, 7.4 miles west of Barnesville, and 4 miles south of Baker.	a185	1964-66, 1970-71	9-16-71	4.50
05061490	Stony Creek near Sabin, Minn.	On line between secs.22 and 27, T.138 N., R.47 W., Clay County, at County Highway 65, 3 miles southeast of Sabin.	a145	1964-66, 1970-71	9-16-71	3.22
05062335	Wild Rice River near Roy Lake, Minn.	Lat 47°23'20", long 95°38'15", in NW¼SW¼ sec.9, T.145 N., R.39 W., Mahnomen County, at bridge on County Highway 4, about 5.8 miles northwest of Roy Lake.	a270	1964-67, 1970-71	9-15-71	19.4
05062435	White Earth River near Mahnomen, Minn.	Lat 47°18'55", long 95°56'00", in NE¼SE¼ sec.1, T.144 N., R.42 W., Mahnomen County, at bridge on county road, 1.2 miles east of Mahnomen.	a190	1964-67, 1970-71	9-15-71	10.3
05062440	Wild Rice River at Mahnomen, Minn.	Lat 47°18'40", long 95°57'18", in SW¼SW¼ sec.1, T.144 N., R.42 W., Mahnomen County, at bridge on County Highway 25, in southeast corner of Mahnomen, 0.5 mile east of junction of U.S. Highway 59 and County Highway 25.	a610	1964-67, 1970-71	9-15-71	35.1
05062650	Wild Rice River tributary at Heiberg, Minn.	Lat 47°16'55", long 96°16'30", in SW¼ sec.16, T.144 N., R.44 W., Norman County, at footbridge in park at Heiberg, 0.2 mile upstream from mouth, and 1.5 miles northwest of Twin Valley.	a70	1964-67, 1970-71	9-15-71	6.89
05063220	South Branch Wild Rice River near White Earth, Minn.	Lat 47°04'37", long 96°00'27", in NW¼NE¼ sec.33, T.142 N., R.42 W., Becker County, at culvert on county road, about 4 miles southwest of Ogema, and 8 miles west of White Earth.	a45	1964-67, 1970-71	9-16-71	2.17
05067900	Sandhill River near Fertile, Minn.	NE¼NE¼ sec.21, T.147 N., R.44 W., Polk County, at bridge on County Highway 12, about 1 mile northeast of Fertile.	a225	1964-67, 1970-71	9-15-71	17.1
05073560	Shotley Brook near Shotley, Minn.	NW¼NE¼ sec.14, T.153 N., R.31 W., Beltrami County, at County Highway 23, 2 miles upstream from mouth, and 3.2 miles northeast of Shotley.	a75	1964-67, 1970-71	9-16-71	2.72
05073630	South Branch Battle River near Kelliher, Minn.	NE¼SE¼ sec.31, T.152 N., R.30 W., Beltrami County, at County Highway 36, 3.4 miles west of Kelliher, and about 11 miles upstream from Lower Red Lake.	a70	1964-67, 1970-71	9-16-71	3.42
05073770	Blackduck River at Quiring, Minn.	SW¼SW¼ sec.23, T.15 N., R.32 W., Beltrami County, at County Highway 101, 0.25 mile downstream from South Branch Cormorant River, and 0.5 mile southwest of Quiring.	a200	1964-67, 1970-71	9-16-71	<.01
05073790	North Branch Cormorant River near Shooks, Minn.	SW¼SW¼ sec.7, T.151 N., R.30 W., Beltrami County, at County Highway 36, 0.25 mile downstream from an unnamed tributary entering from the south, and 5.5 miles northwest of Shooks.	a50	1964-67, 1970-71	9-16-71	.01
05073980	Sandy River near Red Lake, Minn.	Lat 47°50'40", long 95°13'40", in NW¼NE¼ sec.2, T.150 N., R.36 W., Clearwater County, at U.S. Indian Service Road, 2.5 miles upstream from mouth, and 4.2 miles southwest of village of Red Lake.	a63	1964-67, 1970-71	9-16-71	10.5
05075700	Mud River near Grygla, Minn.	SE¼SE¼ sec.14, T.156 N., R.40 W., Marshall County, at bridge on State Highway 89, 6 miles west of Grygla.		1937, 1957, 1966, 1970-71	9-15-71	.18

< Less than.
a Approximately.

Discharge measurements made at low-flow partial-record stations during water year 1971--Continued

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Measurements	
					Date	Discharge (cfs)
		Red River of the North basin--Continued				
05078340	Hill River at Brooks, Minn.	NE¼SW¼ sec.11, T.150 N., R.42 W., Red Lake County, at bridge on U.S. Highway 59 at Brooks.	-	1933, 1950, 1966, 1970-71	9-14-71	14.2
05078380	Poplar River near Brooks, Minn.	Lat 47°48'20", long 96°03'30", in NW¼NE¼ sec.20, T.150 N., R.42 W., Red Lake County, at County Highway B3, 2.5 miles upstream from mouth, and 2.8 miles west of Brooks.	a155	1950, 1964-67, 1970-71	9-14-71	3.73
05078490	Badger Creek near Red Lake Falls, Minn.	On line between sec.1, T.150 N., R.44 W., and sec.36, T.151 N., R.44 W., Red Lake County, at County Highway A4, about 1 mile upstream from mouth, and 3 miles southeast of Red Lake Falls.	-	1970-71	9-14-71	0
05079900	Barnums Creek at Girard, Minn.	NW¼NE¼ sec.15, T.149 N., R.47 W., Polk County, at town road, about 0.2 mile upstream from U.S. Highway 75, and 0.75 mile northeast of Girard.	a110	1964-67, 1970-71	9-14-71	.95
05102900	Roseau River near Skime, Minn.	SE¼SW¼ sec.30, T.160 N., R.38 W., Roseau County, at bridge on County Highway 4, 6.5 miles north of Skime, and about 11 miles southeast of Malung.	-	1971	9-15-71	.35
05105200	Hay Creek near Salol, Minn.	SE¼SE¼ sec.7, T.162 N., R.38 W., Roseau County, at State Highway 11, 1.3 miles southwest of Salol, and about 8.5 miles northeast of Malung.	-	1971	9-15-71	.19
		Lake of the Woods basin				
05124497	Little Isabella River near Isabella, Minn.	SE¼NW¼ sec.29, T.61 N., R.9 W., Lake County, at bridge on Forest Service Road 173, 7 miles upstream from mouth, 10 miles southwest of Forest Center Landing, and 11 miles northwest of Isabella.	-	1970-71	8-11-71 9-14-71	29.0 28.6
05129105	Pelican River near Orr, Minn.	NE¼NE¼ sec.10, T.65 N., R.19 W., St. Louis County, at bridge on trail, 4.5 miles northeast of Cusson, 5.7 miles northeast of Orr, and about 10 miles upstream from mouth.	-	1970-71	8-12-71 9-14-71	39.2 38.9
05129150	Little Indian Sioux River near Buyck, Minn.	SW¼NW¼ sec.1, T.65 N., R.15 W., St. Louis County, at bridge on County Highway 116 (Echo Trail), 1 mile upstream from Range Line Creek, and 15 miles east of Buyck.	-	1970-71	8-12-71 9-14-71	6.86 7.66
05129280	Ash River near Ray, Minn.	SW¼NW¼ sec.33, T.68 N., R.20 W., St. Louis County, at bridge on county road, 0.5 mile upstream from Black Duck River, 8 miles north of Ash Lake, and 14.5 miles southeast of Ray.	-	1970-71	8-12-71 9-14-71	2.26 1.57
05129380	Rat Root River near Littlefork, Minn.	At center of sec.1, T.68 N., R.24 W., Koochiching County, at bridge on county road, 5.7 miles south of Ericsburg, and 9 miles east of Littlefork.	-	1970-71	8-12-71 9-15-71	.34 2.46
05129390	East Fork Rat Root River near Ray, Minn.	On line between secs.29 and 30, T.69 N., R.22 W., Koochiching County, at bridge on County Highway 3, 2 miles north of Ray.	-	1970-71	8-12-71 9-15-71	.18 4.80
05129650	Little Fork River at Cook, Minn.	SE¼NE¼ sec.13, T.62 N., R.19 W., St. Louis County, at bridge on U.S. Highway 53, 0.6 mile west of Cook.	-	1950, 1958-69, 1970-71	8- 5-71 9- 8-71	1.68 7.80
05129920	Little Fork River near Gheen, Minn.	NE¼NW¼ sec.16, T.62 N., R.20 W., in St. Louis County, at bridge on State Highway 1, 2.5 miles east of Meadow Brook, and 8.5 miles southwest of Gheen.	-	1970-71	8- 5-71 9- 8-71 9-15-71	24.5 44.1 91.8

a Approximately.

Discharge measurements made at low-flow partial-record stations during water year 1971--Continued

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Measurements	
					Date	Discharge (cfs)
		Lake of the Woods basin--Continued				
05131310	Bear River near Togo, Minn.	On line between secs.29 and 32, T.62 N., R.21 W., St. Louis County, at bridge on County Highway 5, 2 miles upstream from mouth, and 4.5 miles east of Togo	-	1970-71	8- 5-71 9- 7-71 9-15-71	23.1 27.1 21.4
05131320	Sturgeon River near Togo, Minn.	On line between secs.9 and 16, T.62 N., R.21 W., St. Louis County, at bridge on State Highway 1, 2 miles upstream from mouth, 3.8 miles west of Meadow Brook, and 6 miles northeast of Togo.	-	1970-71	8- 5-71 9- 7-71 9-15-71	83.4 103 86.8
05131325	Valley River near Rauch, Minn.	SE¼NE¼ sec.7, T.63 N., R.22 W., Koochiching County, at bridge on County Highway 57, 2 miles upstream from mouth, 2 miles west of Rauch, and 9.5 miles northwest of Togo.	-	1970-71	8- 5-71 9- 7-71 9-15-71	1.93 5.09 3.58
05131470	Nett Lake River near Littlefork, Minn.	SE¼SE¼ sec.8, T.66 N., R.24 W., Koochiching County, at bridge on County Highway 8, 2.2 miles upstream from mouth, and 13.2 miles southeast of Littlefork.	-	1970-71	8- 6-71 9- 7-71 9-15-71	49.3 14.7 9.07
05131510	Beaver Brook near Littlefork, Minn.	On line between secs.2 and 11, T.68 N., R.25 W., Koochiching County, at bridge on State Highway 217, 1.6 miles upstream from mouth, and 1.5 miles east of Littlefork.	-	1970-71	8- 6-71 9- 7-71 9-15-71	1.79 4.20 4.01
05131600	Bowstring River near Talmoon, Minn.	On line between secs.23 and 24, T.147 N., R.25 W., Itasca County, at bridge on State Highway 6, 0.4 mile south of Bowstring, and 4.5 miles southwest of Talmoon.	-	1969-71	8- 4-71 9- 7-71 9-13-71	20.1 12.8 8.62
05131750	Big Fork River near Big Fork, Minn.	SE¼NE¼ sec.27, T.61 N., R.27 W., Itasca County, at bridge on State Highway 6, 1 mile south of County Highway 14, and 5.5 miles west of Bigfork.	-	1970-71	8- 4-71 9-13-71	138 147
05131760	Rice River near Bigfork, Minn.	On line between secs.16 and 21, T.60 N., R.26 W., Itasca County, at bridge on County Highway 254, 5 miles south of Bigfork.	-	1969-71	8- 4-71 9- 7-71 9-13-71	28.4 7.39 7.22
05131770	Gale Brook near Bigfork, Minn.	NE¼NW¼ sec.4, T.60 N., R.26 W., Itasca County, at culvert on County Highway 7, 1.5 miles south of Bigfork.	-	1969-71	8- 4-71 9- 7-71 9-13-71	1.57 5.77 .84
05131870	Big Fork River near Effie, Minn.	NE¼SW¼ sec.14, T.63 N., R.27 W., Koochiching County, at bridge on State Highway 6, 0.2 mile upstream from Bowerman Brook, 1 mile south of County Highway 5, and 9.5 miles northwest of Effie.	-	1970-71	8- 4-71 9-14-71	188 169
05131880	Bowerman Brook at Caldwell Trail, near Effie, Minn.	SW¼SW¼ sec.14, T.63 N., R.27 W., Koochiching County, at culvert on Caldwell Trail, 7.2 miles north of Effie.	-	1970-71	8- 4-71 9-14-71	.29 0
05131900	Caldwell Brook at Caldwell Trail, near Effie, Minn.	SW¼NW¼ sec.29, T.152 N., R.25 W., Koochiching County, at bridge on Caldwell Trail, 11.6 miles north of Effie.	-	1969-71	8- 4-71 9-14-71	12.4 1.57
05132200	Sturgeon River near Big Falls, Minn.	NE¼SE¼ sec.26, T.155 N., R.26 W., Koochiching County, at bridge on County Highway 30, 6.2 miles northwest of Big Falls.	-	1970-71	8- 5-71 9-14-71	45.0 33.8
05132400	Bear River near Littlefork, Minn.	On line between secs.4 and 9, T.69 N., R.26 W., Koochiching County, at bridge on County Highway 1, 5.5 miles west of Littlefork.	-	1969-71	8- 5-71 9-14-71	7.97 6.55
05132900	Black River near Loman, Minn.	SW¼SE¼ sec.34, T.158 N., R.25 W., in Koochiching County, 4.0 miles south by southwest of Loman, on County Road 11.	-	1970-71	8- 4-71 9- 7-71 9-14-71	36.5 88.4 29.4

Discharge measurements made at low-flow partial-record stations during water year 1971--Continued

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Measurements	
					Date	Discharge (cfs)
		Lake of the Woods basin--Continued				
05133200	West Branch Black River near Loman, Minn.	SE¼SW¼ sec.3, T.158 N., R.25 W., Koochiching County, at bridge on County Highway 82, 1.6 miles northwest of Loman.	a288	1969-71	8- 4-71 9-14-71	1.10 13.6
05134100	North Branch Rapid River near Baudette, Minn.	NW¼SW¼ sec.4, T.158 N., R.31 W., Lake of the Woods County, at bridge on County Highway 1, 12.7 miles southwest of Baudette.	-	1969-71	8- 5-71 9-15-71	18.8 4.09
05135000	East Fork Rapid River near Clementson, Minn.	NE¼NE¼ sec.19, T.160 N., R.29 W., Koochiching County, at Eidems Rapids, 1.5 miles upstream from junction with Rapid River, and 2.0 miles southeast of Clementson.	-	1970-71	8- 4-71 9-15-71	3.78 6.74
05135100	Rapid River at Clementson, Minn.	NE¼SE¼ sec.12, T.160 N., R.30 W., Lake of the Woods County, at bridge on State Highway 11, at Clementson.	-	1969-71	8- 4-71 9-15-71	131 57.1
05136000	Baudette River at Baudette, Minn.	On line between secs.22 and 27, T.160 N., R.31 W., Lake of the Woods County, at bridge on county road, 4 miles southwest of Baudette.	-	1969-71	8- 5-71	1.17
05137000	Winter Road River near Baudette, Minn.	SE¼SE¼ sec.36, T.161 N., R.32 W., Lake of the Woods County, at bridge on old State Highway 11, 4.5 miles west of Baudette.	-	1969-71	8- 5-71 9-15-71	6.44 .62
05138000	County ditch No. 1 near Williams, Minn.	NE¼NE¼ sec.24, T.162 N., R.34 W., Lake of the Woods County, at triple box culvert on County Highway 2, 5.2 miles north of Williams.	-	1969-71	8- 4-71 9-15-71	2.69 .54
		Mississippi River main stem				
05200010	Mississippi River at Lake Itasca, Minn.	NW¼SW¼ sec.35, T.144 N., R.36 W., Clearwater County, at first culvert on County Highway 38, downstream from Lake Itasca, in Itasca State Park, 1 mile south of town of Lake Itasca, and about 21.5 miles southwest of Bemidji.	a80	1964-65, 1967, 1970-71	8- 9-71	8.03
05200445	Mississippi River at Bemidji, Minn.	NW¼NW¼ sec.20, T.146 N., R.33 W., Beltrami County, at bridge on County Highway 11, about 1.5 miles southwest of intersection of U.S. Highway 2 and County Highway 7 in Bemidji, and about 2 miles upstream from Lake Irving.	a400	1950, 1964-65, 1970-71	8- 9-71	104
		Schoolcraft River basin				
05200450	Schoolcraft River near Bemidji, Minn.	SW¼SE¼ sec.31, T.146 N., R.33 W., Beltrami County, at culvert on County Highway 2, 0.1 mile downstream from outlet of Plantaganette Lake, and 4.6 miles south of Bemidji, Minn.	a165	1947, 1964-65, 1970-71	8- 9-71	53.5
		Turtle River basin				
05200850	Turtle River near Pennington, Minn.	SE¼ sec.15, T.147 N., R.31 W., Beltrami County, at bridge on County Highway 20, 7 miles northwest of Pennington.	a165	1950, 1964-65, 1970-71	8- 9-71	32.2
05200920	North Turtle River near Pennington, Minn.	NW¼NE¼ sec.24, T.147 N., R.31 W., Beltrami County, at bridge on County Highway 20, 0.5 mile upstream from mouth, and 5.8 miles northwest of Pennington.	a70	1950, 1964-65, 1970-71	8- 9-71	5.49
		Leech Lake River basin				
05204400	Boy River at Longville, Minn.	NW¼SE¼ sec.34, T.141 N., R.28 W., Cass County, at bridge on State Highway 84, at outlet of Girl Lake at Longville.	a160	1953-54, 1964-65, 1970-71	8- 9-71	36.9

a Approximately.

Discharge measurements made at low-flow partial-record stations during water year 1971--Continued

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Measurements	
					Date	Discharge (cfs)
		Leech Lake River basin--Continued				
05205200	Boy River near Remer, Minn.	S½SE¼ sec.28, T.142 N., R.27 W., Cass County, at bridge on County Highway 53, about 1.5 miles upstream from Boy Lake, and about 9 miles northwest of Remer.	a310	1964-65, 1970-71	8- 9-71	80.3
		Prairie River basin				
05212200	Prairie River near Nashwauk, Minn.	W½ sec.19, T.58 N., R.23 W., Itasca County, at bridge on County Highway 336, about 10 miles northwest of Nashwauk.	a220	1964-65, 1970-71	8- 9-71	23.1
		Willow River basin				
05220670	Willow River near Hill City, Minn.	On line between secs.14 and 15, T.151 N., R.26 W., Aitkin County, at bridge on U.S. Highway 169, 6 miles south of junction of State Highway 34 and U.S. Highway 169, at south edge of Hill City.	a160	1964-65, 1970-71	8- 9-71	43.8
05221020	Willow River below Palisade, Minn.	NW¼NE¼ sec.30, T.49 N., R.25 W., Aitkin County, at bridge on County Highway 3, 3.2 miles west of Palisade.	a445	1946-48, 1953-54, 1957, 1964-65, 1970-71	8- 9-71	98.9
		Rice River basin				
05222200	Rice River at Hassman, Minn.	E½SE¼ sec.34, T.48 N., R.26 W., Aitkin County, at bridge on U.S. Highway 169, about 0.5 mile south of junction of Highways 169 and 210, at Hassman.	a284	1936, 1944-51, 1953-54, 1957, 1964-65, 1970-71	8- 9-71	8.70
		Ripple River basin				
05227480	Ripple River at Aitkin, Minn.	NE¼NE¼ sec.26, T.47 N., R.27 W., Aitkin County, at bridge on U.S. Highway 169, 0.2 mile south of intersection with U.S. Highway 210 in Aitkin, and about 0.8 mile upstream from mouth.	a125	1964-65, 1970-71	8- 9-71	20.6
		Pine River basin				
05229500	Pine River near Jenkins, Minn.	NE¼SE¼ sec.11, T.137 N., R.29 W., Crow Wing County, at bridge on County Highway 15, 0.8 mile upstream from upper Whitefish Lake, and 3.5 miles northeast of Jenkins.	a285	1964-65, 1970-71	8- 9-71	64.7
05235500	Little Pine River near Cross Lake, Minn.	SW¼SW¼ sec.33, T.137 N., R.26 W., Crow Wing County, at bridge on county road, 5 miles upstream from mouth, 6.5 miles southeast of the town of Cross Lake, and about 11 miles north of Crosby.	a195	1964-65, 1970-71	8- 9-71	22.2
		Crow Wing River basin				
05242960	Crow Wing River near Hubbard, Minn.	NE¼NE¼ sec.20, T.139 N., R.33 W., Hubbard County, at bridge on State Highway 87, at outlet of Third Crow Wing Lake, 6.6 miles east of Hubbard.	a218	1930-31, 1964-66, 1970-71	9-14-71	100
05243330	Straight River near Park Rapids, Minn.	NW¼NE¼ sec.11, T.139 N., R.35 W., Hubbard County, at bridge on U.S. Highway 71, 3.2 miles south of Park Rapids, and 3.7 miles northwest of Hubbard.	-	1970-71	9-14-71	66.4
05243730	Straight River near Hubbard, Minn.	NW¼NE¼ sec.18, T.139 N., R.34 W., Hubbard County, at bridge on State Highway 87, 0.5 mile downstream from Fishhook River, 2 miles northwest of Hubbard, and 4.4 miles southeast of Park Rapids.	a374	1964-66, 1970-71	9-14-71	98.2

a Approximately.

Discharge measurements made at low-flow partial-record stations during water year 1971--Continued

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Measurements	
					Date	Discharge (cfs)
		Crow Wing River basin--Continued				
05243740	Long Lake outlet at Hubbard, Minn.	SW¼NW¼ sec.20, T.139 N., R.34 W., Hubbard County, at bridge on State Highway 87 in Hubbard.	a22	1964-66, 1970-71	9-14-71	23.4
05243750	Shell River near Hubbard, Minn.	SW¼NW¼ sec.30, T.139 N., R.34 W., Hubbard County, at bridge on county road, just downstream from Straight River, and 1.2 miles southwest of Hubbard.	a600	1964-66, 1970-71	9-14-71	232
05244340	Leaf River near Bluffton, Minn.	SW¼NW¼ sec.6, T.134 N., R.36 W., Otter Tail County, at bridge on County Highway 143, 2.2 miles southwest of Bluffton, and 4.6 miles northeast of Deer Creek.	-	1970-71	5-14-71 9-16-71	65.2 24.2
05244360	Leaf River near Verndale, Minn.	Lat 46°29'23", long 94°53'00", on line between secs.19 and 20, T.135 N., R.34 W., Wadena County, at bridge on County Highway 22, 6.4 miles north of Verndale.	-	1964-66, 1968-71	5-13-71 9-15-71	124 59.8
05244370	Wing River near Hewitt, Minn.	Lat 46°21'16", long 95°05'35", on line between secs.3 and 4, T.133 N., R.35 W., Todd County, at bridge on county road, 2 miles north of Hewitt.	-	1967-71	5-13-71 9-15-71	29.8 18.5
05244380	Wing River near Verndale, Minn.	SE¼NW¼ sec.26, T.134 N., R.35 W., Wadena County, at County Highway 1, 2.5 miles west of Verndale.	-	1967-71	5-13-71 9-15-71	35.1 22.3
05244390	Wing River at Verndale, Minn.	SW¼NW¼ sec.19, T.134 N., R.34 W., Wadena County, at bridge on County Highway 111, 1 mile northwest of Verndale.	-	1967-71	5-13-71 9-15-71	39.1 31.0
05244400	Wing River below Verndale, Minn.	Lat 46°26'28", long 95°00'02", on line between secs.5 and 8, T.134 N., R.34 W., Wadena County, at bridge on County Highway 4, 3.1 miles north of Verndale.	-	1964-71	5-13-71 9-15-71	45.2 30.8
05244403	Wing River near Wadena, Minn.	SE¼SE¼ sec.29, T.135 N., R.35 W., Wadena County, at bridge on county road, 1 mile upstream from mouth, 5 miles north of Verndale, and 7 miles northeast of Wadena.	-	1967-71	5-13-71 9-15-71	51.6 31.5
05244410	Redeye River at Sebeka, Minn.	NE¼NE¼ sec.4, T.136 N., R.35 W., Wadena County, at bridge on U.S. Highway 71 in Sebeka.	-	1968-71	9-16-71	17.3
05244420	Redeye River near Aldrich, Minn.	Lat 46°29'55", long 94°54'30", on line between secs.13 and 24, T.135 N., R.34 W., Wadena County, at County Highway 7, 1.5 miles upstream from mouth, 3.5 miles north of Central, and 8.5 miles north of Aldrich.	-	1964-66, 1968-71	5-14-71 9-15-71	72.6 31.9
05244440	Leaf River near Aldrich, Minn.	SW¼SW¼ sec.34, T.135 N., R.33 W., Wadena County, at bridge on County Highway 29, 7 miles northeast of Aldrich.	-	1965, 1968-71	5-14-71 9-15-71	279 142
05244470	Partridge River near Aldrich, Minn.	Lat 46°24'58", long 94°50'24", in NW¼SW¼ sec.15, T.134 N., R.33 W., Wadena County, on County Highway 29, about 0.8 mile upstream from mouth, and 5.5 miles northeast of Aldrich.	-	1964-66, 1969-71	5-14-71 9-15-71	19.4 12.0
05244540	Mosquito Creek at Motley, Minn.	E½SW¼ sec.7, T.133 N., R.31 W., Cass County, at U.S. Highway 210, and about 0.2 mile upstream from mouth, at Motley.	-	1964-66, 1970-71	9-16-71	3.75
05245200	Eagle Creek at Browerville, Minn.	SE¼SW¼ sec.5, T.130 N., R.33 W., Todd County, at bridge on County Highway 21, in Browerville, and 0.5 mile upstream from mouth.	-	1970-71	9-16-71	7.14

a Approximately.

Discharge measurements made at low-flow partial-record stations during water year 1971--Continued

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Measurements	
					Date	Discharge (cfs)
		Sauk River basin				
05270130	Ashley Creek at Westport, Minn.	Lat 45°43'07", long 95°09'36", on line between secs.14 and 15, T.126 N., R.36 W., Pope County, at bridge on county road, 0.7 mile northwest of Westport.	-	1970-71	5-12-71	13.4
		Johnson Creek basin				
*05272300	Johnson Creek near St. Augusta, Minn.	Lat 45°27'49", long 94°09'19", in NW¼SW¼ sec.13, T.123 N., R.28 W., Stearns County, at bridge on County Highway 7, 1.0 mile south of St. Augusta, and 3.3 miles upstream from mouth.	46.7	1964-65, 1967-71	5-13-71	17.3
		Crow River basin				
05275970	North Fork Crow River near Georgeville, Minn.	Lat 45°29'07", long 94°55'37", in SE¼SE¼ sec.3, T.123 N., R.34 W., Stearns County, at bridge on County Highway 32, 2 miles east of U.S. Highway 71, and 4 miles north of Georgeville.	-	1970-71	5-12-71 9-20-71	43.8 6.98
05276000	North Fork Crow River near Regal, Minn.	Lat 45°22'45", long 94°47'40", in S½ sec. 11, T.122 N., R.33 W., Kandiyohi County, at bridge on county road, 3 miles southeast of Regal.	215	1943-54≠, 1955, 1969-71	5-12-71	48.1
05277050	Grove Creek near Manannah, Minn.	Lat 45°14'23", long 94°36'26", on line between sec.6, T.120 N., R.31 W., and sec.32, T.121 N., R.31 W., Meeker County, at County Highway 46, 1.1 miles southeast of Manannah, and 8.5 miles northwest of Litchfield.	-	1969-71	8- 5-71 9-20-71 9-21-71	6.12 2.72 2.55
05278100	North Fork Crow River at Forest City, Minn.	NW¼NE¼ sec.17, T.120 N., R.30 W., Meeker County, at County Highway 2, 0.1 mile north of Forest City.	-	1969, 1971	9-20-71	78.4
05278150	Washington Creek near Kingston, Minn.	NW¼NE¼ sec.34, T.120 N., R.29 W., Meeker County, at County Highway 21, 2.1 miles south of Kingston.	-	1969, 1971	9-21-71	3.41
05278340	North Fork Crow River near Delano, Minn.	Lat 45°05'22", long 93°52'07", in NW¼NW¼ sec.29, T.119 N., R.25 W., Wright County, at State Highway 25, 5 miles upstream from confluence with South Fork, 5 miles northwest of Delano, and 5.2 miles south of Buffalo.	-	1969-71	8- 5-71 9-21-71 9-21-71	453 146 146
05278590	South Fork Crow River at Biscay, Minn.	Lat 44°50'11", long 94°17'16", in SE¼SW¼ sec.23, T.116 N., R.29 W., McLeod County, at State Highway 22, 1 mile northwest of Biscay.	-	1969, 1971	9-21-71	27.1
05278830	Buffalo Creek near Buffalo Lake, Minn.	Lat 44°46'05", long 94°32'55", in center of sec.15, T.115 N., R.31 W., Renville County, at bridge on County Highway 25, just upstream from tributary entering on right bank, 2 miles northwest of Stewart, and 2 miles northeast of the town of Buffalo Lake.	-	1969-71	11-17-70 8- 5-71 9-20-71 9-21-71	78.9 11.3 1.84 1.65
05278835	Buffalo Creek tributary No. 2 near Buffalo Lake, Minn.	Lat 44°46'05", long 94°32'55", in center of sec.15, T.115 N., R.31 W., Renville County, at mouth, just downstream from bridge over Buffalo Creek on County Highway 25, 2 miles northwest of Stewart, and 2 miles northeast of the town of Buffalo Lake.	-	1969-71	11-17-70 8- 5-71 9-20-71	66.4 5.24 2.67
05278950	Buffalo Creek near Plato, Minn.	Lat 44°48'03", long 94°02'24", at center of N½ sec.2, T.115 N., R.27 W., McLeod County, at bridge on County Highway 9, 2 miles north of Plato, 5 miles upstream from mouth, and 6 miles northeast of Glencoe.	-	1969-71	11-17-70 8- 6-71 9-21-71	400 39.7 7.22

* Also a crest-stage partial-record station.
≠ Operated as a continuous-record gaging station.

Discharge measurements made at low-flow partial-record stations during water year 1971--Continued

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Measurements	
					Date	Discharge (cfs)
		Minnesota River basin				
05303280	East Branch Chippewa River at Terrace, Minn.	Lat 45°30'34", long 95°19'24", in SW¼NE¼ sec.33, T.124 N., R.37 W., Pope County, at bridge on State Highway 104, at west edge of Terrace.	-	1970-71	5-12-71	33.3
*05305200	Spring Creek near Montevideo, Minn.	Lat 44°58'41", long 95°42'57", in NW¼NW¼ sec.5, T.117 N., R.40 W., Chippewa County, at culvert on State Highway 29, 1.2 miles upstream from mouth, and 2.0 miles north of Montevideo.	16.0	1960-62, 1964-65, 1967-71	10-20-70 11-18-70 6- 3-71 7-12-71 9-16-71	2.00 7.26 4.99 5.25 1.03
05317830	Coon Creek near Blue Earth, Minn.	On line between secs.20 and 29, T.102 N., R.27 W., Faribault County, at bridge on county road (South Ramsey St. extended), 0.25 mile upstream from mouth, and 1.8 miles south of Blue Earth.	-	1969-71	8-18-71	.39
05317840	Badger Creek near Blue Earth, Minn.	N½ sec.13, T.102 N., R.20 W., Faribault County, at bridge on county road, 1.2 miles upstream from mouth, and 1.25 miles west of Blue Earth.	-	1969-71	8-18-71	.31
05318000	East Branch Blue Earth River near Bricelyn, Minn.	Lat 43°37'50", long 93°47'25", in NE¼NE¼ sec.23, T.102 N., R.25 W., Faribault County, at bridge on county road, 2 miles upstream from Brush Creek, 3 miles downstream from South Walnut Lake, and 5 miles northeast of Bricelyn.	132	1951-70≠, 1971	10-27-70	66.4
05318120	East Branch Blue Earth River at Blue Earth, Minn.	Lat 43°38'58", long 94°06'10", in NE¼SW¼ sec.8, T.102 N., R.27 W., Faribault County, at bridge on U.S. Highway 169 in Blue Earth.	-	1969-70	8-18-71	6.60
05318160	Lily Creek near Fairmont, Minn.	On line between sec.31, T.103 N., R.30 W., and sec.36, T.103 N., R.31 W., Martin County, at bridge on County Highway 14, 1 mile upstream from mouth, and 2.3 miles northwest of Fairmont.	-	1969-70	8-19-71	0
05318200	Elm Creek near Trimont, Minn.	W½ sec.3, T.103 N., R.32 W., Martin County, at bridge on county road, 0.1 mile east of County Highway 52, and 3 miles east of Trimont.	-	1969, 1971	8-19-71	0
05318220	Cedar Creek near Trimont, Minn.	On line between secs.34 and 35, T.104 N., R.32 W., Martin County, at bridge on County Highway 52, 1 mile upstream from mouth, and 3 miles east of Trimont.	-	1969-71	8-19-71	0
05318900	South Fork Watonwan River near Ormsby, Minn.	NW¼SE¼ sec.21, T.105 N., R.32 W., Watonwan County, at bridge on State Highway 4, 2.5 miles north of Ormsby.	-	1969-71	8-19-71	b.5
05320020	Le Sueur River near New Richland, Minn.	Near center of N½ sec.34, T.106 N., R.22 W., Waseca County, at bridge on County Highway 56, 3.75 miles northeast of New Richland.	-	1969, 1971	8-18-71	.78
05320040	Boot Creek near New Richland, Minn.	On line between sec.6, T.105 N., R.22 W., and sec.31, T.106 N., R.22 W., Waseca County, at bridge on county road, 0.5 mile upstream from mouth, and 2 miles northwest of New Richland.	-	1969, 1971	8-18-71	.22
05320060	Little Le Sueur River near Wilton, Minn.	SE¼NE¼ sec.7, T.106 N., R.22 W., Waseca County, at bridge on County Highway 51, 0.25 miles upstream from mouth, and 1.5 miles southeast of Wilton.	-	1969, 1971	8-18-71	1.40
05326400	Rush River near Henderson, Minn.	NW¼NW¼ sec.24, T.112 N., R.26 W., Sibley County, at bridge on State Highway 93, 0.4 mile upstream from mouth, and 2 miles south of Henderson.	a397	1970-71	8-19-71	13.4

* Also a crest-stage partial-record station.
≠ Operated as a continuous-record gaging station.
a Approximately.
b Estimated.

Discharge measurements made at low-flow partial-record stations during water year 1971--Continued

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Measurements	
					Date	Discharge (cfs)
		St. Croix River basin				
05336280	Moose River at Barnum, Minn.	NE¼NW¼ sec.1, T.46 N., R.19 W., Carlton County, at bridge on old U.S. Highway 61, at Barnum.	-	1967, 1971	9-21-71	6.03
		Vermillion River basin				
05345000	Vermillion River near Empire City, Minn.	Lat 44°40'00", long 93°03'17", on line between secs.23 and 24, T.114 N., R.19 W., Dakota County, at bridge on County Highway 79, 2 miles northwest of Empire City, and 3.7 miles southwest of Coates.	110	1942-45≠, 1969-71	10-16-70 11-20-70 12-17-70 1-20-71 2-19-71 3-26-71 8- 9-71	33.5 70.1 39.4 33.9 33.2 88.0 33.0
05346000	Vermillion River at Hastings, Minn.	Lat 44°43'12", long 92°51'57", in SE¼SW¼ sec.33, T.115 N., R.17 W., Dakota County, at bridge on County Highway 47 in Hastings, 0.7 mile upstream from mill dam, and 3 miles upstream from Vermillion Slough.	195	1935-38, 1940-41, 1942-47≠, 1949, 1952, 1965-71	10-16-70 11-20-70 12-17-70 1-20-71 2-19-71 8-10-71	56.1 104 66.5 35.4 38.0 45.0
		Cannon River basin				
05352810	Turtle Creek near Owatonna, Minn.	On line between secs.32 and 33, T.107 N., R.20 W., Steele County, at bridge on county road, 0.7 mile upstream from mouth, and 3.7 miles south of Owatonna.	41.1	1969-71	8- 6-71	.47
05352900	Maple Creek at Owatonna, Minn.	Lat 44°05'42", long 93°13'24", in NW¼NW¼ sec.10, T.107 N., R.20 W., Steele County, at Elm Street bridge in Owatonna, 0.3 mile upstream from mouth.	39.0	1969-71	8- 6-71	1.98
05354600	Wolf Creek near Dundas, Minn.	On line between secs.21 and 22, T.111 N., R.20 W., Rice County, at bridge on County Highway 8, 1.5 miles southwest of Dundas.	a43	1969-71	8- 6-71	1.04
05355020	Heath Creek at Northfield, Minn.	NW¼SE¼ sec.2, T.111 N., R.20 W., Rice County, at bridge on County Highway 78 in Northfield.	a38	1965, 1969-71	8- 6-71	.36
05355040	Chub Creek at Randolph, Minn.	Lat 44°31'25", long 93°01'48", in N½ sec.7, T.112 N., R.18 W., Dakota County, at bridge on County Highway 94, at west boundary of Randolph.	a86	1965, 1969-71	8- 6-71	8.93
05355060	Spring Creek near Cannon Falls, Minn.	NE¼SW¼ sec.16, T.112 N., R.18 W., Goodhue County, at bridge on county road, 4.4 miles west of Cannon Falls.	a11	1969-71	8- 5-71	.84
05355080	Prairie Creek near Cannon Falls, Minn.	On line between secs.21 and 28, T.112 N., R.18 W., Goodhue County, at bridge on State Highway 19, 4.5 miles southwest of Cannon Falls.	a86	1966-71	11-20-70	66.4
05355140	Little Cannon River near Cannon Falls, Minn.	Lat 44°28'24", long 92°55'53", in SW¼ sec.25, T.112 N., R.18 W., Goodhue County, at bridge on county road, 2.5 miles south of Cannon Falls.	a89	1966-71	11-20-70	86.5
05355215	Belle Creek near Vasa, Minn.	SE¼ sec.4, T.112 N., R.16 W., Goodhue County, at bridge on County Highway 7, 2 miles north of Vasa.	a75	1966-71	11-23-70	30.7
		Spring Creek basin				
05355260	Spring Creek near Red Wing, Minn.	On line between secs.27 and 28, T.113 N., R.15 W., Goodhue County, at bridge on County Highway 53, 4 miles west of Red Wing.	-	1969-71	8-13-71	4.92
		Hay Creek basin				
05355280	Hay Creek at Red Wing, Minn.	Lat 44°38'08", long 92°33'45", in SE¼NW¼ sec.36, T.113 N., R.15 W., Goodhue County, at bridge on county road in Red Wing.	a48	1969-71	8-13-71	19.3

≠ Operated as a continuous-record gaging station.
a Approximately.

Discharge measurements made at low-flow partial-record stations during water year 1971--Continued

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Measurements	
					Date	Discharge (cfs)
		Wells Creek basin				
05355350	Wells Creek near Frontenac, Minn.	NE¼NW¼ sec.13, T.112 N., R.14 W., Goodhue County, at bridge on county road leading to Old Frontenac, 1.2 miles south of Old Frontenac, and 1.6 miles east of Frontenac.	-	1969-71	8-13-71	21.8
05355370	Miller Creek near Lake City, Minn.	NW¼SE¼ sec.8, T.111 N., R.12 W., Wabasha County, at bridge on County Highway 9, 1.3 miles south of Lake City.	-	1969-71	8-12-71	2.58
		Zumbro River basin				
05372930	Bear Creek at Rochester, Minn.	Lat 44°00'29", long 92°26'44", in SW¼SE¼ sec.1, T.106 N., R.14 W., Olmsted County, at bridge on U.S. Highways 14 and 52, in Rochester, and 1.2 miles upstream from mouth.	80.0	1965, 1968-71	8-10-71	38.4
05372950	Silver Creek at Rochester, Minn.	Lat 44°01'44", long 92°28'18", near center of sec.31, T.107 N., R.14 W., Olmsted County, at bridge on county road at east edge of Rochester, 1.7 miles upstream from mouth.	17.3	1968-71	8-11-71	4.85
05372990	Cascade Creek at Rochester, Minn.	Lat 44°01'51", long 92°28'18", in SE¼NW¼ sec.35, T.107 N., R.14 W., Olmsted County, at bridge on 7th Street N.W. in Rochester, 0.6 mile upstream from mouth.	37.0	1965, 1967-69, 1971	8-10-71	3.69
05373100	Milliken Creek near Concord, Minn.	SW¼NE¼ sec.29, T.108 N., R.16 W., Dodge County, at bridge on County Highway 22, 3.5 miles southeast of Concord.	-	1970-71	8-10-71	1.09
05373130	North Branch Middle Fork Zumbro River at Pine Island, Minn.	W½ sec.32, T.109 N., R.15 W., Goodhue County, at bridge on Main Street in Pine Island, 0.25 mile upstream from Middle Fork Zumbro River.	-	1967, 1970-71	8-11-71	8.35
05373150	Middle Fork Zumbro River near Oronoco, Minn.	Lat 44°10'10", long 92°34'24", at center of SW¼ sec.12, T.109 N., R.15 W., Olmsted County, at bridge on County Highway 31, 2 miles west of Oronoco.	-	1969-71	8-11-71	32.6
05373200	Dodge Center Creek near Dodge Center, Minn.	Lat 44°01'48", long 92°53'14", in SW¼NE¼ sec.32, T.107 N., R.17 W., Dodge County, at bridge on County Road H, 1.5 miles west of Dodge Center.	-	1970-71	8-10-71	3.84
05373290	South Branch Middle Fork Zumbro River near Oronoco, Minn.	NW¼SW¼ sec.23, T.108 N., R.14 W., Olmsted County, at bridge on County Highway 3, 3.5 miles southwest of Oronoco.	-	1969-71	8-11-71	26.8
05373400	Dry Run Creek near Oronoco, Minn.	NW¼NE¼ sec.4, T.108 N., R.14 W., Olmsted County, at bridge on county road, 2 miles northeast of Oronoco.	-	1970-71	8-11-71	4.38
05373850	North Fork Zumbro River at Mazeppa, Minn.	Lat 44°16'00", long 92°32'58", in NW¼NW¼ sec.7, T.109 N., R.14 W., Wabasha County, at bridge on County Highway 1, at the southwest edge of Mazeppa.	-	1969-71	8-12-71	37.2
05373950	Trout Brook near Mazeppa, Minn.	Near center of sec.5, T.109 N., R.14 W., Wabasha County, at bridge on State Highway 60, 1.3 miles east of Mazeppa.	-	1969-71	8-12-71	12.7
05373995	Cold Creek at Zumbro Falls, Minn.	SE¼NE¼ sec.36, T.109 N., R.14 W., Wabasha County, at triple box culvert on State Highway 60, 0.2 mile upstream from mouth, and 0.6 mile northwest of Zumbro Falls.	45.9	1916, 1969-71	8-12-71	11.0
05374420	Long Creek near Millville, Minn.	SE¼SW¼ sec.3, T.109 N., R.12 W., Wabasha County, at bridge on new road along the right bank of the Zumbro River, about 3.2 miles northeast of Millville.	-	1970-71	8-12-71	7.16

Discharge measurements made at low-flow partial-record stations during water year 1971--Continued

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Measurements	
					Date	Discharge (cfs)
		Zumbro River basin--Continued				
05374450	Middle Creek near Theilman, Minn.	On line between secs.2 and 11, T.109 N., R.12 W., Wabasha County, at bridge on county road, 2.5 miles southwest of Theilman, and 3.7 miles northeast of Millville.	-	1970-71	8-12-71	4.58
05374480	Spring Creek near West Albany, Minn.	N½SW¼ sec.27, T.110 N., R.12 W., Wabasha County, at bridge on County Highway 11, 0.8 mile upstream from mouth, and 2.2 miles east of West Albany.	-	1969-71	8-12-71	11.4
05374520	West Indian Creek at Theilman, Minn.	SW¼NW¼ sec.31, T.110 N., R.11 W., Wabasha County, at bridge on County Highway 4, 0.5 mile east of Theilman.	-	1970-71	8-12-71	8.75
		Gorman Creek basin				
05375000	Gorman Creek near Kellogg, Minn.	On line between secs.34 and 35, T.110 N., R.10 W., Wabasha County, at bridge on U.S. Highway 61, 1.1 miles south of Kellogg.	-	1969-71	8-20-71	.93
		Whitewater River basin				
05376200	Middle Fork Whitewater River at Elba, Minn.	SW¼SE¼ sec.9, T.107 N., R.10 W., Winona County, at bridge on State Highway 74, at Elba, 0.5 mile south of North Fork Whitewater River bridge on State Highway 74, and 0.4 mile upstream from confluence with North Fork.	53.4	1969-71	8-20-71	23.6
05377510	Whitewater River at Weaver, Minn.	Lat 44°12'42", long 91°55'36", in SE¼SW¼ sec.29, T.109 N., R.9 W., Wabasha County, at highway bridge on old U.S. Highway 61, 100 ft upstream from new Route 61 bridge, 0.6 mile southeast of Weaver.	-	1932-33, 1935-42, 1944, 1971	5-10-71 8-20-71	178 116
		Garvin Brook basin				
05378240	Garvin Brook at Minnesota City, Minn.	On line between secs.10 and 11, T.107 N., R.8 W., Winona County, at bridge on one-lane road, 0.6 mile southwest of Minnesota City.	-	1935-37, 1939, 1969-71	8-19-71	20.6
05378400	Rollingstone Creek near Minnesota City, Minn.	NW¼SW¼ sec.3, T.107 N., R.8 W., Winona County, at bridge on county road, 1.4 miles west of Minnesota City.	-	1969-71	8-19-71	19.6
05379000	Gilmore Creek at Winona, Minn.	SE¼NW¼ sec.29, T.107 N., R.7 W., Winona County, at highway bridge 2,300 ft upstream from U.S. Highway 14 in Winona.	8.95	1940-63≠, 1964-65, 1971	5-10-71 8-19-71	2.73 1.90
		Burns Valley Creek basin				
05379050	Burns Valley Creek at Winona, Minn.	On line between secs.35 and 36, T.107 N., R.7 W., Winona County, at bridge on County Highway 17, at southeast edge of Winona.	-	1967-71	8-19-71	5.94
		Pleasant Valley Creek basin				
05379090	Pleasant Valley Creek at Winona, Minn.	On line between sec.36, T.107 N., R.7 W., and sec.1, T.106 N., R.7 W., Winona County, at bridge on County Highway 15, at southeast edge of Winona.	-	1967-71	8-19-71	5.78
		Pine Creek basin				
05383520	Pine Creek at La Crescent, Minn.	On line between secs.9 and 16, T.104 N., R.4 W., Houston County, at bridge on County Highway 25, 1 mile southwest of La Crescent.	-	1971	5-10-71 8-19-71	26.7 25.5

≠ Operated as a continuous-record gaging station.

Discharge measurements made at low-flow partial-record stations during water year 1971--Continued

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Measurements	
					Date	Discharge (cfs)
		Root River basin				
05383740	North Branch Root River near Chatfield, Minn.	Lat 43°49'21", long 92°10'24", in SE¼SE¼ sec.8, T.104 N., R.11 W., Fillmore County, at bridge on County Highway 5, 1.6 miles upstream from confluence with Middle Branch, and 1.7 miles southeast of Chatfield.	a225	1969-71	8-17-71	40.2
05383900	Middle Branch Root River near Chatfield, Minn.	Lat 43°48'24", long 92°11'18", on line between secs.17 and 18, T.104 N., R.11 W., Fillmore County, at bridge on County Highway 7, 1 mile upstream from confluence with North Branch, and 2.7 miles south of Chatfield.	a250	1969-71	8-17-71	37.2
05383940	Trout Creek near Pilot Mound, Minn.	On line between secs.8 and 17, T.104 N., R.10 W., Fillmore County, at bridge on State Highway 30, 1.3 miles west of Pilot Mound.	-	1971	5-11-71 8-17-71	29.2 27.6
05384120	South Branch Root River at Lanesboro, Minn.	Lat 43°43'19", long 91°58'43", in NW¼SE¼ sec.13, T.103 N., R.10 W., Fillmore County, at West Coffe St. bridge leading to ball park (bridge closed), in Lanesboro, 2.5 miles upstream from mouth.	a297	1915, 1940-42, 1950, 1965-69, 1971	8-17-71	85.2
05384450	Pine Creek near Rushford, Minn.	NW¼SE¼ sec.32, T.105 N., R.8 W., Winona County, at bridge on County Highway 2, 4.5 miles northwest of Rushford.	a49	1971	5-11-71 8-18-71	15.7 11.8
05384900	Money Creek near Houston, Minn.	NE¼SE¼ sec.19, T.104 N., R.6 W., Houston County, at bridge on State Highway 76, 2.4 miles northwest of Houston.	a78	1969-71	8-18-71	25.0
05385300	Riceford Creek at Yucatan, Minn.	SW¼NW¼ sec.33, T.103 N., R.7 W., Houston County, at bridge on County Highway 15, 0.4 miles east of Yucatan.	-	1971	5-11-71 8-18-71	33.1 25.5
05385400	Beaver Creek near Sheldon, Minn.	NW¼SE¼ sec.19, T.103 N., R.6 W., Houston County, at bridge on County Highway 10, 2 miles north of Sheldon.	-	1971	5-11-71 8-18-71	25.0 23.9
05386050	Silver Creek near Houston, Minn.	NE¼ sec.25, T.104 N., R.6 W., Houston County, at bridge on County Highway 21, 4 miles northeast of Houston.	-	1971	5-11-71 8-18-71	9.01 7.29
		Crooked Creek basin				
05387040	Crooked Creek at Reno, Minn.	W½SE¼ sec.35, T.102 N., R.4 W., Houston County, at bridge on State Highway 26, 0.8 mile southwest of Reno.	-	1971	5-10-71 8-19-71	30.4 27.6
		Winnebago Creek basin				
05387200	Winnebago Creek near New Albin, Iowa	SW¼SW¼ sec.27, T.101 N., R.3 W., Houston County, at bridge on County Highway 5, 1.3 miles northwest of New Albin.	a85	1969-71	8-19-71	33.2
		Upper Iowa River basin				
05387240	Upper Iowa River near Le Roy, Minn.	Lat 43°31'38", long 92°32'12", NW¼NE¼ sec.29, T.101 N., R.14 W., Mower County, at bridge on county road, 2 miles northwest of Le Roy.	-	1971	5-11-71 9-15-71	8.25 2.37
05387270	Beaver Creek near Le Roy, Minn.	On line between secs.33 and 34, T.101 N., R.13 W., Fillmore County, at bridge on State Highway 56, about 1.5 miles northwest of Chester, Iowa, and 5.8 miles east of Le Roy.	-	1971	5-11-71 9-16-71	5.43 .84
		Iowa River basin				
05455900	Cedar River near Blooming Prairie, Minn.	Lat 43°51'47", long 93°00'24", on line between secs.29 and 32, T.105 N., R.18 W., Dodge County, at bridge on County Highway 2, 2.1 miles east of Blooming Prairie.	-	1971	5-12-71 9- 8-71 9-14-71	10.6 1.05 1.23

a Approximately.

Discharge measurements made at low-flow partial-record stations during water year 1971--Continued

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Measurements	
					Date	Discharge (cfs)
		Iowa River basin--Continued				
05455930	Roberts Creek near Lansing, Minn.	On line between secs.1 and 2, T.103 N., R.18 W., Mower County, at bridge on county road, 0.2 mile upstream from mouth, and 1.4 miles northeast of Lansing.	-	1969, 1971	9- 8-71 9-14-71	.61 .96
05455960	Wolf Creek at Austin, Minn.	SW¼SE¼ sec.26, T.103 N., R.18 W., Mower County, at bridge on County Highway 25, in Todd Park at Austin, and 0.3 mile upstream from mouth.	-	1969, 1971	9- 8-71 9-14-71	.73 .56
05456500	Turtle Creek near Austin, Minn.	Lat 43°41'05", long 93°02'15", in NE¼NW¼ sec.31, T.103 N., R.18 W., Mower County, at bridge on county road, 3 miles northwest of Austin, and 5.6 miles upstream from mouth.	144	1946, 1947-51≠, 1969, 1971	9- 8-71 9-14-71	4.69 10.4
05457160	Rose Creek near Austin, Minn.	On line between secs.26 and 27, T.102 N., R.18 W., Mower County, at bridge on County Highway 29, 0.3 mile upstream from mouth, and 3.8 miles south of Austin.	-	1969, 1971	9-14-71	5.34
05457220	Woodbury Creek near Lyle, Minn.	On line between secs.32 and 33, T.101 N., R.18 W., Mower County, at bridge on State Highway 105, 3.3 miles west of Lyle.	-	1971	5-12-71 9-14-71	9.65 1.87
05457280	Otter Creek at Lyle, Minn.	SE¼SE¼ sec.36, T.101 N., R.18 W., Mower County, at bridge on county road on Minnesota-Iowa border in Lyle.	-	1971	5-12-71 9-15-71	13.2 4.49
05457780	Little Cedar River near Johnsburg, Minn.	SE¼SE¼ sec.33, T.101 N., R.16 W., Mower County, at bridge on county road on Minnesota-Iowa border, 1.1 miles southeast of Johnsburg.	-	1971	5-12-71 9-15-71	11.3 3.38
05458970	Shell Rock River at Gordonsville, Minn.	Lat 43°30'51", long 93°16'06", on line between secs.29 and 32, T.101 N., R.20 W., Freeborn County, at bridge on County Highway 1, 0.8 mile west of Gordonsville.	-	1971	5-12-71 9-15-71	83.6 11.6
05458975	Goose Creek near Gordonsville, Minn.	SE¼ sec.31, T.101 N., R.20 W., Freeborn County, at bridge on County Highway 1, 1.1 miles southwest of Gordonsville.	-	1971	5-12-71 9-15-71	20.3 1.59
05459040	Lime Creek near Emmons, Minn.	Lat 43°30'00", long 93°33'29", in SW¼SE¼ sec.35. T.101 N., R.23 W., Freeborn County, at bridge on County Highway 60, 3.5 miles west of Emmons.	-	1971	5-12-71 9-15-71	27.9 2.71
		Des Moines River basin				
05476990	East Fork Des Moines River near Ceylon, Minn.	On line between secs.11 and 12, T.101 N., R.32 W., Martin County, at bridge on County Highway 67, 2.4 miles north of Ceylon.	-	1971	5-13-71	21.7
		Big Sioux River basin				
06480600	Flandreau Creek near Cazenovia, Minn.	NE¼NW¼ sec.13, T.107 N., R.47 W., Pipestone County, at bridge on County Highway 13, 3.5 miles northwest of Cazenovia.	-	1971	5-13-71	2.95
06482560	Pipestone Creek near Pipestone, Minn.	On line between secs.13 and 24, T.106 N., R.47 W., Pipestone County, at bridge on County Highway 55, 6.1 miles southwest of Pipestone.	-	1971	5-13-71	5.46
06483000	Rock River at Luverne, Minn.	NE¼SE¼ sec.11, T.102 N., R.45 W., Rock County, at dam at Main Street in Luverne.	440	1911-14≠, 1967-71	7-27-71	24.2

≠ Operated as a continuous-record gaging station.

Discharge measurements made at low-flow partial-record stations during water year 1971--Continued

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Measurements	
					Date	Discharge (cfs)
		Big Sioux River basin--Continued				
06483355	Little Rock River near Bigelow, Minn.	SE¼SW¼ sec.35, T.101 N., R.42 W., Nobles County, at bridge on county road on Minnesota-Iowa border, 8 miles west of Bigelow.	-	1971	5-13-71	5.66
		Little Sioux River basin				
06603690	West Fork Little Sioux River near Sioux Valley, Minn.	SE¼SE¼ sec.33, T.101 N., R.37 W., Jackson County, at bridge on County Highway 62, 3.3 miles southeast of Sioux Valley.	-	1971	5-13-71	18.8

Crest-stage partial-record stations

The following table contains annual maximum discharge for crest-stage stations. A crest-stage is a device which will register the peak stage occurring between inspections of the gage. A stage-discharge relation for each gage is developed from discharge measurements made by indirect measurements of peak flow or by current meter. The date of the maximum discharge is not always certain but is usually determined by comparison with nearby continuous-record stations, weather records, or local inquiry. Only the maximum discharge for each water year is given. Information on some lower floods may have been obtained, and discharge measurements may have been made for purposes of establishing the stage-discharge relation, but these are not published herein. The years given in the period of record represent water years for which the annual maximum has been determined.

Annual maximum discharge at crest-stage partial-record stations during water year 1971

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Annual maximum		
					Date	Gage height (feet)	Discharge (cfs)
		Streams tributary to Lake Superior					
04011370	Little Devil Track River near Grand Marais, Minn.	Lat 47°47'09", long 90°19'44", in NE¼NW¼ sec.9, T.61 N., R.1 E., Cook County, at culvert on County Highway 12, 1.6 miles upstream from mouth, and 2.5 miles north of Grand Marais.	7.49	1961-71	10-27-70	19.24	273
04011390	Little Devil Track River tributary near Grand Marais, Minn.	Lat 47°47'17", long 90°19'20", in SE¼SE¼ sec.4, T.61 N., R.1 E., Cook County, at culvert on County Highway 55, 0.2 mile upstream from mouth, and 2.8 miles north of Grand Marais.	.47	1966-71	10-27-70	16.31	28
04013100	Lake Superior tributary near Taconite Harbor, Minn.	Lat 47°29'14", long 90°59'19", in SW¼SE¼ sec.20, T.58 N., R.5 W., Cook County, at culvert on U.S. Highway 61, 0.2 mile upstream from mouth, and 3.7 miles southwest of Taconite Harbor.	1.56	1964-71	10-27-70	12.28	188
04013200	Caribou River near Little Marais, Minn.	Lat 47°27'51", long 91°01'50", in NW¼SE¼ sec.36, T.58 N., R.6 W., Lake County, at culvert on U.S. Highway 61, 0.2 mile upstream from mouth, and 5.2 miles northeast of Little Marais.	22.7	1961-71	10-27-70	16.63	1,320
04015150	Crow Creek near Silver Creek, Minn.	Lat 47°08'30", long 91°34'38", in SW¼SW¼ sec.23, T.54 N., R.10 W., Lake County, at culvert on County Highway 3, 2.3 miles northeast of Silver Creek, and 4.0 miles upstream from mouth.	1.07	1960-71	4-12-71	a9.30	30
04015200	Encampment River tributary at Silver Creek, Minn.	Lat 47°07'01", long 91°36'04", in NE¼SE¼ sec.33, T.54 N., R.10 W., Lake County, at culvert on County Highway 3, 0.3 mile north of Silver Creek, and 1.4 miles upstream from mouth.	.96	1960-71	4-11-71	a8.81	45
04015250	Silver Creek tributary near Two Harbors, Minn.	Lat 47°04'40", long 91°36'49", in SW¼NE¼ sec.16, T.53 N., R.10 W., Lake County, at culvert on County Highway 3, 1.0 mile upstream from mouth, and 4.5 miles northeast of Two Harbors.	3.72	1965-71	10-27-70	5.21	206
04015300	Little Stewart River near Two Harbors, Minn.	Lat 47°03'52", long 91°40'03", in SE¼NE¼ sec.24, T.53 N., R.11 W., Lake County, at culvert on county highway, 2.0 miles upstream from mouth, and 2.7 miles north of Two Harbors.	5.54	1960-71	4-11-71	a12.72	207
04015360	Lake Superior tributary No. 2 at French River, Minn.	Lat 46°53'43", long 91°54'31", in SW¼SE¼ sec.18, T.51 N., R.12 W., St. Louis County, at culvert on U.S. Highway 61, 0.35 mile upstream from mouth, and 0.7 mile west of French River.	1.41	1964-71	4-11-71	a18.89	80
04015370	Talmadge River at Duluth, Minn.	Lat 46°53'20", long 91°55'21", in SE¼NE¼ sec.24, T.51 N., R.13 W., St. Louis County, at culvert on U.S. Highway 61, 0.6 mile upstream from mouth, and 0.5 mile northeast of Duluth city limits.	5.79	1964-71	4-11-71	15.33	358
04015400	Miller Creek at Duluth, Minn.	Lat 46°49'01", long 92°10'42", in SE¼NE¼ sec.13, T.50 N., R.15 W., St. Louis County, at culvert on U.S. Highway 53, 0.2 mile northwest of Duluth city limits.	4.92	1960-71	4-11-71	16.83	254
04017700	McKinley Lake tributary at McKinley, Minn.	Lat 47°30'41", long 92°25'11", in SW¼NE¼ sec.18, T.58 N., R.16 W., St. Louis County, at culvert on State Highway 135 at west edge of McKinley.	b.37	1960-71	6-20-71	8.47	17
04018800	East Two River tributary at Virginia, Minn.	Lat 47°31'54", long 92°33'51", in NE¼NE¼ sec.12, T.58 N., R.18 W., St. Louis County, at culvert on U.S. Highway 169, 0.2 mile west of Virginia city limits, and 1.1 miles upstream from mouth.	4.26	1959-71	4-16-71	a7.07	74

a Backwater from ice.
b Revised.

Annual maximum discharge at crest-stage partial-record stations during water year 1971--Continued

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Annual maximum		
					Date	Gage height (feet)	Discharge (cfs)
		Streams tributary to Lake Superior--Continued					
04024100	Rock Creek near Blackhoof, Minn.	Lat 46°32'10", long 92°22'12", in SW¼SE¼ sec.21, T.47 N., R.16 W., Carlton County, at culvert on State Highway 23, 4.0 miles upstream from mouth, and 4.4 miles east of Blackhoof.	4.94	1961-65, 1967-71	4-11-71	a17.26	233
04024110	Rock Creek tributary near Blackhoof, Minn.	Lat 46°32'14", long 92°22'05", in NE¼SE¼ sec.21, T.47 N., R.16 W., Carlton County, at culvert on State Highway 23, 0.1 mile upstream from mouth, and 4.5 miles east of Blackhoof.	.20	1961-71	4-11-71	a10.11	8.7
04024200	South Fork Nemadji River near Holyoke, Minn.	Lat 46°29'38", long 92°24'36", in SE¼SE¼ sec.6, T.46 N., R.16 W., Carlton County, at culvert on State Highway 23, 1.7 miles downstream from Clear Creek, and 2.0 miles northwest of Holyoke.	19.4	1961-71	4-11-71	a12.59	590
		Red River of the North basin					
05047600	West Branch Mustinka River near Graceville, Minn.	Lat 45°37'43", long 96°26'35", in NW¼NW¼ sec.22, T.125 N., R.46 W., Traverse County, at culverts on county highway, 4.1 miles north of Graceville.	56.7	1964-71	4- 7-71	8.51	(≠)
05047700	West Branch Mustinka River tributary near Graceville, Minn.	Lat 45°36'53", long 96°19'47", in NE¼NW¼ sec.28, T.125 N., R.45 W., Traverse County, at culvert on county highway, 6.0 mile northeast of Graceville.	3.37	1964-71	3-14-71	a8.26	34
05049200	Eighteen Mile Creek near Wheaton, Minn.	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, at culvert on County Highway 67, 1.4 miles upstream from mouth, and 2.0 miles southwest of Wheaton.	68.5	1965-68, 1970-71	3-14-71	a9.24	(≠)
05060800	Buffalo River near Callaway, Minn.	Lat 47°01'17", long 95°54'43", in SW¼SW¼ sec.17, T.141 N., R.41 W., Becker County, at culvert on U.S. Highway 59, 2.7 miles north of Callaway.	b94.5	1960-71	4-18-71	a13.65	323
05061200	Whisky Creek at Barnesville, Minn.	Lat 46°39'35", long 96°23'54", in SE¼SW¼ sec.20, T.137 N., R.45 W., Clay County, at culvert on State Highway 34, 0.7 mile upstream from Blue Eagle Lake, and 1.0 mile northeast of Barnesville.	25.3	1961-64, 1965-66≠, 1967-71	6-29-71	4.44	119
05061400	Hay Creek above Downer, Minn.	Lat 46°44'37", long 96°25'12", in NW¼NW¼ sec.30, T.138 N., R.45 W., Clay County, at culvert on county road, 3.1 miles east of Downer.	5.81	1961-71	6-29-71	7.38	84
05062280	Mosquito Creek near Bagley, Minn. (Formerly published as Wild Rice River tributary near Bagley)	Lat 47°27'02", long 95°22'55", in SW¼NW¼ sec.21, T.146 N., R.37 W., Clearwater County, at culvert on State Highway 92, 5.0 miles south of Bagley.	3.34	1961-71	4-20-68 4-26-70 4- 8-71	c8.06 c8.09 8.47	b11 b12 21
05062470	Marsh Creek tributary near Mahnomen, Minn.	Lat 47°19'31", long 96°04'41", in SE¼SW¼ sec.36, T.145 N., R.43 W., Norman County, at culvert on State Highway 31, 0.1 mile upstream from mouth, and 5.2 miles west of Mahnomen.	b11.9	1961-71	4- 7-71	a11.42	98
05062700	Wild Rice River tributary near Twin Valley, Minn.	Lat 47°17'47", long 96°19'42", in SW¼SE¼ sec.12, T.144 N., R.45 W., Norman County, at culvert on State Highway 31, 1.2 miles upstream from mouth, and 4.1 miles northwest of Twin Valley.	b2.16	1961-71	9- 4-71	12.26	102
05062800	Coon Creek near Twin Valley, Minn.	Lat 47°15'51", long 96°20'34", in NE¼NE¼ sec.26, T.144 N., R.45 W., Norman County, at bridge on County Highway 28, 1.3 miles upstream from mouth, and 4.0 miles west of Twin Valley.	b50.8	1962-71	9- 4-71	9.28	42
05063200	Spring Creek tributary near Ogema, Minn. (Formerly published as South Branch Wild Rice River near Ogema)	Lat 47°07'22", long 95°57'35", in SE¼SE¼ sec.11, T.142 N., R.42 W., Becker County, at culvert on county highway, 2.0 miles northwest of Ogema.	b4.99	1963-71	4- 9-71	6.00	37
05073600	South Branch Battle River at Northome, Minn.	Lat 47°52'20", long 94°17'50", in NE¼ sec.25, T.151 N., R.29 W., Koochiching County, at culvert on U.S. Highway 71, 0.8 mile west of Northome, and 3 miles upstream from Battle Lake.	3.19	1960-71	4-13-71	a14.84	43

≠ Discharge not determined.
≠ Operated as a continuous-record gaging station.
a Backwater from ice.
b Revised.
c Affected by shifting control.

Annual maximum discharge at crest-stage partial-record stations during water year 1971--Continued

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Annual maximum		
					Date	Gage height (feet)	Discharge (cfs)
		Red River of the North basin--Continued					
05073750	South Branch Cormorant River tributary near Blackduck, Minn.	Lat 47°46'20", long 94°31'20", in NW¼NW¼ sec.32, T.150 N., R.30 W., Beltrami County, at culvert on County Highway 304, 3 miles upstream from mouth, and 3¾ miles north of Blackduck.	4.45	1960-71	4-11-71	a14.20	81
05073800	Perry Creek near Shooks, Minn.	Lat 47°52'00", long 94°32'50", in NW¼SW¼ sec.30, T.151 N., R.30 W., Beltrami County, at culvert on State Highway 72, 5 miles west of Shooks.	2.41	1960-71	4-11-71	c6.96	36
05076600	Red Lake River tributary near Thief River Falls, Minn.	Lat 48°04'44", long 96°12'15", in SW¼SE¼ sec.8, T.153 N., R.43 W., Pennington County, at culvert on County Highway 7, 0.5 mile upstream from mouth, and 3.1 miles south of Thief River Falls.	2.33	1962-71	4- 8-71	6.89	64
05078100	Lost River at Gonvick, Minn.	Lat 47°44'14", long 95°31'05", in NE¼SE¼ sec.9, T.149 N., R.38 W., Clearwater County, at culvert on State Highway 92, at Gonvick, and 3.8 miles downstream from Pine Lake.	b53.6	1960-71	4- 8-69 4-26-70 4- 8-71	a13.33 9.50 a11.38	d308 d230 142
05078180	Silver Creek near Clearbrook, Minn. (Formerly published as Lost River tributary No. 2 near Clearbrook)	Lat 47°38'43", long 95°26'33", in NW¼ sec.13, T.148 N., R.38 W., Clearwater County, at culvert on county highway, 3.4 miles south of Clearbrook.	b4.96	1960-71	4- 9-71	9.07	46
05078200	Silver Creek tributary at Clearbrook, Minn. (Formerly published as Lost River tributary at Clearbrook)	Lat 47°41'49", long 95°25'50", in SW¼NW¼ sec.29, T.149 N., R.37 W., Clearwater County, at culvert on county highway at north edge of Clearbrook, 0.9 mile upstream from mouth.	b6.02	1960-71	4- 8-71	c10.19	43
05078400	Clearwater River tributary near Plummer, Minn.	Lat 47°52'34", long 96°08'35", in SE¼SE¼ sec.22, T.151 N., R.43 W., Red Lake County, at culvert on county highway, 1.2 miles upstream from mouth, and 5.3 miles southwest of Plummer.	b7.75	1961-71	4- 7-71	a7.48	38
		Lake of the Woods basin					
05128300	Pike River near Gilbert, Minn.	Lat 47°29'34", long 92°29'15", in NE¼SW¼ sec.22, T.58 N., R.17 W., St. Louis County, at culvert on State Highway 135, 1.1 miles west of Gilbert.	.73	1966-71	4-16-71	c7.91	33
05128700	Pike River tributary near Wahlsten, Minn.	Lat 47°43'04", long 92°17'12", in SW¼SW¼ sec.32, T.61 N., R.15 W., St. Louis County, at culvert on State Highway 135, 1.2 miles south of Wahlsten, and 2.7 miles upstream from mouth.	1.93	1961-71	6-17-71	7.31	70
05129710	Johnson Creek near Britt, Minn.	Lat 47°39'40", long 92°38'03", in NW¼NE¼ sec.28, T.60 N., R.18 W., St. Louis County, at culvert adjacent to U.S. Highway 53, 0.6 mile downstream from Sand Lake, and 5.9 miles west of Britt.	6.92	1961-64, 1966-71	4-16-71	8.19	37
05130300	Boriin Creek near Chisholm, Minn.	Lat 47°36'14", long 92°51'58", in SE¼SE¼ sec.9, T.59 N., R.20 W., St. Louis County, at culvert on State Highway 73, 1.2 miles upstream from mouth, and 7.8 miles north of Chisholm.	13.7	1959-71	4-17-71	c13.11	410
		Smith Creek basin					
b05210200	Smith Creek near Hill City, Minn.	Lat 47°04'58", long 93°34'59", in SE¼NW¼ sec.13, T.53 N., R.26 W., Itasca County, at culvert on U.S. Highway 169, 6.2 miles north of Hill City.	5.06	1961-71	4-16-71	c5.67	120
		Swan River basin					
05216700	O'Brien Creek near Nashwauk, Minn.	Lat 47°22'59", long 93°08'08", in NE¼NE¼ sec.33, T.57 N., R.22 W., Itasca County, at culvert on U.S. Highway 169, 1.5 miles east of Nashwauk, and 3.0 miles upstream from Welcome Creek.	8.26	1959-71	4-16-71	a8.80	68

a Backwater from ice.
b Revised.
c Affected by shifting control.
d Not previously published.

Annual maximum discharge at crest-stage partial-record stations during water year 1971--Continued

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Annual maximum		
					Date	Gage height (feet)	Discharge (cfs)
		Swan River basin--Continued					
05216980	Swan River tributary at Warba, Minn.	Lat 47°07'11", long 93°15'00", in SE¼NW¼ sec.34, T.54 N., R.23 W., Itasca County, at culvert on U.S. Highway 2, 0.9 mile upstream from mouth, and 1.1 miles southeast of Warba.	2.36	1961-71	4-10-71	a6.74	42
		Bluff Creek basin					
05217700	Bluff Creek near Jacobson, Minn.	Lat 47°00'19", long 93°17'30", in SW¼NW¼ sec.8, T.52 N., R.23 W., Aitkin County, at culvert on State Highway 200, 1.2 miles west of Jacobson.	2.95	1961-71	4-10-71	a8.42	49
		Crow Wing River basin					
05244100	Kitten Creek near Sebeka, Minn.	Lat 46°40'33", long 95°04'46", in SE¼SE¼ sec.15, T.137 N., R.35 W., Wadena County, at culvert on county highway, 3.2 miles north of Sebeka, and 3.3 miles upstream from mouth.	b14.7	1961-71	4-10-71	9.98	76
05244200	Cat River near Nimrod, Minn.	Lat 46°37'49", long 94°55'51", in SW¼SW¼ sec.36, T.137 N., R.34 W., Wadena County, at bridge on State Highway 227, 2.5 miles west of Nimrod, and 3.0 miles upstream from mouth.	b49.2	1961-71	4-11-71	5.67	140
		Platte River basin					
05267800	Big Mink Creek tributary near Lastrup, Minn.	Lat 46°01'58", long 94°06'13", in NW¼SW¼ sec.14, T.41 N., R.30 W., Morrison County, at culvert on State Highway 25, 1.4 miles upstream from mouth, and 2.1 miles west of Lastrup.	1.53	1961-71	4- 7-71	10.58	28
05267900	Hillman Creek near Pierz, Minn.	Lat 45°58'27", long 94°04'21", in NE¼SE¼ sec.9, T.40 N., R.30 W., Morrison County, at bridge on county highway, 1.1 miles upstream from mouth, and 1.5 miles east of Pierz.	b46.7	1964-71	5- 7-64 4-13-65 4- 9-69 4- 8-71	14.55 14.68 15.48 13.97	b1,380 b1,550 b2,960 670
		Sauk River basin					
05270300	Sauk River tributary at Spring Hill, Minn.	Lat 45°31'22", long 94°48'31", in SW¼NE¼ sec.27, T.124 N., R.33 W., Stearns County, at culvert on State Highway 4, 1.0 mile east of Spring Hill, and 2.7 miles upstream from mouth.	b7.06	1960-71	3-31-71	a13.54	134
05270310	Sauk River tributary No. 2 near St. Martin, Minn.	Lat 45°31'44", long 94°44'50", in SE¼SE¼ sec.19, T.124 N., R.32 W., Stearns County, at culvert on county highway, 4.2 miles northwest of St. Martin.	b.24	1960, 1962-71	7- 7-71	7.07	7.1
		Johnson Creek basin					
05271800	Johnson Creek tributary at Luxemburg, Minn.	Lat 45°26'30", long 94°14'46", in NW¼NE¼ sec.30, T.123 N., R.28 W., Stearns County, at culverts on State Highway 15, 0.8 mile south of Luxemburg.	b3.82	1964-71	4- 6-71	7.78	49
05272000	Johnson Creek tributary No. 2 near St. Augusta, Minn.	Lat 45°26'52", long 94°12'00", in NE¼SE¼ sec.21, T.123 N., R.28 W., Stearns County, at culverts on county highway, 0.7 mile upstream from mouth, and 3.1 miles southwest of St. Augusta.	13.4	1964-71	6-29-71	6.88	57
05272300	Johnson Creek near St. Augusta, Minn.	Lat 45°27'49", long 94°09'19", in NW¼SW¼ sec.13, T.123 N., R.28 W., Stearns County, at bridge on County Highway 7, 1.0 mile south of St. Augusta, and 3.3 miles upstream from mouth.	46.7	1964-71	4- 6-71	12.58	185
		Otsego Creek basin					
05273700	Otsego Creek near Otsego, Minn.	Lat 45°17'19", long 93°38'59", in SW¼NE¼ sec.13, T.121 N., R.24 W., Wright County, at culvert on County Highway 39, 1.3 miles upstream from mouth, and 1.9 miles west of Otsego.	3.11	1964-71	3-30-71	3.31	37

a Backwater from ice.
b Revised.

Annual maximum discharge at crest-stage partial-record stations during water year 1971--Continued

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Annual maximum		
					Date	Gage height (feet)	Discharge (cfs)
		Elk River basin					
05274200	Stony Brook tributary near Foley, Minn.	Lat 45°38'42", long 93°54'54", in NE¼NW¼ sec.2, T.36 N., R.29 W., Benton County, at culvert on State Highway 25, 0.3 mile upstream from mouth, and 1.5 miles south of Foley.	b2.26	1960-71	3-31-71	a9.84	41
		Crow River basin					
05276100	North Fork Crow River tributary near Paynesville, Minn.	Lat 45°23'29", long 94°46'56", in SW¼NW¼ sec.12, T.122 N., R.33 W., Kandiyohi County, at culvert on county highway, 1.2 miles upstream from mouth, and 3.0 miles west of Paynesville.	b.55	1960-71	6-29-71	17.45	23
05278350	Fountain Creek near Montrose, Minn.	Lat 45°01'20", long 93°56'29", in NE¼NW¼ sec.22, T.118 N., R.26 W., Wright County, at culvert on County Highway 30, 3.3 miles southwest of Montrose.	6.73	1962-71	3-31-71	a7.77	60
05278700	Otter Creek near Lester Prairie, Minn.	Lat 44°54'23", long 94°04'24", in SE¼SE¼ sec.28, T.117 N., R.27 W., McLeod County, at culvert on State Highway 7, 2.1 miles northwest of Lester Prairie, and 4.4 miles upstream from mouth.	30.2	1961-71	6-29-71	8.08	170
05278750	Otter Creek tributary near Lester Prairie, Minn.	Lat 44°53'34", long 94°04'24", in SE¼SE¼ sec.33, T.117 N., R.27 W., McLeod County, at culvert on County Highway 63, 1.7 miles northwest of Lester Prairie, and 3.3 miles upstream from mouth.	1.54	1962-71	6-29-71	8.32	30
05278850	Buffalo Creek tributary near Brownton, Minn.	Lat 44°45'55", long 94°22'33", in NE¼SE¼ sec.13, T.115 N., R.30 W., McLeod County, at culvert on State Highway 15, 0.6 mile upstream from mouth, and 2.6 miles northwest of Brownton.	9.45	1961-71	6-29-71	13.98	43
05280300	School Lake Creek tributary near St. Michael, Minn.	Lat 45°12'09", long 93°41'31", in NW¼SE¼ sec.15, T.120 N., R.24 W., Wright County, at culvert on county highway, 0.2 mile upstream from mouth, and 1.5 miles southwest of St. Michael.	2.04	1964-71	3-30-71	a8.89	39
		Rum River basin					
05284100	Mille Lacs Lake tributary near Wealthwood, Minn.	Lat 46°21'26", long 93°41'43", in NW¼NE¼ sec.25, T.45 N., R.27 W., Aitkin County, at culvert on State Highway 18, 0.2 mile upstream from mouth, and 2.0 miles west of Wealthwood.	.06	1961-71	4-11-71	a9.77	15
05284600	Robinson Brook near Onamia, Minn.	Lat 45°58'22", long 93°39'42", in NE¼SE¼ sec.11, T.40 N., R.27 W., Mille Lacs County, at culvert on U.S. Highway 169, 0.2 mile upstream from mouth, and 6.8 miles south of Onamia.	b4.79	1960-71	4- 8-71	15.30	116
05284620	Rum River tributary near Onamia, Minn.	Lat 45°57'29", long 93°39'43", in NE¼SE¼ sec.14, T.40 N., R.27 W., Mille Lacs County, at culvert on U.S. Highway 169, 0.3 mile upstream from mouth, and 7.8 miles south of Onamia.	b2.37	1960-71	4- 8-71	a8.66	55
05284920	Stanchfield Creek tributary near Day, Minn.	Lat 45°41'29", long 93°23'45", in NW¼SE¼ sec.13, T.37 N., R.25 W., Isanti County, at culvert on County Highway 60, 0.5 mile upstream from mouth, and 1.5 miles southwest of Day.	1.26	1961-71	3-30-71	5.62	22
		Minnesota River basin					
05299100	Lazarus Creek tributary near Canby, Minn.	Lat 44°43'04", long 96°19'42", in NE¼NW¼ sec.6, T.114 N., R.45 W., Yellow Medicine County, at culvert on State Highway 68, 2.7 miles west of Canby, and 4.2 miles upstream from mouth.	2.97	1960-71	6-29-71	13.92	420
05301200	Minnesota River tributary near Montevideo, Minn.	Lat 44°56'08", long 95°48'12", in SW¼SE¼ sec.16, T.117 N., R.41 W., Lac qui Parle County, at culvert on U.S. Highway 212, 0.1 mile upstream from mouth, and 4.0 miles west of Montevideo.	b.40	1960-71	6-29-71	8.54	18

a Backwater from ice.
b Revised.

Annual maximum discharge at crest-stage partial-record stations during water year 1971--Continued

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Annual maximum		
					Date	Gage height (feet)	Discharge (cfs)
		Minnesota River basin--Continued					
05302970	Outlet Creek tributary near Starbuck, Minn. (Formerly published as Lake Emily tributary near Starbuck)	Lat 45°31'18", long 95°33'43", in SW¼NW¼ sec.27, T.124 N., R.39 W., Pope County, at culvert on State Highway 29, 2.0 miles upstream from mouth, and 6.6 miles south of Starbuck.	b.33	1962-71	6-29-71	7.65	12
05303450	Hassel Creek near Clontarf, Minn.	Lat 45°24'03", long 95°34'13", in SW¼SE¼ sec.4, T.122 N., R.39 W., Swift County, at culvert on State Highway 29, 0.2 mile upstream from Lake Hassel, and 5.6 miles east of Clontarf.	b7.53	1962-71	3-31-71	a10.03	61
*05305200	Spring Creek near Montevideo, Minn.	Lat 44°58'41", long 95°42'57", in NW¼NW¼ sec.5, T.117 N., R.40 W., Chippewa County, at culvert on State Highway 29, 1.2 miles upstream from mouth, and 2.0 miles north of Montevideo.	b16.0	1959-71	3-13-71	14.99	185
05311200	North Branch Yellow Medicine River near Ivanhoe, Minn.	Lat 44°27'32", long 96°21'27", in NE¼NW¼ sec.2, T.111 N., R.46 W., Lincoln County, at culvert on State Highway 19, 5.3 miles west of Ivanhoe.	14.8	1960-71	3-14-71	a13.55	59
05311250	North Branch Yellow Medicine River tributary near Wilno, Minn.	Lat 44°33'12", long 96°16'33", in SE¼NE¼ sec.33, T.113 N., R.45 W., Lincoln County, at culvert on U.S. Highway 75, 2.1 miles upstream from mouth, and 4.3 miles northwest of Wilno.	.33	1960-71	7- 7-71	9.51	34
05311300	North Branch Yellow Medicine River tributary No. 2 near Porter, Minn.	Lat 44°35'39", long 96°16'34", in SE¼NE¼ sec.16, T.113 N., R.45 W., Lincoln County, at culvert on U.S. Highway 75, 6.2 miles southwest of Porter.	3.70	1960-71	6-29-71	14.61	76
05313800	County ditch No. 16 near Blomkest, Minn. (Formerly published as Chetomba Creek tributary near Blomkest)	Lat 44°58'48", long 95°02'36", in SW¼SW¼ sec.35, T.118 N., R.35 W., Kandiyohi County, at culvert on U.S. Highway 71, 2.8 miles northwest of Blomkest.	b.83	1959-71	6-29-71	9.15	32
05314900	Redwood River at Ruthton, Minn.	Lat 44°10'53", long 96°06'07", in NW¼NW¼ sec.11, T.108 N., R.44 W., Pipestone County, at culvert on State Highway 23, 0.3 mile north of Ruthton.	b5.46	1959-71	6-29-71	e15.25	230
05315200	Prairie Ravine near Marshall, Minn.	Lat 44°29'44", long 95°47'48", in SE¼NE¼ sec.20, T.112 N., R.41 W., Lyon County, at culvert on U.S. Highway 59, 2.7 miles north of Marshall.	5.63	1959-64≠, 1965-71	3-14-71	a7.51	45
05316550	West Fork Beaver Creek near Olivia, Minn.	Lat 44°50'56", long 95°01'53", in SE¼SW¼ sec.14, T.116 N., R.35 W., Renville County, at culvert on field road, 0.25 mile upstream from U.S. Highway 71, and 5.5 miles northwest of Olivia.	b12.2	1959-71	3-31-71	a9.85	148
05316690	Spring Creek tributary near Sleepy Eye, Minn.	Lat 44°23'54", long 94°45'35", in NW¼ sec.25, T.111 N., R.33 W., Brown County, at culvert on county highway, 0.1 mile upstream from mouth, and 7.5 miles north of Sleepy Eye.	3.69	1966-71	5-31-71	5.56	64
05316700	Spring Creek near Sleepy Eye, Minn.	Lat 44°24'12", long 94°44'41", in NE¼SE¼ sec.24, T.111 N., R.33 W., Brown County, at culvert on county highway, 4.3 miles upstream from mouth, and 7.5 miles north of Sleepy Eye.	b31.3	1959-71	5-31-71	11.55	212
05316800	Cottonwood River tributary near Balaton, Minn.	Lat 44°14'24", long 95°57'22", in NW¼NW¼ sec.19, T.109 N., R.42 W., Lyon County, at culvert on U.S. Highway 14, 4.0 miles west of Balaton.	b.91	1959-71	6- 7-71	5.97	39
05316850	Meadow Creek tributary near Marshall, Minn.	Lat 44°22'42", long 95°45'20", in SE¼NE¼ sec.34, T.111 N., R.41 W., Lyon County, at culvert on U.S. Highway 59, 1.2 miles upstream from mouth, and 4.5 miles south of Marshall.	.54	1961-71	6- 7-71	15.05	112
05316900	Dry Creek near Jeffers, Minn.	Lat 44°07'21", long 95°12'13", in NE¼NE¼ sec.31, T.108 N., R.36 W., Cottonwood County, at culvert on County Highway 10, 4.5 miles north of Jeffers.	3.13	1961-71	5-31-71	6.56	163

* Also a low-flow partial-record station.
≠ Operated as a continuous-record gaging station.
a Backwater from ice.
b Revised.
e Backwater from debris.

Annual maximum discharge at crest-stage partial-record stations during water year 1971--Continued

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Annual maximum		
					Date	Gage height (feet)	Discharge (cfs)
		Minnesota River basin--Continued					
05316920	Cottonwood River tributary near Sanborn, Minn.	Lat 44°10'34", long 95°07'15", in SW¼NW¼ sec.12, T.108 N., R.36 W., Cottonwood County, at culvert on U.S. Highway 71, 2.4 miles south of Sanborn.	.42	1966-71	5-31-71	6.18	76
05317850	Foster Creek near Alden, Minn.	Lat 43°39'31", long 93°35'30", in NE¼NE¼ sec.9, T.102 N., R.23 W., Freeborn County, at culvert on U.S. Highway 16, 1.2 miles southwest of Alden.	2.26	1959-71	6- 7-71	6.83	147
05318100	East Branch Blue Earth River tributary near Blue Earth, Minn.	Lat 43°37'09", long 94°01'03", in SW¼SE¼ sec.24, T.102 N., R.27 W., Faribault County, at culvert on County Highway 13, 0.5 mile upstream from mouth, and 4.3 miles east of Blue Earth.	9.20	1960-71	3-31-71	a5.67	107
05318300	Watonwan River near Delft, Minn. (Formerly published as North Fork Watonwan River)	Lat 43°59'55", long 95°07'11", in NE¼SE¼ sec.11, T.106 N., R.36 W., Cottonwood County, at culvert on U.S. Highway 71, 1.7 miles northwest of Delft.	b13.0	1960-71	3-27-71	a16.42	177
05320200	Le Sueur River tributary near Mankato, Minn.	Lat 44°07'29", long 93°57'33", in SE¼SW¼ sec.28, T.108 N., R.26 W., Blue Earth County, at culvert on State Highway 22, 0.2 mile upstream from mouth, and 1.5 miles southeast of Mankato Airport.	.073	1959-71	7- 7-71	22.51	61
05320300	Cobb River tributary near Mapleton, Minn.	Lat 44°01'05", long 93°57'30", in SW¼NE¼ sec.4, T.106 N., R.26 W., Blue Earth County, at culvert on State Highway 22, 1.0 mile upstream from mouth, and 6.3 miles north of Mapleton.	7.25	1959-71	11- 9-70	15.94	140
05320400	Maple River tributary near Mapleton, Minn.	Lat 43°55'18", long 94°01'17", in SE¼SW¼ sec.1, T.105 N., R.27 W., Blue Earth County, at culvert on State Highway 30, 0.9 mile upstream from mouth, and 3.3 miles west of Mapleton.	6.22	1959-71	9-25-70 6-11-71	15.18 21.16	d38 f500
05320440	Judicial ditch No. 49 near Amboy, Minn.	Lat 43°53'17", long 94°07'38", in NW¼ sec.19, T.105 N., R.27 W., Blue Earth County, at culvert on State Highway 30, 1.6 miles east of Amboy.	18.0	1959-71	3-27-71	14.25	207
05330150	Sand Creek tributary near Montgomery, Minn.	Lat 44°25'41", long 93°30'31", in NE¼NE¼ sec.18, T.111 N., R.22 W., Rice County, at culvert on State Highway 21, 3.5 miles east of Montgomery.	.36	1961-71	3-31-71	a9.14	24
05330200	Rice Lake tributary near Montgomery, Minn.	Lat 44°25'42", long 93°32'10", in NE¼NW¼ sec.13, T.111 N., R.23 W., Le Sueur County, at culvert on State Highway 21, 1.8 miles upstream from Rice Lake, and 2.5 miles east of Montgomery.	3.16	1960-71	3-14-71	8.33	91
05330300	Sand Creek near New Prague, Minn.	Lat 44°32'37", long 93°32'16", in NE¼NW¼ sec.1, T.112 N., R.23 W., Le Sueur County, at culvert on State Highway 13 and 19, 1.9 miles east of New Prague.	62.4	1960-71	3-31-71	a13.89	665
05330550	Raven Stream tributary near New Prague, Minn.	Lat 44°34'21", long 93°35'58", in NW¼ sec.28, T.113 N., R.23 W., Scott County, at culvert on county road, 1.6 miles upstream from mouth, and 2.3 miles northwest of New Prague.	22.1	1960-71	3-31-71	11.82	211
05330600	Sand Creek tributary No. 2 near Jordan, Minn.	Lat 44°37'45", long 93°36'33", in NW¼NE¼ sec.5, T.113 N., R.23 W., Scott County, at culvert on State Highway 21, 0.8 mile upstream from mouth, and 2.8 miles south of Jordan.	2.62	1960-71	3-31-71	13.55	91
		St. Croix River basin					
05336200	Glaisby Brook near Kettle River, Minn.	Lat 46°27'19", long 92°51'34", in SE¼NW¼ sec.22, T.46 N., R.20 W., Carlton County, at bridge on State Highways 27 and 73, 1.0 mile upstream from mouth, and 2.4 miles south of Kettle River.	24.2	1960-70≠, 1971	4-11-71	7.65	770
05336300	Moose River tributary at Moose Lake, Minn.	Lat 46°27'17", long 92°47'14", in SE¼NE¼ sec.19, T.46 N., R.19 W., Carlton County, at culvert on State Highway 27, 0.9 mile upstream from mouth, and 1.2 miles west of Moose Lake.	1.23	1960-71	4-11-71	9.18	94

≠ Operated as a continuous-record gaging station.
a Backwater from ice.
b Revised.
d Not previously published.
f Estimated.

Annual maximum discharge at crest-stage partial-record stations during water year 1971--Continued

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Annual maximum		
					Date	Gage height (feet)	Discharge (cfs)
		St. Croix River basin--Continued					
05336550	Wolf Creek tributary near Sandstone, Minn.	Lat 46°09'45", long 92°51'58", in NE¼SE¼ sec.33, T.43 N., R.20 W., Pine County, at culvert on U.S. Highway 61, 0.2 mile upstream from mouth, and 2.2 miles north of Sandstone.	5.46	1960-71	4- 8-71	a16.92	79
05336600	Kettle River tributary at Sandstone, Minn.	Lat 46°08'46", long 92°51'57", in SE¼SE¼ sec.4, T.42 N., R.20 W., Pine County, at culvert on U.S. Highway 61 at Sandstone, and 0.2 mile upstream from mouth.	.65	1960-71	4- 8-71	a7.60	15
05338200	Mission Creek near Hinckley, Minn.	Lat 45°59'52", long 92°56'44", in SW¼SW¼ sec.25, T.41 N., R.21 W., Pine County, at culvert on U.S. Highway 23, 1.2 miles south of Hinckley.	3.84	1960-71	3-31-71	a15.72	56
		Vermillion River basin					
05345900	Vermillion River tributary near Hastings, Minn.	Lat 44°43'19", long 92°56'03", in NE¼SE¼ sec.35, T.115 N., R.18 W., Dakota County, at culvert on county highway, 2.0 miles upstream from mouth, and 4.1 miles west of Hastings.	14.3	1960-71	3-31-71	a15.89	23
		Cannon River basin					
05352700	Turtle Creek tributary No. 2 near Pratt, Minn.	Lat 44°00'02", long 93°08'30", in NW¼SW¼ sec.8, T.106 N., R.19 W., Steele County, at culvert on U.S. Highway 218, 1 mile upstream from mouth, and 1.7 miles southeast of Pratt.	b1.26	1960-71	6-11-71	19.40	210
05352800	Turtle Creek tributary near Steele Center, Minn.	Lat 44°00'26", long 93°12'20", in NW¼NW¼ sec.11, T.106 N., R.20 W., Steele County, at culvert on township road, 1.3 miles upstream from mouth, and 1.6 miles northeast of Steele Center.	5.01	1960-71	6-11-71	11.64	344
05355100	Little Cannon River tributary near Kenyon, Minn.	Lat 44°20'45", long 92°58'47", in NE¼SE¼ sec.9, T.110 N., R.18 W., Goodhue County, at culvert on State Highway 56, 0.3 mile upstream from mouth, and 5.3 miles north of Kenyon.	b2.20	1960-71	7-12-71	13.34	167
05355150	Pine Creek near Cannon Falls, Minn.	Lat 44°32'27", long 92°53'40", in NE¼NE¼ sec.6, T.112 N., R.17 W., Goodhue County, at culvert on State Highway 20, 2.0 miles upstream from mouth, and 2.1 miles north of Cannon Falls.	20.2	1960-71	3-31-71	3.62	232
05355230	Cannon River tributary near Welch, Minn.	Lat 44°36'04", long 92°42'34", in SW¼SW¼ sec.11, T.113 N., R.16 W., Goodhue County, at culvert on U.S. Highway 61 1.2 miles upstream from mouth, and 2.7 miles northeast of Welch.	.05	1960-71	6-29-71	7.70	6.1
		Zumbro River basin					
05373350	Zumbro River tributary near South Troy, Minn.	Lat 44°11'16", long 92°25'22", in SE¼NE¼ sec.6, T.108 N., R.13 W., Olmsted County, at culvert on county road, 0.8 mile upstream from mouth, and 1.3 miles south of South Troy.	.16	1962-71	3-31-71	a9.17	9.0
05373700	Spring Creek near Wanamingo, Minn. (Formerly published as North Fork Zumbro River tributary near Wanamingo)	Lat 44°17'13", long 92°52'17", in SE¼SE¼ sec.32, T.110 N., R.17 W., Goodhue County, at culvert on County Highway 1, 3.5 miles upstream from mouth, and 4.2 miles southwest of Wanamingo.	b9.93	1960-71	3-31-71	a12.83	450
05373900	Trout Brook tributary near Goodhue, Minn.	Lat 44°21'30", long 92°36'58", in NE¼SE¼ sec.4, T.110 N., R.15 W., Goodhue County, at culvert on State Highway 58, 0.8 mile upstream from mouth, and 3.0 miles south of Goodhue.	b.40	1960-71	3-31-71	a9.87	102
05374400	Long Creek near Potsdam, Minn.	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, at culvert on county highway, 2.6 miles northeast of Potsdam.	4.46	1966-71	10- 9-70	15.27	100

a Backwater from ice.
b Revised.

Annual maximum discharge at crest-stage partial-record stations during water year 1971--Continued

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Annual maximum		
					Date	Gage height (feet)	Discharge (cfs)
		East Indian Creek basin					
05375800	East Indian Creek tributary near Weaver, Minn.	Lat 44°13'41", long 91°58'35", in NW¼SE¼ sec.23, T.109 N., R.10 W., Wabasha County, at culvert on County Highway 14, 0.3 mile upstream from mouth, and 2.5 miles northwest of Weaver.	.21	1962-71	7- 8-71	8.79	6.6
		Garvin Brook basin					
05378290	Straight Valley Creek near Altura, Minn.	Lat 44°05'39", long 91°53'07", in SW¼SE¼ sec.3, T.107 N., R.9 W., Winona County, at culvert on State Highway 248, 2.4 miles upstream from mouth, and 3.1 miles northeast of Altura.	-	1966-71	7- 8-71	11.83	(≠)
		Root River basin					
05383600	North Branch Root River tributary near Stewartville, Minn.	Lat 43°51'20", long 92°26'50", near center sec.36, T.105 N., R.14 W., Olmsted County, at culvert on State Highway 30, 2.0 miles east of Stewartville, and 2.3 miles upstream from mouth.	.73	1958, 1959-64≠, 1965-71	3-31-71	5.95	25
05383700	Mill Creek tributary near Chatfield, Minn.	Lat 43°53'57", long 92°14'16", in SW¼NW¼ sec.14, T.105 N., R.12 W., Olmsted County, at culvert on county highway, 0.8 mile upstream from mouth, and 4.5 miles northwest of Chatfield.	2.36	1959-71	6- 7-71	13.12	(≠)
05383720	Mill Creek near Chatfield, Minn.	Lat 43°53'01", long 92°13'46", in SE¼NW¼ sec.23, T.105 N., R.12 W., Olmsted County, at bridge on county highway, 3.4 miles northwest of Chatfield, and 4.8 miles upstream from mouth.	22.4	1962-71	7-12-71	12.71	1,130
05383850	South Fork Bear Creek near Grand Meadow, Minn.	Lat 43°43'24", long 92°35'24", in NE¼SE¼ sec.14, T.103 N., R.15 W., Mower County, at bridge on county highway, 1.5 miles northwest of Grand Meadow, and 4.0 miles upstream from North Fork Bear Creek.	b14.0	1962-71	3-31-71	a18.66	570
05384100	Duschee Creek near Lanesboro, Minn.	Lat 43°39'40", long 91°58'10", in SW¼SW¼ sec.6, T.102 N., R.9 W., Fillmore County, at culvert on county highway, 4 miles south of Lanesboro, and 7.4 miles upstream from mouth.	3.85	1959-71	7-12-71	14.48	218
05384150	Root River tributary near Whalan, Minn.	Lat 43°43'03", long 91°56'39", in SE¼SW¼ sec.17, T.103 N., R.9 W., Fillmore County, at culvert on private road, 1.3 miles southwest of Whalan.	.08	1959-71	7-12-71	6.28	19
05384200	Gribben Creek near Whalan, Minn.	Lat 43°42'26", long 91°54'50", in NE¼SE¼ sec.21, T.103 N., R.9 W., Fillmore County, at bridge on county highway, 1.9 miles southeast of Whalan, and 2.4 miles upstream from mouth.	7.80	1959-71	7-12-71	18.50	855
05384300	Big Springs Creek near Arendahl, Minn.	Lat 43°49'26", long 91°57'00", in NE¼SE¼ sec.7, T.104 N., R.9 W., Fillmore County, at culvert on State Highway 250, 2.0 miles west of Arendahl.	.14	1959-71	3-31-71	8.69	16
05384400	Pine Creek near Arendahl, Minn.	Lat 43°50'27", long 91°53'39", in SE¼NE¼ sec.3, T.104 N., R.9 W., Fillmore County, at bridge on County Highway 25, 1.3 miles northeast of Arendahl, and 4.9 miles upstream from Hemingway Creek.	28.1	1959-71	6- 7-71	12.24	566
		Iowa River basin					
05457080	Rose Creek tributary near Dexter, Minn.	Lat 43°42'11", long 92°44'35", in SE¼SW¼ sec.22, T.103 N., R.16 W., Mower County, at culvert on county highway, 0.2 mile upstream from mouth, and 2.2 miles southwest of Dexter.	b1.17	1962-71	10-27-70	8.22	81

≠ Discharge not determined.
≠ Operated as a continuous-record gaging station.
a Backwater from ice.
b Revised.

Annual maximum discharge at crest-stage partial-record stations during water year 1971--Continued

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Annual maximum		
					Date	Gage height (feet)	Discharge (cfs)
		Des Moines River basin					
05474750	Beaver Creek tributary No. 2 near Slayton, Minn.	Lat 43°59'35", long 95°48'01", in NW¼NW¼ sec.17, T.106 N., R.41 W., Murray County, at culvert on State Highway 30, 2.4 miles west of Slayton, and 3.2 miles upstream from mouth.	4.25	1961-71	3-27-71	16.42	39
05474760	Beaver Creek tributary above Slayton, Minn.	Lat 43°59'35", long 95°47'12", in NE¼NE¼ sec.17, T.106 N., R.41 W., Murray County, at culvert on State Highway 30, 0.9 mile upstream from mouth, and 1.7 miles west of Slayton.	2.20	1961-71	6-29-71	18.25	68
05475400	Warren Lake tributary near Windom, Minn.	Lat 43°54'02", long 95°07'13", in SE¼NE¼ sec.14, T.105 N., R.36 W., Cottonwood County, at culvert on U.S. Highway 71, 0.2 mile upstream from Warren Lake, and 2.4 miles north of Windom.	b1.39	1960-71	6-29-71	5.41	47
05475800	Des Moines River tributary near Jackson, Minn.	Lat 43°41'36", long 95°01'26", in NW¼SE¼ sec.27, T.103 N., R.35 W., Jackson County, at culvert on county highway, 0.8 mile upstream from mouth, and 5.3 miles north of Jackson.	b1.52	1960-71	3-27-71	15.03	59
05475900	Des Moines River tributary No. 2 near Lakefield, Minn.	Lat 43°40'28", long 95°03'15", in SE¼SE¼ sec.32, T.103 N., R.35 W., Jackson County, at culvert on County Highway 19, 1.9 miles upstream from mouth, and 5.8 miles east of Lakefield.	b5.18	1960-71	3-27-71	7.96	155
05476010	Nelson Creek at Jackson, Minn.	Lat 43°36'56", long 94°59'36", in NW¼NW¼ sec.25, T.102 N., R.35 W., Jackson County, in flume spillway at intersection of U.S. Highways 16 and 71, at south edge of Jackson.	b6.19	1959, 1964-71	5-31-71	14.41	542
05476100	Story Brook near Petersburg, Minn.	Lat 43°32'22", long 94°59'38", in SW¼NW¼ sec.24, T.101 N., R.35 W., Jackson County, at bridge on U.S. Highway 71, 3.5 miles upstream from mouth, and 3.8 miles west of Petersburg.	b25.8	1960-71	3-27-71	10.88	960
05476900	Fourmile Creek near Dunnell, Minn. (Formerly published as East Fork Des Moines River tributary near Dunnell)	Lat 43°34'57", long 94°46'26", in SW¼NW¼ sec.2, T.101 N., R.33 W., Martin County, at bridge on State Highway 4, 0.6 mile upstream from mouth, and 1.6 miles north of Dunnell.	b14.0	1960-71.	5-31-71	13.26	345
		Big Sioux River basin					
06482950	Mound Creek near Hardwick, Minn.	Lat 43°48'18", long 96°12'47", in SE¼SE¼ sec.15, T.104 N., R.45 W., Rock County, at culvert on county highway, 2.2 miles northwest of Hardwick.	2.47	1959-71	3-27-71	7.90	31
06482960	Mound Creek tributary at Hardwick, Minn.	Lat 43°46'05", long 96°12'44", in NE¼SE¼ sec.34, T.104 N., R.45 W., Rock County, at culvert on U.S. Highway 75, 0.7 mile upstream from mouth, and 0.9 mile southwest of Hardwick.	.19	1959-71	3-27-71	6.54	28
06483050	Rock River tributary near Luverne, Minn.	Lat 43°34'15", long 96°12'45", in NE¼NE¼ sec.10, T.101 N., R.45 W., Rock County, at culvert on U.S. Highway 75, 5.8 miles south of Luverne.	.21	1959-71	6- 7-71	14.76	146
06483200	Kanaranzi Creek tributary near Lismore, Minn.	Lat 43°45'41", long 95°55'56", in SW¼SW¼ sec.31, T.104 N., R.42 W., Nobles County, at culvert on county highway adjacent to State Highway 91, 60 ft upstream from mouth, and 1.2 miles northeast of Lismore.	.14	1959-71	3-27-71	a19.76	123
06483210	Kanaranzi Creek tributary No. 2 near Wilmont, Minn.	Lat 43°43'32", long 95°52'20", in SW¼NW¼ sec.15, T.103 N., R.42 W., Nobles County, at culvert on County Highway 15, 3.5 miles southwest of Wilmont, and 3.7 miles upstream from mouth.	2.14	1966-71	6- 7-71	7.39	283

a Backwater from ice.
b Revised.

Annual maximum discharge at crest-stage partial-record stations during water year 1971--Continued

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Annual maximum		
					Date	Gage height (feet)	Dis-charge (cfs)
		Little Sioux River basin					
06603520	Judicial ditch 28 tributary near Spafford, Minn.	Lat 43°36'58", long 95°22'58", in NW¼NE¼ sec.27, T.102 N., R.38 W., Jackson County, at culvert on U.S. Highway 16, 0.4 mile west of Spafford, and 0.6 mile upstream from mouth.	2.66	1959-71	3-14-71	8.81	80
*06603530	Little Sioux River near Spafford, Minn.	Lat 43°36'08", long 95°15'27", in NE¼NE¼ sec.34, T.102 N., R.37 W., Jackson County, at bridge on county highway, 1.6 miles downstream from Jackson County ditch No. 11, and 5.8 miles east of Spafford.	41.1	1962-71	3-27-71	a9.18	380

* Also a low-flow partial-record station.
a Backwater from ice.

Discharge measurements at miscellaneous sites

Measurements of streamflow at points other than gaging stations are given in the following table. Those that are measurements of base flow are designated by an asterisk (*); measurements of peak flow by a dagger (†).

Discharge measurements made at miscellaneous sites during water year 1971

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
		Streams tributary to Lake Superior				
Temperance River	Lake Superior	SE¼NE¼ sec.26, T.63 N., R.4 W., Cook County, at downstream end of portage between Weird Lake and Jack Lake, 0.5 mile downstream from Vern River, 2.0 miles upstream from Pipe Creek, and 23.8 miles north of Tofte, Minn.	-	-	8-25-71	*1.72
St. Louis River	Lake Superior	NW¼NE¼ sec.33, T.58 N., R.14 W., St. Louis County, at bridge on east fork of County Highway 346, 3.6 miles southeast of Hoyt Lakes, Minn.	-	-	10- 6-70	.57
St. Louis River	Lake Superior	NW¼SE¼ sec.22, T.58 N., R.15 W., St. Louis County, 150 ft upstream from Partridge River, about 0.7 mile upstream from County Highway 100, and 1.5 miles south of Aurora, Minn.	a149	1966	10- 6-70	6.25
St. Louis River tributary	St. Louis River	NE¼SE¼ sec.20, T.58 N., R.15 W., St. Louis County, at culvert on County Highway 341, 3 miles southwest of Aurora, Minn.	-	-	10- 6-70	1.20
St. Louis River tributary	St. Louis River	NE¼SE¼ sec.19, T.58 N., R.15 W., St. Louis County, at culvert on County Highway 341, 3.4 miles southwest of Aurora, Minn.	-	-	10- 6-70	.07
St. Louis River tributary	St. Louis River	NE¼SE¼ sec.25, T.58 N., R.16 W., St. Louis County, at culvert on County Highway 341, 4 miles southwest of Aurora, Minn.	-	-	10- 6-70	.02
St. Louis River	Lake Superior	SE¼SE¼ sec.36, T.58 N., R.16 W., St. Louis County, at bridge on county road, 5.4 miles southwest of Biwabik, Minn.	-	-	10- 7-70	28.5
St. Louis River tributary	St. Louis River	NE¼SE¼ sec.1, T.57 N., R.16 W., St. Louis County, at bridge on County Highway 560, about 6.2 miles southeast of Biwabik, Minn.	-	-	10- 7-70	.34
St. Louis River tributary (Frying Pan Lake Outlet)	St. Louis River	NW¼SW¼ sec.18, T.57 N., R.15 W., St. Louis County, at bridge on County Highway 4, 2 miles upstream from mouth, and 8.2 miles southeast of Biwabik, Minn.	-	-	10- 7-70	.15
St. Louis River tributary (Lost Lake Outlet)	St. Louis River	SW¼SE¼ sec.10, T.57 N., R.16 W., St. Louis County, at bridge on County Highway 108, about 0.4 mile upstream from mouth, and 6.2 miles southeast of McKinley, Minn.	-	-	10- 7-70	.40
St. Louis River	Lake Superior	SW¼SE¼ sec.21, T.57 N., R.16 W., St. Louis County, at bridge on County Highway 95, 7.8 miles south of McKinley, Minn.	-	-	10- 7-70	32.4
Embarrass River	St. Louis River	SE¼SE¼ sec.13, T.60 N., R.14 W., St. Louis County, at County Highway 620, 0.1 mile upstream from Spring Mine Creek, and 5.9 miles southwest of Babbitt, Minn.	-	-	10-22-70	5.28
Spring Mine Creek	Embarrass River	SE¼NE¼ sec.24, T.60 N., R.14 W., St. Louis County, at County Highway 104, 0.5 mile upstream from mouth, and 6.4 miles southwest of Babbitt, Minn.	-	-	10-22-70	2.48
Embarrass River tributary	Embarrass River	SW¼NE¼ sec.23, T.60 N., R.14 W., St. Louis County, at County Highway 104, 5.4 miles east of Embarrass, Minn.	-	-	10-22-70	0

* Base flow.
a Approximately.

Discharge measurements made at miscellaneous sites during water year 1971

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
		Streams tributary to Lake Superior--Continued				
Embarrass River	St. Louis River	NE¼SE¼ sec.16, T.60 N., R.14 W., St. Louis County, at bridge on County Highway 318, 4 miles northeast of Embarrass, Minn.	-	-	10-22-70	15.3
Camp Eight Creek	Embarrass River	NW¼NE¼ sec.16, T.60 N., R.14 W., St. Louis County, at County Highway 21, 4 miles northeast of Embarrass, Minn.	-	-	10-22-70	4.05
Embarrass River tributary	Embarrass River	SW¼NW¼ sec 22. T.60 N., R.14 W., St. Louis County, at bridge on County Highway 318, 3.9 miles east of Embarrass, Minn.	-	-	10-22-70	5.01
Trimble Creek	Embarrass River	SW¼NE¼ sec.20, T.60 N., R.14 W., St. Louis County, at bridge on County Highway 104, 2.6 miles east of Embarrass, Minn.	-	-	10-22-70	3.02
Trimble Creek tributary	Trimble Creek	SW¼NE¼ sec.20, T.60 N., R.14 W., St. Louis County, at culvert on County Highway 104, 2.4 miles east of Embarrass, Minn.	-	-	10-22-70	2.55
Bear Creek	Embarrass River	NE¼NE¼ sec.13, T.60 N., R.15 W., St. Louis County, at bridge on County Highway 21, 0.7 mile upstream from mouth, and 2.1 miles north of Embarrass, Minn.	-	-	10-22-70	34.9
Heikkilla Lake Outlet	Embarrass River	SW¼NW¼ sec.30, T.60 N., R.14 W., St. Louis County, at culvert on private road, 1 mile southeast of Embarrass, Minn.	-	-	10-22-70	.91
Embarrass River	St. Louis River	Lat 47°39'24", long 92°11'51", in NW¼ sec.25, T.60 N., R.15 W., St. Louis County, at bridge on County Highway 362 at Embarrass, Minn.	93.8	1942-65≠	10-22-70	78.6
Embarrass River tributary	Embarrass River	NW¼NW¼ sec.25, T.60 N., R.15 W., St. Louis County, at Embarrass, Minn., 50 ft upstream from mouth.	-	-	10-22-70	1.42
Embarrass River tributary	Embarrass River	NE¼NW¼ sec.26, T.60 N., R.15 W., St. Louis County, at culvert on County Highway 21, 0.3 mile west of Embarrass, Minn.	-	-	10-22-70	1.10
Embarrass River	St. Louis River	SE¼NE¼ sec.4, T.59 N., R.15 W., St. Louis County, at bridge on State Highway 135, 3 miles southwest of Embarrass, Minn.	-	-	10-22-70	91.3
Embarrass River tributary	Embarrass River	NE¼SE¼ sec.33, T.60 N., R.15 W., St. Louis County, at culvert on County Highway 558, 2.7 miles southwest of Embarrass, Minn.	-	-	10-22-70	.68
Embarrass River	St. Louis River	SW¼NW¼ sec.18, T.59 N., R.15 W., St. Louis County, 0.2 mile upstream from Sabin Lake, 0.2 mile east of County Highway 69, and 5 miles north of Biwabik, Minn.	-	-	10-23-70	119
Embarrass River	St. Louis River	NE¼SW¼ sec.20, T.57 N., R.16 W., St. Louis County, at bridge on County Highway 95, about 1 mile upstream from mouth, and 7.4 miles south of McKinley, Minn.	a180	-	10- 7-70	22.7
Hay Creek	St. Louis River	SE¼SW¼ sec.19, T.57 N., R.16 W., St. Louis County, at culvert on County Highway 95, 0.4 mile upstream from mouth, and 7.8 miles south of McKinley, Minn.	-	-	10- 7-70	b.06

≠ Operated as a continuous-record gaging station.
a Approximately.
b Estimated.

Discharge measurements made at miscellaneous sites during water year 1971

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
Streams tributary to Lake Superior--Continued						
St. Louis River tributary	St. Louis River	NE¼SW¼ sec.26, T.57 N., R.17 W., St. Louis County, at bridge on county road, 0.5 mile upstream from mouth, and 6.8 miles south of Gilbert, Minn.	-	-	10- 7-70	1.36
St. Louis River	Lake Superior	NW¼NW¼ sec.2, T.56 N., R.17 W., St. Louis County, at bridge on County Highway 957, 8.1 miles south of Gilbert, Minn.	-	-	10- 7-70	55.3
Mud Hen Creek	St. Louis River	On line between secs.3 and 10, T.56 N., R.17 W., St. Louis County, at bridge on County Highway 16, 0.9 mile upstream from mouth, 4.5 miles north of Central Lakes, and 6 miles southwest of Forbes, Minn.	a118	1970	10- 7-70	2.07
East Two Rivers	St. Louis River	SE¼SW¼ sec.27, T.58 N., R.18 W., St. Louis County, at bridge on County Highway 102, 4 miles north of Iron Junction, Minn.	-	-	10-21-70	20.5
East Two Rivers tributary	East Two Rivers	SW¼SE¼ sec.34, T.58 N., R.18 W., St. Louis County, at culvert on County Highway 101, 2.8 miles north of Iron Junction, Minn.	-	-	10-21-70	.23
East Two Rivers tributary	East Two Rivers	SW¼NE¼ sec.4, T.57 N., R.18 W., St. Louis County, at farm lane, 700 ft downstream from Duluth, Mesabi and Iron Range railroad, and about 2.5 miles northwest of Iron Junction, Minn.	-	-	10-21-70	.22
East Two Rivers	St. Louis River	NW¼SW¼ sec.9, T.57 N., R.18 W., St. Louis County, 600 ft north of dead end on County Highway 754, 2.2 miles northwest of Iron Junction, Minn.	-	-	10-20-70	25.6
East Two Rivers	St. Louis River	NW¼NW¼ sec.20, T.57 N., R.18 W., St. Louis County, at bridge on County Highway 452, 2.6 miles west of Iron Junction, Minn.	-	-	10-20-70	28.5
East Two Rivers	St. Louis River	NW¼NE¼ sec.5, T.56 N., R.18 W., St. Louis County, at twin culverts on County Highway 16, 2.2 miles west of Forbes, Minn.	-	-	10-20-70	29.2
East Two Rivers	St. Louis River	SW¼SW¼ sec.5, T.56 N., R.18 W., St. Louis County, 100 ft upstream from section line, 850 ft west of County Highway 313, 1.2 miles upstream from mouth, and 2.9 miles southwest of Forbes, Minn.	a47	-	10-20-70	30.1
West Two Rivers	St. Louis River	SW¼NW¼ sec.13, T.57 N., R.18 W., St. Louis County, at bridge on County Highway 447, 4.9 miles west of Iron Junction, Minn.	-	-	10-20-70	34.2
West Two Rivers	St. Louis River	NW¼NW¼ sec.18, T.56 N., R.18 W., St. Louis County, at bridge on County Highway 661, about 0.6 mile upstream from mouth, and 4.3 miles northwest of Zim, Minn.	a78	-	10-19-70	38.9
St. Louis River	Lake Superior	NW¼NE¼ sec.15, T.55 N., R.19 W., St. Louis County, at bridge on County Highway 436, 7 miles southwest of Zim, Minn.	-	-	10-19-70	630
St. Louis River tributary	St. Louis River	SE¼NE¼ sec.15, T.55 N., R.19 W., St. Louis County, at culvert on County Highway 83, 6.9 miles northeast of Toivola, Minn.	-	-	10-19-70	1.13
Stone River	St. Louis River	SW¼SE¼ sec.28, T.55 N., R.19 W., St. Louis County, at bridge on County Highway 83, 1.5 miles upstream from mouth, and 4 miles northeast of Toivola, Minn.	-	-	10-19-70	3.40

a Approximately.

Discharge measurements made at miscellaneous sites during water year 1971

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
		Streams tributary to Lake Superior--Continued				
St. Louis River	Lake Superior	SW¼SW¼ sec.29, T.55 N., R.19 W., St. Louis County, at bridge on County Highway 92, 0.4 mile upstream from Swan River and 3.1 miles north of Toivola, Minn.	a1,040	-	10-19-70	6.47
Coons Creek	West Swan River	NW¼SE¼ sec.5, T.55 N., R.21 W., St. Louis County, at County Highway 440, 0.6 mile northwest of Silica, Minn.	-	-	10-21-70	1.76
West Swan River	Swan River	NW¼NW¼ sec.9, T.55 N., R.21 W., St. Louis County, at bridge on State Highway 73, 0.2 mile south of Silica, Minn.	-	-	10-21-70	3.37
West Swan River tributary	West Swan River	NE¼SE¼ sec.36, T.56 N., R.21 W., St. Louis County, 0.2 mile upstream from mouth, about 4 miles northeast of Silica, Minn.	-	-	10-21-70	3.13
West Swan River	Swan River	NE¼NE¼ sec.1, T.55 N., R.21 W., St. Louis County, at bridge on County Highway 57, 4 miles northeast of Silica, Minn.	-	-	10-21-70	8.84
West Swan River tributary	West Swan River	SE¼SE¼ sec.32. T.56 N., R.20 W., St. Louis County, at twin culverts on County Highway 442, 5.6 miles northeast of Silica, Minn.	-	-	10-21-70	1.32
West Swan River	Swan River	NW¼SW¼ sec.11, T.55 N., R.20 W., St. Louis County, at bridge on County Highway 86, 6.6 miles northwest of Toivola, Minn.	-	-	10-21-70	19.0
West Swan River tributary	West Swan River	NW¼NW¼ sec.23, T.55 N., R.20 W., St. Louis County, at culvert on County Highway 750, 5.3 miles north of Toivola, Minn.	-	-	10-21-70	1.68
West Swan River	Swan River	SW¼NW¼ sec.13, T.55 N., R.20 W., St. Louis County, at bridge on County Highway 444, about 0.7 mile upstream from confluence with East Swan River, and 5.8 miles north of Toivola, Minn.	a130	-	10-20-70	20.9
Barber Creek	East Swan River	NE¼NE¼ sec.10, T.57 N., R.20 W., St. Louis County, at culvert on State Highway 92, 4.1 miles east of Hibbing, Minn.	-	-	10-20-70	7.48
Barber Creek	East Swan River	NW¼SE¼ sec.22, T.57 N., R.20 W., St. Louis County, at bridge on county road, about 0.3 mile upstream from State Highway 37, and 4.3 miles southeast of Hibbing, Minn.	-	-	10-20-70	8.08
Barber Creek tributary	Barber Creek	SW¼SW¼ sec.21, T.57 N., R.20 W., St. Louis County, at culvert on State Highway 37, 3.2 miles southeast of Hibbing, Minn.	-	-	10-20-70	26.4
Barber Creek	East Swan River	SE¼NE¼ sec.3, T.56 N., R.20 W., St. Louis County, at bridge on county road, about 1.8 miles upstream from confluence with Dempsey Creek, and 5.9 miles southeast of Hibbing, Minn.	-	-	10-20-70	31.4
Dempsey Creek	East Swan River	SE¼SW¼ sec.1, T.56 N., R.20 W., St. Louis County, at bridge on county road, about 0.6 mile upstream from confluence with Barber Creek, and 7.4 miles southeast of Hibbing, Minn.	-	-	10-20-70	12.5
East Swan River tributary	East Swan River	NW¼SW¼ sec.12, T.56 N., R.20 W., St. Louis County, at bridge on county road, 0.3 mile upstream from mouth, and 7.6 miles southeast of Hibbing, Minn.	-	-	10-20-70	0

a Approximately.

Discharge measurements made at miscellaneous sites during water year 1971

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
		Streams tributary to Lake Superior--Continued				
East Swan River tributary	East Swan River	NE¼SE¼ sec.10, T.56 N., R.20 W., St. Louis County, at bridge on county road, 0.5 mile upstream from mouth, and 7 miles southeast of Hibbing, Minn.	-	-	10-20-70	.62
East Swan River tributary	East Swan River	NE¼NE¼ sec.23, T.56 N., R.20 W., St. Louis County, at culvert on County Highway 444, 0.7 mile upstream from mouth, and 8.8 miles southeast of Hibbing, Minn.	-	-	10-19-70	0
East Swan River	Swan River	SW¼SW¼ sec.23, T.56 N., R.20 W., St. Louis County, at bridge on county road, 1.1 miles south of Onega station on Great Northern Railway, and 9.2 miles south of Hibbing, Minn.	-	-	10-19-70	52.3
East Swan River tributary	East Swan River	NE¼NE¼ sec.35, T.56 N., R.20 W., St. Louis County, at bridge on County Highway 799, 0.6 mile upstream from mouth, and 9 miles north of Toivola, Minn.	-	-	10-19-70	.58
East Swan River tributary	East Swan River	SE¼SE¼ sec.36, T.56 N., R.20 W., St. Louis County, at bridge on County Highway 442, 8 miles north of Toivola, Minn.	-	-	10-19-70	.43
East Swan River tributary	East Swan River	SW¼SW¼ sec.6, T.55 N., R.19 W., St. Louis County, at bridge on County Highway 5, 7.3 miles north of Toivola, Minn.	-	-	10-19-70	.31
Swan River	St. Louis River	Lat 47°15'02", long 92°48'36", in NE¼NE¼ sec.13, T.55 N., R.20 W., St. Louis County, at bridge on County Highway 5, 0.4 mile downstream from confluence of East and West Swan Rivers, 4.4 miles upstream from mouth, and 5.9 miles north of Toivola, Minn.	254	1953-61≠	10-19-70	91.1
Swan River tributary	Swan River	SE¼SE¼ sec.7, T.55 N., R.19 W., St. Louis County, at bridge on County Highway 518, 6 miles north of Toivola, Minn.	-	-	10-19-70	.85
Swan River	St. Louis River	NE¼SW¼ sec.30, T.55 N., R.19 W., St. Louis County, at dead end on County Highway 433, about 0.8 mile upstream from mouth, and 3.5 miles north of Toivola, Minn.	a264	-	10-19-70	84.6
		Red River of the North basin				
Campbell Creek	Pelican River	Lat 46°53'29", long 95°51'57", on line between sec.4, T.139 N., R.41 W., and sec.33, T.140 N., R.41 W., Becker County, at upstream side of 36-inch corrugated metal pipe culvert on county road, 5.3 miles north of Detroit Lakes, Minn.	-	1969-70	10- 5-70	.17
					11-16-70	*.06
					12-15-70	.57
					1-18-71	0
					2-22-71	0
					3-22-71	0
					4- 7-71	13.8
					4-12-71	20.0
					5-10-71	*.14
					6-17-71	.24
					7-12-71	.82
					9-28-71	6.11
Floyd Lake Outlet	Pelican River	Lat 46°52'42", long 95°50'23", in SE¼SE¼ sec.3, T.139 N., R.41 W., Becker County, on upstream side of concrete box culvert on County Highway 21, 3.7 miles northeast of Detroit Lakes, Minn.	-	1969-70	10- 5-70	0
					11-16-70	.21
					12-15-70	.28
					1-18-71	*.21
					2-22-71	.37
					3-23-71	0
					4- 6-71	.89
					5-10-71	6.63
					6-17-71	*3.24
					7-12-71	3.64
					9-28-71	7.87

* Base flow.
≠ Operated as a continuous-record gaging station.
a Approximately.

Discharge measurements made at miscellaneous sites during water year 1971

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
		Red River of the North basin--Continued				
Oxidation Pond Outlet	St. Clair Lake	SE¼NE¼ sec.32, T.139 N., R.41 W., Becker County, at outlet of Oxidation Pond, 1.8 miles west of Detroit Lakes, Minn.	-	1968-70	10- 6-70	.91
					10-26-70	1.10
					11-17-70	1.13
					11-30-70	1.05
					12-15-70	.95
					1-19-71	.96
					2-23-71	.91
					3-22-71	1.03
					4- 6-71	1.12
					5-12-71	.84
					6-16-71	1.04
					7-13-71	1.48
					8-25-71	1.26
					9-28-71	1.58
Pelican River tributary	Pelican River	Lat 46°47'02", long 95°53'07", in NE½ sec.8, T.138 N., R.41 W., Becker County, at State Fish Hatchery, on left downstream abutment of bridge over outlet from rearing ponds, 1,000 ft north of Muskrat Lake Outlet and 3 miles southwest of Detroit Lakes, Minn.	-	1968-70	10- 6-70	.20
					11-17-70	.27
					12-16-70	*.20
					1-20-71	*.16
					2-23-71	.18
					3-23-71	.43
					4- 7-71	.54
					5-11-71	*.49
					6-17-71	*.41
					7-13-71	*.33
					8-25-71	*.15
					9-28-71	*.10
Monson Lake Outlet	Pelican River	Lat 46°47'15", long 95°53'30", in NW¼ sec.8, T.138 N., R.41 W., Becker County, 50 ft upstream from culvert, 100 ft downstream from Monson Lake, 800 ft upstream from Lake Sallie, and 3 miles southwest of Detroit Lakes, Minn.	-	1968-70	10- 6-70	0
					11-17-70	.01
					12-16-70	0
					1-20-71	0
					2-23-71	0
					3-23-71	0
					4- 7-71	0
					5-11-71	.41
					6-16-71	*.16
					7-13-71	.49
					8-25-71	*.02
					9-28-71	.07
Fox Lake Outlet	Pelican River	Lat 46°46'24", long 95°54'37", in NE¼ sec.18, T.138 N., R.41 W., Becker County, 500 ft downstream from Fox Lake, 800 ft upstream from Lake Sallie, and 4.5 miles southwest of Detroit Lakes, Minn.	-	1968-70	10- 6-70	0
					11-17-70	.01
					12-15-70	.78
					1-19-71	.98
					2-23-71	.90
					3-23-71	.79
					4- 6-71	1.15
					5-11-71	1.49
					6-16-71	*.02
					7-13-71	1.48
					8-25-71	*.38
					9-28-71	.38
Pelican River	Otter Tail River	NE¼SW¼ sec.31, T.138 N., R.41 W., Becker County, at highway crossing at Buck's Mill, 6.5 miles southwest of city of Detroit Lakes, Minn.	123	1942-52≠, 1968-70	10-27-70	.53
					11-17-70	8.46
					12-16-70	11.0
					1-20-71	18.6
					2-23-71	24.7
					3-23-71	33.7
					4- 7-71	42.4
					7-13-71	32.7
Wild Rice River	Red River of the North	On line between sec.13, T.144 N., R.46 W., and sec.18, T.144 N., R.45 W., Norman County, at bridge on County Highway 24, 0.3 mile south of State Highway 31, and 3.2 miles southeast of Ada, Minn.	-	1945-51, 1965-70	4- 8-71	1,010
South Branch Wild Rice River	Wild Rice River	On line between secs.8 and 9, T.142 N., R.45 W., Clay County, at bridge on County Highway 63, 5.5 miles northeast of Felton, Minn.	a180	1959-70	3-31-71	320
					4- 9-71	101

* Base flow.
≠ Operated as a continuous-record gaging station.
a Approximately.

Discharge measurements made at miscellaneous sites during water year 1971

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
		Red River of the North basin--Continued				
State ditch No. 45	Wild Rice River	On line between secs.15 and 16, T.141 N., R.46 W., Clay County, at culvert on State Highway 9, 3 miles south of Felton, Minn.	a45	1959-70	3-31-71	25.5
Red Lake River	Red River of the North	Lat 47°55'24", long 97°00'59", in SW¼SW¼ sec.1, T.15 N., R.49 W., Polk County, at bridge on State Highway 220 in East Grand Forks, Minn., 0.3 mile upstream from mouth.	a5,660	1903, 1906, 1908, 1910-11, 1918, 1964, 1970	10-13-70 11-17-70 5- 4-71 5-26-71 9-14-71	707 656 1,740 1,740 596
Snake River	Red River of the North	Lat 48°11'50", long 96°46'45", in SE¼ sec.36, T.155 N., R.48 W., Marshall County, at highway bridge on Minnesota Street in Warren, Minn.	a260	1945, 1953-56	4- 8-71 4-13-71	381 55.3
Middle River	Snake River	SW¼SW¼ sec.25, T.157 N., R.46 W., Marshall County, at County Road 114, 5.8 miles southeast of Florian and 10 miles west of Newfolden, Minn.	-	-	8-18-71 9-15-71	0 0
Middle River	Snake River	SE¼SE¼ sec.5, T.156 N., R.46 W., Marshall County, at county road 6.1 miles southeast of Florian, and about 11 miles west of Argyle, Minn.	-	-	8-18-71 9-15-71	.19 .09
Middle River	Snake River	NE¼NE¼ sec.14, T.156 N., R.47 W., Marshall County, at County Highway 1, at Alma, 7.4 miles east of Argyle, Minn.	-	-	8-18-71 9-15-71	0 0
Two Rivers	Red River of the North	Lat 48°46'30", long 96°55'52", in SE¼SE¼ sec.12, T.161 N., R.49 W., Kittson County, at bridge on County Highway 3, at east edge of Hallock, and 0.25 mile downstream from South Branch.	625	1911-14≠, 1929-30≠, 1941-43≠, 1967-70	4- 9-71 4-13-71 4-21-71	1,100 1,390 1,160
Roseau River	Red River of the North	SW¼ sec.13, T.162 N., R.40 W., Roseau County, at bridge on State Highway 11, at Roseau, Minn.	-	1911-14, 1943, 1967-70	4-10-71	1,400
		Lake of the Woods basin				
Shagawa Lake tributary	Shagawa Lake	NW¼SE¼ sec.20, T.63 N., R.12 W., St. Louis County, on County Highway 88, 2 miles northwest of Ely, Minn.	-	1969-70	10-28-70 12- 3-70 4-13-71 4-15-71 4-17-71 4-19-71 4-20-71 5-19-71	6.47 .98 11.9 10.9 26.3 20.0 18:2 .70
Little Fork River	Rainy River	SE¼NE¼ sec.13, T.62 N., R.19 W., St. Louis County, at bridge on U.S. Highway 53, 0.6 mile west of Cook, Minn.	-	1950, 1958-70	4-16-71 4-21-71 5-20-71	374 519 58.4
Rice River	Little Fork River	Lat 42°30'00", long 92°38'40", in SW¼SW¼ sec.4, T.60 N., R.18 W., St. Louis County, at bridge on U.S. Highway 53, 1.7 miles south of Idington, Minn.	-	1958-62	10-22-70	42.4
Johnson Creek	Rice River	SE¼SE¼ sec.31, T.61 N., R.18 W., St. Louis County, at triple culverts on County Highway 111, 0.5 mile upstream from mouth, and 1.7 miles southwest of Idington, Minn.	-	-	10-22-70	9.17
Rice River tributary	Rice River	NE¼NE¼ sec.29, T.61 N., R.18 W., St. Louis County, at culvert on county road, 0.6 mile north of Idington, Minn.	-	-	10-22-70	.20
Rice River	Little Fork River	NE¼SE¼ sec.30, T.61 N., R.18 W., St. Louis County, at bridge on County Highway 779, 1.1 miles west of Idington, Minn.	-	-	10-22-70	67.2

≠ Operated as a continuous-record gaging station.
a Approximately.

Discharge measurements made at miscellaneous sites during water year 1971

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
		Lake of the Woods basin--Continued				
Rice River tributary	Rice River	SW¼NW¼ sec.19, T.61 N., R.18 W., St. Louis County, at culvert on County Highway 912, 2.6 miles southwest of Shermans Corner, Minn., and 3.3 miles southwest of Angora, Minn.	-	-	10-22-70	1.27
Rice River tributary	Rice River tributary	NE¼NW¼ sec.30, T.61 N., R.18 W., St. Louis County, at culvert on County Highway 82, 2 miles northwest of Idington, Minn.	-	-	10-22-70	2.01
Rice River	Little Fork River	NW¼NE¼ sec.19, T.61 N., R.18 W., St. Louis County, at bridge on County Highway 113, 1.9 miles southwest of Shermans Corner, Minn., and 2.6 miles southwest of Angora, Minn.	-	-	10-22-70	59.8
Rice River tributary	Rice River	SW¼SE¼ sec.17, T.61 N., R.18 W., St. Louis County, at culvert on County Highway 113, 1.4 miles south of Shermans Corner, Minn., and 1.8 miles north of Idington, Minn.	-	-	10-21-70	b.01
Rice River tributary	Rice River tributary	SW¼SW¼ sec.17, T.61 N., R.18 W., St. Louis County, at culvert on County Highway 113, 1.5 miles southwest of Shermans Corner, Minn., and 2 miles southwest of Angora, Minn.	-	-	10-21-70	b.1
Rice River tributary	Rice River	NW¼SE¼ sec.8, T.61 N., R.18 W., St. Louis County, at culvert on County Highway 22, at Shermans Corner, Minn., and 1.1 miles northwest of Angora, Minn.	-	-	10-21-70	.10
Rice River	Little Fork River	SE¼SW¼ sec.9, T.61 N., R.18 W., St. Louis County, at bridge on County Highway 22, 0.6 mile west of Angora, Minn.	-	-	10-21-70	67.9
Rice River tributary	Rice River	SE¼SW¼ sec.9, T.61 N., R.18 W., St. Louis County, at culvert on County Highway 22, on west edge of Angora, Minn.	-	-	10-21-70	.06
Rice River tributary	Rice River	SE¼SW¼ sec.10, T.61 N., R.18 W., St. Louis County, at twin culverts on County Highway 22, 0.6 mile east of Angora, Minn.	-	-	10-21-70	1.54
Rice River tributary	Rice River tributary	SW¼SW¼ sec.10, T.61 N., R.18 W., St. Louis County, at culvert on County Highway 22, 0.1 mile east of Angora, Minn.	-	-	10-21-70	b.01
Rice River tributary	Rice River	SW¼SW¼ sec.2, T.61 N., R.18 W., St. Louis County, at culvert on County Highway 421, 0.2 mile upstream from mouth, and 1.6 miles northeast of Angora, Minn.	-	-	10-21-70	b.2
Sassas Creek	Rice River	SW¼NW¼ sec.2, T.61 N., R.18 W., St. Louis County, at twin culverts on County Highway 421, 2 miles northeast of Angora, Minn.	-	-	10-21-70	6.08
Rice River	Little Fork River	NE¼NE¼ sec.3, T.61 N., R.18 W., St. Louis County, at bridge on County Highway 87, 2.1 miles northeast of Angora, Minn.	-	-	10-21-70	76.5
Dark River	Sturgeon River	NE¼NW¼ sec.12, T.59 N., R.19 W., St. Louis County, at bridge on County Highway 109, 6.9 miles northwest of Mountain Iron, Minn.	-	-	10-21-70	10.9

b Estimated.

Discharge measurements made at miscellaneous sites during water year 1971

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
Lake of the Woods basin--Continued						
Dark River	Sturgeon River	SE¼NE¼ sec.3, T.59 N., R.19 W., St. Louis County, at bridge on County Highway 20, 7.6 miles north of Kinney, Minn.	-	-	10-21-70	12.4
Dark River tributary	Dark River	SE¼SW¼ sec.34, T.60 N., R.19 W., St. Louis County, at culvert on county road, 8.4 miles north of Kinney, Minn.	-	-	10-21-70	.76
Dark River	Sturgeon River	SE¼SW¼ sec.33, T.60 N., R.19 W., St. Louis County, at twin box culverts on County Highway 25, 0.6 mile upstream from Dark Lake, and 9.6 miles north of Buhl, Minn.	-	-	10-21-70	23.6
Dark River	Sturgeon River	NE¼SW¼ sec 32, T.60 N., R.19 W., St. Louis County, at dead end on County Highway 663, 800 ft downstream from Dark Lake, and 10 miles north of Buhl, Minn.	-	-	10-22-70	28.9
Dark River tributary	Dark River	N½ sec.30, T.60 N., R.19 W., St. Louis County, at box culvert on County Highway 445, 0.3 mile south of junction with County Highway 65, and 11.4 miles north of Buhl, Minn.	-	-	10-22-70	1.28
Knuckey Creek	Dark River	SE¼NE¼ sec.29, T.60 N., R.19 W., St. Louis County, at box culvert on County Highway 25, about 1 mile upstream from mouth, and 11.1 miles north of Buhl, Minn.	-	-	10-21-70	3.62
Leander Creek	Dark River	SE¼NE¼ sec.20, T.60 N., R.19 W., St. Louis County, at culvert on County Highway 25, 1.7 miles upstream from mouth, and 12.1 miles north of Buhl, Minn.	-	-	10-22-70	.66
Dark River	Sturgeon River	SE¼SE¼ sec.3, T.60 N., R.20 W., St. Louis County, at bridge on County Highway 110, about 0.6 mile upstream from mouth, and 9.4 miles southwest of Idington, Minn.	a53	-	10-21-70	41.4
Big Fork River	Rainy River	Sec.12, T.149 N., R.27 W., Itasca County, at bridge on County Highway 29, at Dora Lake, Minn.	-	1965-70	2-16-71 4-26-71 6- 2-71	94.6 779 516
County ditch No. 6	Warroad River	SW¼SE¼ sec.31, T.162 N., R.36 W., Roseau County, at bridge at mouth, 1 mile southeast of Warroad, Minn.	-	1967, 1969	4-10-71 4-14-71	4.07 .68
Prairie River basin						
Prairie River	Mississippi River	Lat 47°13'59", long 93°29'15", in NW¼SW¼ sec.14, T.55 N., R.25 W., Itasca County, at bridge on U.S. Highway 169, 0.5 mile northeast of Grand Rapids, Minn.	-	1970	4-22-71	2,920
Prairie River	Mississippi River	SW¼NE¼ sec.26, T.55 N., R.25 W., Itasca County, at bridge on U.S. Highway 2, 1 mile upstream from mouth, and 2.5 miles southeast of Grand Rapids, Minn.	-	-	10- 1-70	22.5
Swan River basin						
Panasa Lake Outlet	Swan River	NW¼SE¼ sec.34, T.56 N., R.23 W., Itasca County, 400 ft upstream from mouth, 2,000 ft downstream from Panasa Lake, and 2.8 miles southeast of Calumet, Minn.	-	-	10-19-70	8.36
Swan River	Mississippi River	NE¼SE¼ sec.31, T.56 N., R.23 W., Itasca County, at bridge on county road, 2.2 miles south of Marble, Minn.	-	-	10-19-70	61.7

a Approximately.

Discharge measurements made at miscellaneous sites during water year 1971

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
		Swan River basin--Continued				
Swan River tributary	Swan River	NW¼SW¼ sec.31, T.56 N., R.23 W., Itasca County, on upstream left bank of County Highway 69, 2.5 miles southwest of Marble, Minn.	-	-	10-19-70	0
Twin Lakes Outlet	Swan River	SE¼SW¼ sec.25, T.56 N., R.24 W., Itasca County, at Twin Lakes Outlet, 2.2 miles southwest of Marble, Minn.	-	-	10-19-70	1.58
Holman Lake Outlet	Swan River	SW¼SW¼ sec.25, T.56 N., R.24 W., Itasca County, at Holman Lake Outlet, 2.4 miles southeast of Taconite, Minn.	-	-	10-19-70	0
Swan River	Mississippi River	NE¼NE¼ sec.15, T.55 N., R.24 W., Itasca County, at bridge on County Highway 70, 4.2 miles south of Taconite, Minn.	-	-	10-19-70	65.1
Trout Creek	Swan River	SW¼SE¼ sec.15, T.55 N., R.24 W., Itasca County, at bridge on County Highway 10, 4.2 miles north of Blackberry, Minn.	-	-	10-19-70	1.58
Swan River tributary	Swan River	NE¼SW¼ sec.23, T.55 N., R.24 W., Itasca County, at culvert on county road, 5.3 miles southeast of Bovey, Minn.	-	-	10-19-70	.34
Swan River	Mississippi River	NE¼NW¼ sec.26, T.55 N., R.24 W., Itasca County, at bridge on County Highway 71, 6.5 miles southeast of Bovey, Minn.	-	-	10-19-70	64.2
Swan River	Mississippi River	NW¼SE¼ sec.32, T.55 N., R.23 W., Itasca County, at bridge on County Highway 10, 5 miles northeast of Blackberry, Minn.	-	-	10-19-70	67.4
Swan River tributary	Swan River	SW¼SE¼ sec.32, T.55 N., R.23 W., Itasca County, just upstream from mouth, 5.2 miles northeast of Blackberry, Minn.	-	-	10-20-70	11.5
Swan River tributary	Swan River	NW¼SE¼ sec.8, T.54 N., R.23 W., Itasca County, at bridge on County Highway 10, 7.2 miles west of Goodland, Minn.	-	-	10-20-70	0
Swan River tributary	Swan River	SW¼NW¼ sec.9, T.54 N., R.23 W., Itasca County, at bridge on county road, 0.1 mile north of junction with County Highway 444, and 6.9 miles west of Goodland, Minn.	-	-	10-20-70	1.22
Swan River	Mississippi River	NW¼SW¼ sec.9, T.54 N., R.23 W., Itasca County, at bridge on County Highway 444, 6.9 miles west of Goodland, Minn.	-	-	10-20-70	78.7
Swan River tributary	Swan River	NE¼NE¼ sec.21, T.54 N., R.23 W., Itasca County, at highway bridge in Warba, Minn.	-	-	10-20-70	1.67
Swan River tributary	Swan River	NE¼SE¼ sec.20, T.54 N., R.23 W., Itasca County, at bridge on County Highway 10, 0.7 mile north of junction with U.S. Highway 2, in Warba, Minn.	-	-	10-20-70	b.01
Swan River tributary	Swan River	SE¼NE¼ sec.29, T.54 N., R.23 W., Itasca County, at culvert on County Highway 10, 0.3 mile north of junction with U.S. Highway 2, in Warba, Minn.	-	-	10-20-70	b.02
Swan River tributary	Swan River	NE¼SE¼ sec.33, T.54 N., R.23 W., Itasca County, at culvert on county road, 0.3 mile upstream from mouth, and 1.2 miles south of Warba, Minn.	-	-	10-20-70	.89
Swan River	Mississippi River	Lat 47°06'40", long 93°15'50", in SE¼ sec.33, T.54 N., R.23 W., at bridge on County Highway 72, 1.4 miles south of Warba, Minn.	254	1954-69≠	10-20-70	87.8

≠ Operated as a continuous-record gaging station.
b Estimated.

Discharge measurements made at miscellaneous sites during water year 1971

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
		Crow Wing River basin				
Little Sand Lake Outlet	Crow Wing River	NE¼ sec.36, T.141 N., R.34 W., Hubbard County, 0.5 mile downstream from Little Sand Lake, and 3 miles northeast of Dorset.	b74	1930-41≠, 1942, 1956-70	10- 5-70	12.4
		Mississippi River main stem				
Mississippi River	Gulf of Mexico	Lat 45°32'58", long 94°08'48", in SW¼ sec.1, T.35 N., R.31 W., Stearns County, at bridge on 10th St. South in St. Cloud, Minn., 500 ft upstream from dam at St. Cloud State College, and 2.9 miles downstream from Sauk River.	-	1967-69	4-14-71	24,500
		Elk River basin				
St. Francis River	Elk River	Lat 45°32'30", long 93°48'50", in NE¼ sec.10, T.35 N., R.28 W., Sherburne County, on right bank, 0.2 mile east of Santiago, Minn., and 0.4 mile upstream from bridge on county road.	-	1965-70≠	10- 1-70	1.23
St. Francis River	Elk River	Lat 45°23'07", long 93°44'02", in NW¼NW¼ sec.5, T.35 N., R.27 W., Sherburne County, on right bank, 1.6 miles north of Big Lake, Minn., and 4 miles upstream from mouth.	-	1965-70≠	10- 1-70	32.5
		Crow River basin				
South Fork Crow River	Crow River	Lat 44°53'44", long 94°22'08", in SE¼SW¼ sec.31, T.117 N., R.29 W., McLeod County, at bridge on State Highways 15 and 22, at Otter Lake outlet in Hutchinson, Minn.	-	1947, 1965, 1967, 1969	3-31-71	748
Buffalo Creek	South Fork Crow River	At center of sec.13, T.115 N., R.28 W., McLeod County, at bridge on County Highway 75 (Pleasant Ave.) Glencoe, Minn.	-	1947, 1968-69	4- 1-71	898
South Fork Crow River	Crow River	NE¼SE¼ sec.11, T.118 N., R.25 W., Wright County, at bridge on Bridge Avenue in Delano, Minn.	-	1962-63, 1966-69	3-31-71	2,820
		Elm Creek basin				
Elm Creek	Mississippi River	Lat 45°11'04", long 93°24'06", on line between sec.19, T.120 N., R.21 W., and sec.24, T.120 N., R.22 W., Hennepin County, at bridge on Cartway Road, at south edge of Champlin, Minn.	-	1969-70	10-20-70 11-10-70 12-21-70 1-29-71 2-24-71 3-30-71 4-29-71 6- 3-71 7-21-71 8- 6-71 9-16-71	*5.57 39.7 *6.10 *2.69 *.85 147 53.3 67.7 *36.0 *9.45 *5.95
		Coon Creek basin				
Coon Creek	Mississippi River	Lat 45°09'00", long 93°17'49", in NW¼NE¼ sec.26, T.31 N., R.24 W., Anoka County, at bridge on Coon Rapids Boulevard, at southeast edge of Coon Rapids, Minn.	-	1932-34, 1936, 1941, 1955-56, 1969-70	10-20-70 11-10-70 12-21-70 1-29-71 2-24-71 3-30-71 4-29-71 6- 3-71 7-21-71 8- 6-71 9-16-71	*34.7 153 *132 *38.0 *37.4 112 94.7 81.3 *32.6 *25.6 *24.8

* Base flow.
≠ Operated as a continuous-record gaging station.
b Estimated.

Discharge measurements made at miscellaneous sites during water year 1970

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
		Rice Creek basin				
Rice Creek	Mississippi River	Lat 45°05'30", long 93°15'47", on line between secs.14 and 15, T.30 N., R.24 W., Anoka County, at culvert on State Highway 47 (University Avenue), at north edge of Fridley, Minn.	-	1969-70	10-20-70	*21.5
					11-10-70	203
					12-21-70	*83.9
					1-29-71	*14.5
					2-24-71	*18.8
					3-30-71	96.6
					4-29-71	147
					6- 3-71	88.1
					7-21-71	*40.3
					8- 6-71	*28.1
					9-16-71	*16.1
		Shingle Creek basin				
Shingle Creek	Mississippi River	Lat 45°04'45", long 93°18'55", in NE¼NW¼ sec.35, T.119 N., R.21 W., Hennepin County, at bridge on 69th Avenue North, in Brooklyn Center, Minn.	-	1969-70	10-20-70	*10.1
					11-10-70	48.2
					12-21-70	*30.8
					1-29-71	*40.7
					2-24-71	*35.8
					3-30-71	47.7
					4-29-71	34.3
					6- 3-71	39.0
					7- 8-71	54.3
					8- 3-71	*19.0
					9-16-71	*8.50
		Bassett Creek basin				
Bassett Creek	Mississippi River	W½ sec.28, T.118 N., R.21 W., Hennepin County, at bridge on County Highway 66, in Golden Valley, Minn., and 0.2 mile west of underpass on State Highway 100.	-	1963-70	10-19-70	*5.54
					11- 9-70	108
					11-24-70	*11.4
					4-27-71	17.6
					6- 2-71	29.1
					7-20-71	*15.2
					9-15-71	*4.46
North Fork Bassett Creek	Bassett Creek	NW¼ sec.21, T.118 N., R.21 W., Hennepin County, at culvert on 34th Avenue North at Crystal, Minn., and 0.8 mile upstream from mouth.	-	1963-70	10-19-70	*.48
					11- 9-70	31.4
					11-24-70	.5
					4-27-71	1.43
					6- 2-71	11.7
					7-20-71	*.42
					9-15-71	0
South Fork Bassett Creek	Bassett Creek	Near center of W½ sec.19, T.29 N., R.24 W., Hennepin County, at culvert on Olsen Memorial Highway, 0.25 mile east of State Highway 100, in Golden Valley, Minn.	-	1963-69	11- 9-70	41.1
					11-25-70	*.69
Bassett Creek	Mississippi River	SE¼ sec.20, T.29 N., R.24 W., Hennepin County, at Fruen Mill, Minneapolis, Minn., and 700 feet downstream from Glenwood Avenue.	41.6	1952, 1954-55, 1963-70	10-19-70	*8.23
					11-12-70	139
					11-25-70	*16.2
					4-27-71	23.4
					6- 2-71	35.4
					7-20-71	*17.4
					9-15-71	*6.73
		Minnesota River basin				
Chippewa River diversion	Minnesota River	On line between secs.15 and 16, T.118 N., R.41 W., Chippewa County, at weir at bridge on county road, 1 mile north of Watson, Minn.	-	1943-58, 1960-67, 1969-70	10-21-70	11.6
					11-18-70	0
					3-31-71	730
					4-28-71	21.2
					6- 3-71	206
					7- 9-71	387
					8-11-71	3.08
					9-15-71	25.7
Chippewa River	Minnesota River	On line between secs.15 and 22, T.118 N., R.41 W., Chippewa County, downstream from diversion channel, at culvert and spillway at bridge on County Highway 13, 1 mile northeast of Watson, Minn.	a2,050	1910-17≠, 1931-36≠, 1937, 1943-58, 1960-67, 1969-70	10-21-70	70.3
					3-31-71	680
					4-28-71	434
					6- 3-71	590
					7- 9-71	784
					8-11-71	98.5
					9-15-71	48.0

* Base flow.
≠ Operated as a continuous-record gaging station.
a Approximately.

Discharge measurements made at miscellaneous sites during water year 1971

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
		Minnesota River basin--Continued				
Minnesota River	Mississippi River	SW¼SW¼ sec.32, T.116 N., R.39 W., Yellow Medicine County, at bridge on U.S. Highway 212, at Granite Falls, Minn.	-	1969	4- 6-71	2,840
Birch Coulee Creek tributary	Birch Coulee Creek	On line between secs.29 and 30, T.114 N., R.34 W., Renville County, at culvert on gravel road, 1 mile upstream from mouth, and 7 miles north of Morton, Minn.	0.62	-	6-11-71	✓155
Birch Coulee Creek	Minnesota River	On line between sec.32, T.113 N., R.34 W., and sec.29, T.114 N., R.34 W., Renville County, at culvert on County Highway 50, 0.2 mile downstream from an unnamed right bank tributary, 6 miles north of Morton, Minn., and 10 miles upstream from mouth.	14.8	-	6-11-71	✓1,890
Birch Coulee Creek tributary	Birch Coulee Creek	On line between secs.8 and 9, T.113 N., R.34 W., Renville County, at culvert on gravel road, about 1.5 miles upstream from mouth, and 4 miles north of Morton, Minn.	1.59	-	6-11-71	✓513
Cottonwood River	Minnesota River	NW¼NE¼ sec.19, T.109 N., R.34 W., Brown County, at bridge on County Highway 5, in Springfield, Minn.	-	1969	3-16-71	2,340
Minnesota River	Mississippi River	Lat 44°12'00", long 94°11'36", in E½ sec.33, T.109 N., R.28 W., Blue Earth County, at bridge on County Highway 42, 0.3 mile northeast of Judson, Minn., and 11 miles upstream from Blue Earth, Minn.	a11,200	1938-50≠, 1967-69	4- 7-71	7,310
Center Creek	Blue Earth River	N¾NW¼ sec.5, T.102 N., R.30 W., Martin County, at bridge on County Highway 59, in Fairmont, Minn.	-	1969	8-19-71	*.01
Minnesota River	Mississippi River	SE¼NW¼ sec.28, T.110 N., R.26 W., Nicollet County, at bridge on State Highway 22, in St. Peter, Minn.	-	-	3-20-71	22,900
Minnesota River	Mississippi River	NE¼NE¼ sec.21, T.110 N., R.26 W., Nicollet County, at bridge on State Highway 99, in St. Peter, Minn.	-	-	4- 8-71	15,000
Carver Creek	Minnesota River	Lat 44°45'01", long 93°39'00", in SW¼SE¼ sec.24, T.115 N., R.24 W., Carver County, at bridge on County Highway 40, 1.6 miles upstream from mouth, and 1.5 miles southwest of Carver, Minn.	-	1968-70	10-14-70	11.9
					11-10-70	72.7
					11-18-70	*51.8
					12-16-70	*14.3
					1-26-71	*4.64
					3-25-71	139
					5- 3-71	37.6
					6- 7-71	54.0
					7-12-71	55.5
					8- 4-71	*18.7
					9-20-71	*4.15
Riley Creek	Minnesota River	Lat 44°49'23", long 93°28'48", on line between secs.28 and 29, T.116 N., R.22 W., Hennepin County, at culvert on County Highway 4, 2.2 miles south of Eden Prairie, Minn.	-	1969-70	10-14-70	.81
					11-10-70	.96
					11-19-70	*1.28
					12-16-70	*1.24
					1-26-71	*.91
					2-18-71	*.76
					3-25-71	2.11
					5- 3-71	5.42
					6- 7-71	6.05
					7-12-71	17.2
					8- 4-71	*2.06
					9-20-71	*1.05

* Base flow.
✓ Peak flow.
≠ Operated as a continuous-record gaging station.
a Approximately.

Discharge measurements made at miscellaneous sites during water year 1971

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
		Minnesota River basin--Continued				
Purgatory Creek	Minnesota River	Lat 44°49'38", long 93°25'20", in SE¼NE¼ sec.26, T.116 N., R.22 W., Hennepin County, at culvert on County Highway 1, at Eden Prairie, Minn.	-	1968-70	10-14-70 11-10-70 11-19-70 12-16-70 1-26-71 2-18-71 3-25-71 5- 3-71 6- 7-71 7-12-71 8- 4-71 9-20-71	12.5 32.3 *29.6 *6.39 *3.20 *.96 42.1 16.1 16.0 28.3 *3.95 *1.48
Eagle Creek	Minnesota River	Lat 44°46'13", long 93°23'52", in SW¼NW¼ sec.18, T.115 N., R.21 W., Scott County, 30 ft upstream from Boiling Springs, just inside the western boundary of Savage, Minn., and 1.1 miles southwest of the intersection of State Highways 13 and 101.	-	-	9-24-71	*.39
Eagle Creek tributary	Eagle Creek	Lat 44°46'13", long 93°23'52", in SW¼NW¼ sec.18, T.115 N., R.21 W., Scott County, 20 ft upstream from Boiling Springs, just inside the western boundary of Savage, Minn., and 1.1 miles southwest of the intersection of State Highways 13 and 101.	-	-	9-24-71	*.20
Eagle Creek	Minnesota River	Lat 44°46'14", long 93°23'52", in SW¼NW¼ sec.18, T.115 N., R.21 W., Scott County, 40 ft downstream from Boiling Springs, just inside the western boundary of Savage, Minn., and 1.1 miles southwest of the intersection of State Highways 13 and 101.	-	-	9-24-71	*2.89
		Mississippi River main stem				
Mississippi River	Gulf of Mexico	At Hastings, Dakota County, Minn.	a37,100	1928, 1931-39, 1941-57, 1959-70	4-13-71 5-17-71 9- 2-71	49,700 13,800 5,670
		St. Croix River basin				
Kettle River	St. Croix River	NE¼NW¼ sec.26, T.41 N., R.20 W., Pine County, at bridge on State Highway 48, 4.5 miles east of Hinckley, Minn.	-	1966-69	4-16-71	7,080
Valley Branch	St. Croix River	Lat 44°54'40", long 92°46'48", in NW¼SW¼ sec.14, T.28 N., R.20 W., Washington County, at bridge on State Highway 95, 0.3 mile upstream from mouth, and 0.6 mile north of Afton, Minn.	13.0	1967, 1969-70	10-16-70 11-23-70 12-17-70 1-20-71 2-19-71 3-26-71 5- 6-71 6-11-71 7-16-71 8-10-71 9-23-71	*9.99 *8.84 *11.5 *9.13 *10.6 11.2 10.4 12.7 10.8 *10.0 11.0
St. Croix River	Mississippi River	At Prescott, Pierce County, Wis.	a7,650	1928-30, 1932-39, 1946-48, 1950, 1953-57, 1959-70	4-13-71	28,900
		Mississippi River main stem				
Mississippi River	Gulf of Mexico	W½NW¼ sec.10, T.113 N., R.15 W., Goodhue County, at U.S. Corps of Engineers Lock and Dam No. 3, 5.1 miles northwest of Red Wing, Minn., and at mile 796.9 upstream from Ohio River.	-	1940-41	5-12-71 8- 3-71	28,700 10,400

* Base flow.
a Approximately.

Discharge measurements made at miscellaneous sites during water year 1971

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
		Vermillion River basin				
Vermillion River	Mississippi River	Lat 44°40'00", long 93°03'17", on line between secs.23 and 24, T.114 N., R.19 W., Dakota County, at bridge on County Highway 79, 2 miles northwest of Empire City, and 3.7 miles southwest of Coates, Minn.	110	1942-45≠, 1969-70	5- 6-71 6-10-71 7-15-71 9-23-71	45.7 61.0 89.0 33.1
Vermillion River	Mississippi River	Lat 44°43'12", long 92°51'57", in SE¼SW¼ sec.33, T.115 N., R.17 W., Dakota County, at bridge on County Highway 47 in Hastings, 0.7 mile upstream from mill dam, and 3 miles upstream from Vermillion Slough.	195	1935-38, 1940-41, 1942-47≠, 1949, 1952, 1965-70	3-16-71 5- 6-71 6-10-71 7-16-71 9-23-71	238 84.3 80.3 163 48.0
		Cannon River basin				
Cannon River	Mississippi River	SW¼NE¼ sec.30, T.110 N., R.20 W., Rice County, at mill dam, 0.1 mile upstream from State Highway 3, 0.3 mile upstream from Straight River, in Faribault, Minn.	a341	1965-70	10-26-70 12- 1-70 1- 5-71 2- 8-71 3-16-71 4-19-71 5-24-71 6-28-71 9-13-71	190 *343 *113 *63.4 420 605 195 213 *16.3
Straight River	Cannon River	Lat 44°05'04", long 93°13'48", at center of SE¼ sec.9, T.107 N., R.20 W., Steele County, at bridge on West Bridge Street, in Owatonna, Minn.	209	1961, 1966-70	10-27-70 12- 1-70 3-17-71 4- 1-71 4-20-71 5-25-71 6-29-71 9-13-71	159 *117 675 1,080 137 230 79.5 *11.6
Crane Creek	Straight River	SE¼NW¼ sec.20, T.108 N., R.20 W., Steele County, at culvert on service road, 1 mile northwest of Clinton Falls, Minn.	105	1965-70	10-26-70 12- 1-70 1- 6-71 2- 9-71 4-20-71 5-25-71 6-28-71 9-13-71	67.8 *73.1 *5.45 *4.75 80.0 98.2 38.6 *3.26
Cannon River	Mississippi River	Lat 44°29'17", long 93°07'42", in SW¼SE¼ sec.20, T.112 N., R.19 W., Dakota County, at bridge on county road, 0.7 mile east of Waterford, Minn.	a915	1970	8- 6-71	*99.9
		Zumbro River basin				
South Fork Zumbro River	Zumbro River	SE¼SE¼ sec.8, T.106 N., R.14 W., Olmsted County, at bridge on County Highway D (Bamber Valley Road SW), just downstream from Mayowood Lake, and 3.2 miles southwest of Rochester, Minn.	-	-	3-15-71	1,360
Zumbro River	Mississippi River	NW¼SE¼ sec.22, T.110 N., R.10 W., Wabasha County, at bridge on U.S. Highway 61, at Kellogg, Minn.	a1,400	1932-33, 1935-36, 1938-39, 1945, 1962, 1970	8-12-71	*440
		Mississippi River main stem				
Mississippi River	Gulf of Mexico	Lat 43°48'45", long 91°15'25", in sec.31, T.16 N., R.7 W., La Crosse County, at La Crosse, Wis., 0.4 mile downstream from La Crosse River, and at mile 697.8 upstream from Ohio River.	a62,800	1929-55≠, 1965-67, 1969	4-20-71 4-27-71 5- 5-71	130,000 79,800 62,200

* Base flow.
≠ Operated as a continuous-record gaging station.
a Approximately.

Discharge measurements made at miscellaneous sites during water year 1971

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
		Root River basin				
Root River	Mississippi River	On line between secs.14 and 24, T.104 N., R.8 W., Fillmore County, at bridge on U.S. Highway 16 and State Highway 43, at south boundary of Rushford, Minn., and 0.3 mile upstream from Rush Creek.	a1,010	1952, 1967, 1969	3-16-71 4- 1-71	3,950 11,500
Root River	Mississippi River	Lat 43°45'57", long 91°20'42", in NE¼SW¼ sec.32, T.104 N., R.4 W., Houston County, at bridge on U.S. Highway 16, at Hokah, Minn.	a1,630	1967	8-18-71	*593
		Iowa River basin				
Cedar River	Iowa River	Lat 43°42'25", long 92°57'37", in SE¼SW¼ sec.23, T.103 N., R.18 W., Mower County, at bridge on County Highway 25, 2.8 miles north of Austin, Minn.	-	-	9-14-71	*16.2
Cedar River	Iowa River	Lat 43°30'00", long 93°00'07", in SE¼SW¼ sec.33, T.101 N., R.18 W., Mower County, at bridge on county road on Minnesota-Iowa State line, 2.9 miles southwest of Lyle, Minn.	-	-	9-14-71	*68.5

* Base flow.
a Approximately.

PART 2. WATER QUALITY RECORDS

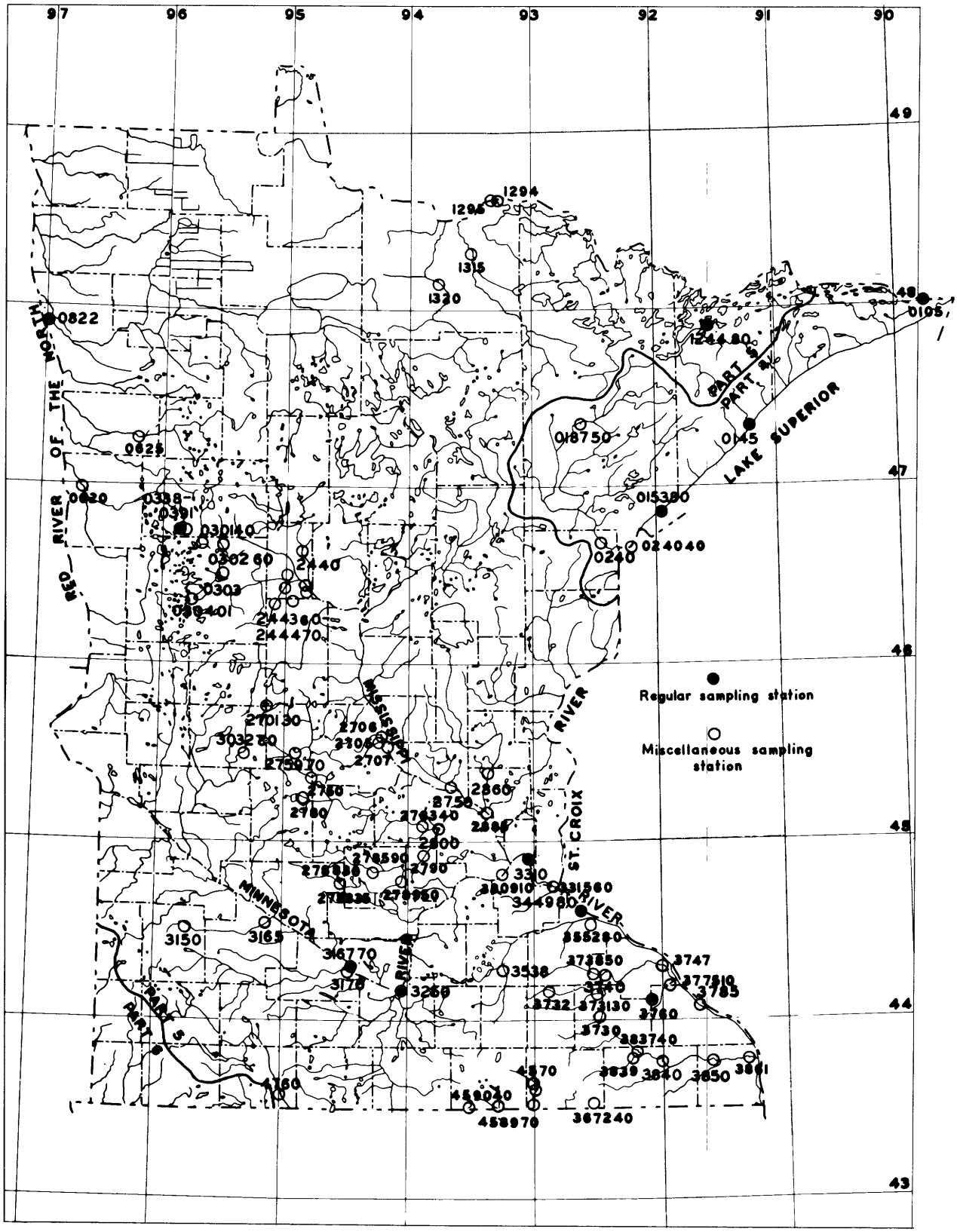


Figure 3.-- Map showing location of water-quality stations.

04010500 PIGEON RIVER AT MIDDLE FALLS, NEAR GRAND PORTAGE, MINN.

(International gaging station)

LOCATION.--Lat 48°00'44", long 89°36'58", in NE¼ sec.24, T.64 N., R.6 E., Cook County, at gaging station on right bank 400 ft upstream from Middle Falls, 2.5 miles upstream from Grand Portage Port of Entry, 3.5 miles upstream from mouth, and 4.7 miles northeast of village of Grand Portage.
DRAINAGE AREA.--600 sq mi.
PERIOD OF RECORD.--Water temperatures: October 1970 to September 1971.
EXTREMES, 1970-71.--Water temperatures: Maximum, 21°C Aug. 10; mimimum, freezing point on many days during winter period.

TEMPERATURE (°C) OF WATER, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971
(ONCE-DAILY MEASUREMENT AT ABOUT 0800)

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8.0	5.0	---	---	---	---	---	5.0	11.5	18.0	16.0	17.5
2	10.0	5.0	---	---	---	---	---	5.0	12.0	17.0	16.5	18.0
3	8.5	4.5	---	---	---	---	---	5.0	14.5	18.0	14.5	20.5
4	7.0	4.0	---	---	---	---	---	6.5	16.0	18.0	15.5	20.5
5	6.5	4.0	---	0	---	---	---	7.0	16.0	19.0	16.5	20.0
6	8.0	3.5	---	---	---	---	---	7.0	16.0	20.0	17.5	20.0
7	9.0	3.5	---	---	---	---	---	8.0	16.0	20.0	18.5	19.0
8	7.5	3.0	---	---	---	---	---	8.5	15.0	18.0	19.0	19.0
9	8.0	3.0	---	---	0	---	---	9.0	14.5	18.5	20.0	18.5
10	7.0	3.5	---	---	---	---	---	10.0	14.5	18.5	21.0	16.0
11	6.0	3.0	---	---	---	---	0	10.0	15.5	19.0	18.5	16.0
12	5.5	2.0	---	---	---	---	0	9.0	16.0	19.0	18.0	15.5
13	6.5	1.0	---	---	---	---	0	9.0	16.5	18.0	18.5	15.0
14	6.0	1.0	---	---	---	---	0	9.5	17.0	18.0	18.0	16.0
15	5.0	0	---	---	---	---	0	10.0	17.5	19.0	18.0	15.0
16	4.5	0	---	---	---	0.5	0.5	10.5	18.0	20.0	17.5	12.0
17	4.0	1.0	---	---	---	---	0.5	11.0	19.0	19.0	18.0	12.0
18	4.0	2.0	---	---	---	---	1.0	11.0	19.0	19.0	18.0	12.0
19	3.5	1.5	---	---	---	---	1.0	10.0	18.5	18.5	20.5	11.5
20	4.5	1.0	---	---	---	---	1.0	8.5	18.5	19.0	20.5	11.0
21	6.0	1.0	---	---	---	---	1.5	8.0	18.0	18.5	19.0	11.5
22	6.0	0	---	---	---	---	2.0	8.5	18.0	20.0	19.0	11.0
23	7.5	0	---	---	---	---	3.0	8.5	18.0	19.5	18.0	11.0
24	8.0	0	---	---	---	---	3.5	8.5	17.0	19.5	16.5	10.0
25	8.0	0	---	---	---	---	4.0	7.0	15.0	18.0	14.0	11.0
26	8.5	0	---	---	---	---	4.5	6.0	16.0	18.0	13.5	11.0
27	8.5	0	---	---	---	---	4.5	8.0	16.5	16.5	15.0	11.5
28	8.5	0	---	---	---	---	4.5	10.0	17.0	17.0	16.0	13.0
29	7.0	---	---	---	---	---	5.0	10.0	19.5	15.0	17.0	12.0
30	6.0	---	---	---	---	---	5.0	10.5	19.0	15.5	17.0	12.5
31	5.5	---	---	---	---	---	---	11.0	---	16.0	17.0	---
MONTH	6.5	2.0	---	---	---	---	---	8.5	16.5	18.5	17.5	14.5

04014500 BAPTISM RIVER NEAR BEAVER BAY, MINN.

LOCATION.--Lat 47°20'15", long 91°12'00", in SE¼NE¼ sec.15, T.56 N., R.7 W., Lake County, at gaging station on right bank 30 ft upstream from bridge on U.S. Highway 61, 0.2 mile upstream from mouth, 4 miles northeast of Silver Bay, and 7 miles northeast of village of Beaver Bay.
DRAINAGE AREA.--140 sq mi.
PERIOD OF RECORD.--Water temperatures: October 1970 to September 1971.
EXTREMES, 1970-71.--Water temperatures: Maximum observed, 22.5°C Sept. 2; minimum, freezing point on many days during winter period.

TEMPERATURE (°C) OF WATER, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971
(ONCE DAILY MEASUREMENT AT ABOUT 0800)

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10.0	10.0	---	---	---	---	---	7.0	15.0	18.0	18.0	---
2	11.0	9.0	---	---	---	---	---	7.5	15.5	20.0	17.5	---
3	9.0	8.0	---	---	---	---	---	8.0	16.0	20.0	18.5	22.5
4	9.5	7.5	---	0	---	---	1.5	8.0	16.0	22.0	18.5	22.0
5	10.0	6.0	---	---	---	---	1.5	9.5	16.0	20.0	19.0	20.5
6	10.5	5.0	---	---	---	---	1.5	10.0	16.0	20.0	20.0	18.0
7	10.0	5.0	---	---	---	---	1.0	10.5	17.0	18.0	20.5	18.0
8	11.0	5.0	---	---	---	---	2.0	11.0	16.0	20.0	21.0	17.0
9	11.0	5.0	---	---	0	---	2.0	12.5	16.0	21.0	20.5	16.0
10	11.0	5.5	---	---	---	---	2.5	14.5	---	19.0	20.0	16.0
11	9.5	5.0	---	---	---	---	1.5	14.5	---	18.0	20.5	16.0
12	8.0	3.5	---	---	---	---	1.5	15.0	---	16.5	20.5	16.0
13	8.5	3.0	---	---	---	---	2.0	13.5	---	18.5	19.0	16.0
14	9.0	2.5	---	---	---	---	2.0	13.0	---	19.0	18.0	15.0
15	4.5	1.5	---	---	---	---	2.0	12.5	21.5	20.0	19.0	15.0
16	4.5	1.0	---	---	---	0	2.0	16.0	21.0	21.0	19.5	12.0
17	5.0	2.0	---	---	---	---	2.5	14.0	20.0	20.0	19.5	10.0
18	5.0	1.5	---	---	---	---	3.0	12.5	18.0	18.0	19.5	10.0
19	5.5	2.0	---	---	---	---	3.5	11.5	20.0	19.0	20.0	10.0
20	6.5	2.0	---	---	---	---	3.0	12.0	20.0	21.0	20.0	10.0
21	6.0	2.0	---	---	---	---	3.0	12.0	19.0	20.0	20.0	10.0
22	8.0	---	---	---	---	---	3.5	12.0	20.0	20.0	17.0	10.0
23	9.5	---	---	---	---	---	4.5	8.5	20.0	19.0	---	10.0
24	9.5	---	---	---	---	---	6.0	8.5	18.5	19.0	---	10.0
25	9.5	---	---	---	---	---	6.0	8.5	19.0	18.5	---	10.0
26	9.0	---	---	---	---	---	6.5	10.5	16.0	18.5	---	10.0
27	10.0	---	---	---	---	---	6.5	11.0	16.5	18.0	---	10.0
28	10.0	---	---	---	---	---	6.5	12.5	20.0	17.5	---	10.5
29	10.0	---	---	---	---	---	6.5	12.5	18.0	17.0	---	10.0
30	10.0	---	---	---	---	---	7.0	10.5	18.0	17.5	19.0	10.0
31	10.0	---	---	---	---	---	---	12.0	---	18.0	---	---
MONTH	8.5	---	---	---	---	---	3.5	11.5	18.0	19.0	---	13.5

04015380 LAKE SUPERIOR AT DULUTH, MINN.

LOCATION.--Lat 46°51'33", long 91°57'20", in NE¼ sec.35, T.51 N., R.13 W., St. Louis County, at intake of City of Duluth Lakewood Pumping Plant, 3.8 miles northeast of the Lester River and 10 miles northeast of Duluth post office.

WATER QUALITY DATA, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DATE	ALKALINITY AS CACO3 (MG/L)	SULFATE (SO4) (MG/L)	CHLORIDE (CL) (MG/L)	TEMPERATURE (DEG C)	SPECIFIC CONDUCTANCE (MICROMHOS)	COLOR (PLATINUM-COBALT UNITS)	PH (UNITS)	TURBIDITY (JTU)	DISSOLVED OXYGEN (MG/L)	BIOCHEMICAL OXYGEN DEMAND (MG/L)	IMMEDIATE COLIFORM (COL. PER 100 ML)	HARDNESS (CA,MG) (MG/L)
OCT.												
05...	43	3.6	1.2	7.8	90	0	7.9	0	11.8	.6	0	45
05-07	--	--	--	--	--	--	--	--	--	--	--	--
13...	43	3.2	1.2	6.7	--	0	7.8	0	12.3	.2	3	45
19...	43	2.9	1.3	7.8	93	0	7.9	0	12.4	.3	0	44
20...	--	--	--	8.0	--	--	--	--	--	--	--	--
20...	--	--	--	7.8	95	--	--	--	--	--	--	--
26...	43	3.0	1.2	7.2	100	0	7.9	0	12.7	.5	0	44
NOV.												
02...	43	3.2	1.2	7.2	100	0	8.0	1	12.3	.2	5	44
02-04	--	--	--	--	--	--	--	--	--	--	--	--
09...	43	3.2	1.3	7.8	90	0	7.9	2	12.0	.2	1	44
16...	43	3.1	1.3	6.7	95	0	8.0	3	11.9	.2	2	44
23...	43	4.2	1.0	5.6	105	0	7.9	5	12.0	.2	10	44
30...	43	3.6	1.3	5.6	92	0	8.0	2	12.2	.2	5	44
30...	--	--	--	5.5	--	--	--	--	--	--	--	--
30...	--	--	--	5.5	92	--	--	--	--	--	--	--
DEC.												
07...	43	3.7	1.3	5.0	105	0	8.0	2	12.6	.2	3	44
07-09	--	--	--	--	--	--	--	--	--	--	--	--
14...	43	3.2	1.0	4.4	92	0	8.0	3	12.5	.2	6	44
21...	43	3.1	1.3	4.4	95	0	8.0	1	12.6	.3	1	44
28...	43	3.2	1.2	3.9	90	0	7.9	1	12.7	.2	0	44
JAN.												
04...	43	2.2	1.2	3.9	90	0	7.9	2	12.8	.2	0	44
04...	--	--	--	--	--	--	--	--	--	--	--	--
04...	--	--	--	3.9	90	--	--	--	--	--	--	--
04-06	--	--	--	--	--	--	--	--	--	--	--	--
11...	43	2.8	1.3	3.9	92	0	7.9	1	12.9	.2	0	44
18...	43	3.8	1.3	2.2	92	0	8.0	1	13.2	.2	0	44
25...	43	1.3	3.3	1.1	90	0	8.0	0	13.4	.1	0	44
FEB.												
01...	43	3.1	1.5	.6	92	0	7.9	3	13.6	.2	4	44
01-03	--	--	--	--	--	--	--	--	--	--	--	--
08...	43	3.3	1.3	.6	95	0	8.0	2	13.4	.1	4	44
08...	--	--	--	.5	--	--	--	--	--	--	--	--
08...	--	--	--	--	95	--	--	--	--	--	--	--
16...	43	3.4	1.3	.6	90	0	7.9	1	13.9	.1	0	44
22...	43	3.1	1.2	.6	100	0	8.0	0	14.1	.4	0	44
MAR.												
01...	43	3.3	1.3	.6	92	0	7.9	0	14.0	.2	1	44

04015380 LAKE SUPERIOR AT DULUTH, MINN.--Continued

PERIOD OF RECORD.--Chemical analyses: August 1969 to current year.
REMARKS.--Some analyses furnished by City of Duluth, Water, Gas, and Sewage Treatment Department and Water Quality office, Environmental Protection Agency.

WATER QUALITY DATA, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DATE	SODIUM (NA) (MG/L)	POTASSIUM (K) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)	ORGANIC NITROGEN (N) (MG/L)	AMMONIA NITROGEN (N) (MG/L)	NITRATE (N) (MG/L)	NITRATE (NO3) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	DISSOLVED PHOSPHORUS (P) (MG/L)	METHYLENE BLUE ACTIVE SUBSTANCE (MG/L)	DISSOLVED ARSENIC (AS) (UG/L)
OCT.											
05...	--	--	--	--	--	--	--	--	--	--	--
05-07	--	--	--	--	--	--	--	--	--	--	--
13...	--	--	--	--	--	--	--	--	--	--	--
19...	--	--	--	--	--	--	--	--	--	--	--
20...	1.1	3.1	.0	.16	.02	.4	1.8	.050	.040	.02	0
20...	--	--	--	--	--	--	--	--	--	--	--
26...	--	--	--	--	--	--	--	--	--	--	--
NOV.											
02...	--	--	--	--	--	--	--	--	--	--	--
02-04	--	--	--	--	--	--	--	--	--	--	--
09...	--	--	--	--	--	--	--	--	--	--	--
16...	--	--	--	--	--	--	--	--	--	--	--
23...	--	--	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--	--	--
30...	1.2	.5	.1	.18	.02	.2	.8	.14	.000	.00	--
30...	--	--	--	--	--	--	--	--	--	--	--
DEC.											
07...	--	--	--	--	--	--	--	--	--	--	--
07-09	--	--	--	--	--	--	--	--	--	--	--
14...	--	--	--	--	--	--	--	--	--	--	--
21...	--	--	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--	--	--
JAN.											
04...	--	--	--	--	--	--	--	--	--	--	--
04...	--	--	--	.19	.02	.6	2.5	.010	.010	.01	--
04...	--	--	--	--	--	--	--	--	--	--	--
04-06	--	--	--	--	--	--	--	--	--	--	--
11...	--	--	--	--	--	--	--	--	--	--	--
18...	--	--	--	--	--	--	--	--	--	--	--
25...	--	--	--	--	--	--	--	--	--	--	--
FEB.											
01...	--	--	--	--	--	--	--	--	--	--	--
01-03	--	--	--	--	--	--	--	--	--	--	--
08...	--	--	--	--	--	--	--	--	--	--	--
08...	--	--	--	.18	.02	.3	1.3	.010	.020	.00	--
08...	--	--	--	--	--	--	--	--	--	--	--
16...	--	--	--	--	--	--	--	--	--	--	--
22...	--	--	--	--	--	--	--	--	--	--	--
MAR.											
01...	--	--	--	--	--	--	--	--	--	--	--

DATE	DISSOLVED CADMIUM (CD) (UG/L)	DISSOLVED CHROMIUM (CR) (UG/L)	HEXAVALENT CHROMIUM (CR6) (UG/L)	DISSOLVED COBALT (CO) (UG/L)	DISSOLVED LEAD (PB) (UG/L)	DISSOLVED ZINC (ZN) (UG/L)	TOTAL MERCURY (HG) (UG/L)	SAMPLE SIZE (GALS)	TOTAL CARBON EXTRACTABLES (UG/L)	CARBON ALCOHOL EXTRACTABLES (UG/L)	CARBON CHLOROFORM EXTRACTABLES (UG/L)
OCT.											
05...	--	--	--	--	--	--	--	--	--	--	--
05-07	--	--	--	--	--	--	--	1050	232	207	25
13...	--	--	--	--	--	--	--	--	--	--	--
19...	--	--	--	--	--	--	--	--	--	--	--
20...	1	0	0	0	0	82	.4	--	--	--	--
20...	--	--	--	--	--	--	--	--	--	--	--
26...	--	--	--	--	--	--	--	--	--	--	--
NOV.											
02...	--	--	--	--	--	--	--	--	--	--	--
02-04	--	--	--	--	--	--	--	1327	167	149	18
09...	--	--	--	--	--	--	--	--	--	--	--
16...	--	--	--	--	--	--	--	--	--	--	--
23...	--	--	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--	--	--
DEC.											
07...	--	--	--	--	--	--	--	--	--	--	--
07-09	--	--	--	--	--	--	--	1080	220	202	18
14...	--	--	--	--	--	--	--	--	--	--	--
21...	--	--	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--	--	--
JAN.											
04...	--	--	--	--	--	--	--	--	--	--	--
04...	--	--	--	--	--	--	--	--	--	--	--
04...	--	--	--	--	--	--	--	--	--	--	--
04-06	--	--	--	--	--	--	--	968	232	209	23
11...	--	--	--	--	--	--	--	--	--	--	--
18...	--	--	--	--	--	--	--	--	--	--	--
25...	--	--	--	--	--	--	--	--	--	--	--
FEB.											
01...	--	--	--	--	--	--	--	--	--	--	--
01-03	--	--	--	--	--	--	--	1215	253	220	33
08...	--	--	--	--	--	--	--	--	--	--	--
08...	--	--	--	--	--	--	--	--	--	--	--
08...	--	--	--	--	--	--	--	--	--	--	--
16...	--	--	--	--	--	--	--	--	--	--	--
22...	--	--	--	--	--	--	--	--	--	--	--
MAR.											
01...	--	--	--	--	--	--	--	--	--	--	--

04015380 LAKE SUPERIOR AT DULUTH, MINN.--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DATE	ALKALINITY AS CACO3 (MG/L)	SULFATE (SO4) (MG/L)	CHLORIDE (CL) (MG/L)	TEMPERATURE (DEG C)	SPECIFIC CONDUCTANCE (MICROMHOS)	COLOR (PLATINUM-COBALT UNITS)	PH (UNITS)	TURBIDITY (JTU)	DISSOLVED OXYGEN (MG/L)
MAR.									
01-03	--	--	--	--	--	--	--	--	--
08...	43	2.9	1.3	.6	90	0	8.0	0	13.9
15...	43	3.4	1.3	.6	92	0	8.0	1	14.2
15...	--	--	--	--	--	--	--	--	--
15...	--	--	--	.6	92	--	--	--	--
22...	43	4.3	1.3	.6	90	0	7.9	0	13.9
29...	43	4.6	1.3	.6	92	0	7.9	0	13.9
APR.									
05...	43	3.4	1.3	.6	92	0	7.9	1	14.0
06-08	--	--	--	--	--	--	--	--	--
10...	--	--	--	--	--	--	--	--	--
12...	43	5.6	1.3	.6	90	0	8.0	2	14.0
19...	43	3.6	1.3	.6	90	0	8.0	2	14.1
26...	43	3.4	1.0	1.1	95	0	7.9	2	13.9
MAY									
03-05	--	--	--	--	--	--	--	--	--
04...	43	4.8	1.3	1.7	92	0	7.9	1	13.9
04...	--	--	--	1.5	98	--	7.9	--	--
10...	44	4.3	1.3	2.8	90	0	8.0	3	14.0
17...	44	5.0	1.5	3.3	90	0	7.7	2	13.7
17...	--	--	--	3.3	--	--	--	--	--
25...	43	3.8	1.3	2.8	95	0	8.0	2	14.3
JUNE									
01...	43	4.0	1.3	3.3	90	0	8.0	1	11.0
07...	43	3.8	1.3	3.9	92	0	8.0	1	13.2
14...	43	3.2	1.3	4.4	92	0	8.0	0	13.8
21...	43	3.8	1.3	3.9	92	0	8.0	2	13.1
21...	--	--	--	3.9	--	--	--	--	--
28...	43	4.7	1.3	6.1	95	0	8.0	3	12.8
JULY									
06...	44	3.8	1.0	5.0	95	5	8.0	1	13.0
12...	43	5.0	1.3	9.4	95	10	8.0	11	11.5
19...	44	4.2	1.3	6.1	92	5	8.0	1	12.4
26...	--	--	--	4.0	--	--	--	--	--
27...	44	3.9	1.3	4.4	95	0	7.9	7	12.6
AUG.									
02...	44	4.7	1.5	5.6	90	0	7.9	3	12.5
09...	43	3.8	1.3	5.0	95	0	7.8	2	12.8
16...	43	4.2	1.3	7.2	92	0	7.9	2	10.2
23...	--	--	--	--	--	--	--	--	--

DATE	BIOCHEMICAL OXYGEN DEMAND (MG/L)	IMMEDIATE COLIFORM (COL. PER 100 ML)	HARDNESS (CA,MG) (MG/L)	SODIUM (NA) (MG/L)	POTASSIUM (K) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)	ORGANIC NITROGEN (N) (MG/L)	AMMONIA NITROGEN (N) (MG/L)	NITRITE PLUS NITRATE (N) (MG/L)
MAR.									
01-03	--	--	--	--	--	--	--	--	--
08...	.2	6	44	--	--	--	--	--	--
15...	.2	176	44	--	--	--	--	--	--
15...	--	--	--	2.0	.6	.0	.16	.10	--
15...	--	--	--	--	--	--	--	--	--
22...	.1	3	44	--	--	--	--	--	--
29...	.1	14	44	--	--	--	--	--	--
APR.									
05...	.2	3	44	--	--	--	--	--	--
06-08	--	--	--	--	--	--	--	--	--
10...	--	--	--	1.8	.5	.3	--	.06	.30
12...	.2	4	44	--	--	--	--	--	--
19...	.1	14	44	--	--	--	--	--	--
26...	.3	0	44	--	--	--	--	--	--
MAY									
03-05	--	--	--	--	--	--	--	--	--
04...	.4	0	44	--	--	--	--	--	--
04...	--	--	--	--	--	--	--	.06	.40
10...	.1	0	45	--	--	--	--	--	--
17...	.4	2	44	--	--	--	--	--	--
17...	--	--	--	--	--	--	.25	.09	.30
25...	.3	3	44	--	--	--	--	--	--
JUNE									
01...	.5	2	44	--	--	--	--	--	--
07...	.2	2	44	--	--	--	--	--	--
14...	.2	1	44	--	--	--	--	--	--
21...	.2	2	44	--	--	--	--	--	--
21...	--	--	--	1.3	.6	.0	--	.00	.31
28...	.3	1	44	--	--	--	--	--	--
JULY									
06...	.2	1	45	--	--	--	--	--	--
12...	.1	5	44	--	--	--	--	--	--
19...	.2	16	45	--	--	--	--	--	--
26...	--	--	--	--	--	--	.07	.09	.30
27...	.2	12	45	--	--	--	--	--	--
AUG.									
02...	.2	2	45	--	--	--	--	--	--
09...	.2	4	44	--	--	--	--	--	--
16...	.3	1	44	--	--	--	--	--	--
23...	--	11	--	--	--	--	--	--	--

04015380 LAKE SUPERIOR AT DULUTH, MINN.--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DATE	AMMONIA (NH4) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	DIS-SOL-VED-PHOS-PHORUS (P) (MG/L)	METHY-LENE BLUE ACTIVE SUB-STANCE (MG/L)	SAMPLE SIZE (GALS)	TOTAL CARBON EX-TRACT ABLES (UG/L)	CARBON ALCOHOL EX-TRACT ABLES (UG/L)	CARBON CHLORO-FORM EX-TRACT ABLES (UG/L)
MAR.								
01-03	--	--	--	--	1050	195	171	24
08...	--	--	--	--	--	--	--	--
15...	--	--	--	--	--	--	--	--
15...	--	.050	.050	.00	--	--	--	--
15...	--	--	--	--	--	--	--	--
22...	--	--	--	--	--	--	--	--
29...	--	--	--	--	--	--	--	--
APR.								
05...	--	--	--	--	--	--	--	--
06-08	--	--	--	--	1065	221	199	22
10...	.08	.050	.030	.00	--	--	--	--
12...	--	--	--	--	--	--	--	--
19...	--	--	--	--	--	--	--	--
26...	--	--	--	--	--	--	--	--
MAY								
03-05	--	--	--	--	1012	229	204	25
04...	--	--	--	--	--	--	--	--
04...	.08	.17	.000	--	--	--	--	--
10...	--	--	--	--	--	--	--	--
17...	--	--	--	--	--	--	--	--
17...	.12	.060	.050	.00	--	--	--	--
25...	--	--	--	--	--	--	--	--
JUNE								
01...	--	--	--	--	--	--	--	--
07...	--	--	--	--	--	--	--	--
14...	--	--	--	--	--	--	--	--
21...	--	--	--	--	--	--	--	--
21...	.00	.040	.030	--	--	--	--	--
28...	--	--	--	--	--	--	--	--
JULY								
06...	--	--	--	--	--	--	--	--
12...	--	--	--	--	--	--	--	--
19...	--	--	--	--	--	--	--	--
26...	.12	.020	.010	.00	--	--	--	--
27...	--	--	--	--	--	--	--	--
AUG.								
02...	--	--	--	--	--	--	--	--
09...	--	--	--	--	--	--	--	--
16...	--	--	--	--	--	--	--	--
23...	--	--	--	--	--	--	--	--

DATE	ALKA-LINITY AS CACO3 (MG/L)	SULFATE (SO4) (MG/L)	CHLO-RIDE (CL) (MG/L)	TEMP-ERATURE (DEG C)	SPECI-FIC COND-UCTANCE (MICRO-MHOS)	COLOR (PLAT-INUM-COBALT UNITS)	PH (UNITS)	TUR-BID-ITY (JTU)	DIS-SOLVED OXYGEN (MG/L)	BIO-CHEM-ICAL OXYGEN DEMAND (MG/L)
AUG.										
23...	44	5.6	1.3	12.8	95	5	7.9	2	10.8	.2
SEP.										
01...	--	--	--	12.8	--	--	--	--	--	--
07...	44	4.2	1.3	12.2	95	0	7.9	2	11.0	.3
13...	40	5.6	1.3	15.0	95	0	8.0	0	9.5	.0
20...	43	3.6	1.3	11.1	95	0	7.9	1	11.6	.3
27...	44	5.2	1.3	13.0	92	0	7.9	1	10.3	.4

DATE	IMME-DIATE COLI-FORM (COL. PER 100 ML)	HARD-NESS (CA,MG) (MG/L)	TOTAL NITRO-GEN (N) (MG/L)	AMMONIA NITRO-GEN (N) (MG/L)	TOTAL KJEL-DAHL NITRO-GEN (N) (MG/L)	NITRITE PLUS NITRATE (N) (MG/L)	AMMONIA (NH4) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	DIS-SOL-VED-PHOS-PHORUS (P) (MG/L)	METHY-LENE BLUE ACTIVE SUB-STANCE (MG/L)
AUG.										
23...	--	45	--	--	--	--	--	--	--	--
SEP.										
01...	--	--	.55	.15	.29	.26	.19	.050	.090	.00
07...	2	45	--	--	--	--	--	--	--	--
13...	6	45	--	--	--	--	--	--	--	--
20...	0	44	--	--	--	--	--	--	--	--
27...	5	45	--	--	--	--	--	--	--	--

05033800 CAMPBELL CREEK NEAR DETROIT LAKES, MINN.

LOCATION.--Lat 46°53'29", long 95°51'57", on line between sec.4, T.139 N., R.41 W., and sec.33, T.140 N., R.41 W., Becker County, on upstream side of culvert on county road 5 miles north of city of Detroit Lakes.
PERIOD OF RECORD.--Chemical analyses: July 1969 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DATE	DIS-CHARGE (CFS)	SILICA (SIO2) (MG/L)	DIS-SOLVED IRON (FE) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	SODIUM (NA) (MG/L)	PO-TAS-SIUM (K) (MG/L)	BICAR-BONATE (HCO3) (MG/L)	CAR-BONATE (CO3) (MG/L)	ALKA-LINITY AS CACO3 (MG/L)	SULFATE (SO4) (MG/L)	CHLO-RIDE (CL) (MG/L)	DIS-SOLVED FLUO-RIDE (F) (MG/L)
OCT.												
05...	.18	31	60	12	2.5	3.3	522	0	428	43	1.5	.0
NOV.												
16...	.06	28	70	30	3.3	5.5	522	0	428	86	3.1	.3
DEC.												
15...	.57	30	100	750	4.7	6.7	536	0	440	36	4.6	.3
MAY												
10...	.15	2.5	70	180	3.4	5.9	331	--	271	200	3.9	.2
JULY												
12...	.82	19	40	31	2.2	3.9	253	0	208	110	1.7	.4
SEP.												
28...	6.1	--	--	--	--	--	--	--	--	--	--	--

DATE	TOTAL NITRO-GEN (N) (MG/L)	ORGANIC NITRO-GEN (N) (MG/L)	AMMONIA NITRO-GEN (N) (MG/L)	NITRITE (N) (MG/L)	NITRATE (N) (MG/L)	TOTAL KJEL-DAHL NITRO-GEN (N) (MG/L)	NITRITE PLUS NITRATE (N) (MG/L)	DIS-SOLVED ORTHO PHOS-PHATE (PO4) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	AMMONIA (NH4) (MG/L)	NITRATE (NO3) (MG/L)	DIS-SOLVED BORON (B) (UG/L)
OCT.												
05...	--	--	--	--	.1	--	--	--	.050	--	.3	70
NOV.												
16...	--	--	--	--	.1	--	--	--	.020	--	.3	50
DEC.												
15...	--	--	--	--	.6	--	--	--	.000	--	3.4	80
MAY												
10...	--	--	--	--	--	--	.40	--	.050	--	--	100
JULY												
12...	--	--	--	--	--	--	.46	--	.15	--	--	110
SEP.												
28...	.91	.68	.10	.000	.1	.78	.13	.03	.85	.13	--	--

DATE	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L)	DIS-SOLVED SOLIDS (TONS PER DAY)	DIS-SOLVED SOLIDS (TONS PER AC-FT)	HARD-NESS (CA,MG) (MG/L)	NON-CAR-BONATE HARD-NESS (MG/L)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	SPECI-FIC COND-UCTANCE (MICRO-MHOS)	PH (UNITS)	TEMP-ERATURE (DEG C)	COLOR (PLAT-INUM-COBALT UNITS)
OCT.												
05...	552	498	.27	.75	470	44	1	.1	767	8.0	14.0	45
NOV.												
16...	639	557	.10	.87	520	89	1	.1	841	8.0	.5	50
DEC.												
15...	601	506	.92	.82	480	38	2	.1	803	8.1	.0	3
MAY												
10...	682	542	.22	.74	480	210	1	.1	862	8.0	16.0	50
JULY												
12...	462	365	1.02	.63	320	110	1	.1	612	7.9	20.5	100
SEP.												
28...	380	--	6.27	.52	--	--	--	--	517	7.7	13.0	--

05033810 FLOYD LAKE OUTLET NEAR DETROIT LAKES, MINN.

LOCATION.--Lat 46°52'42", long 95°50'23", in SE¼SE¼ sec.3, T.139 N., R.41 W., Becker County, on upstream side of culvert on County Highway 21, 3.7 miles northeast of city of Detroit Lakes.
PERIOD OF RECORD.--Chemical analyses: December 1969 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DATE	DIS-CHARGE (CFS)	SILICA (SIO2) (MG/L)	DIS-SOLVED IRON (FE) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	SODIUM (NA) (MG/L)	PO-TAS-SIUM (K) (MG/L)	BICAR-BONATE (HCO3) (MG/L)	CAR-BONATE (CO3) (MG/L)	ALKA-LINITY AS CACO3 (MG/L)	SULFATE (SO4) (MG/L)	CHLO-RIDE (CL) (MG/L)	DIS-SOLVED FLUO-RIDE (F) (MG/L)
NOV.												
16...	.21	11	20	0	3.1	5.5	229	0	188	36	2.8	.0
DEC.												
15...	.28	15	30	25	3.6	6.2	268	0	219	42	4.6	.1
JAN.												
18...	.21	17	0	150	3.6	6.1	279	0	229	40	3.3	.1
FEB.												
22...	.37	17	0	47	3.4	6.1	268	0	220	40	3.6	.1
MAY												
10...	6.6	11	70	20	2.6	4.2	218	16	205	32	3.2	.1
JULY												
12...	3.6	13	10	0	2.7	4.7	166	25	178	29	2.0	.2
SEP.												
28...	7.8	--	--	--	--	--	--	--	--	--	--	--

DATE	TOTAL NITRO-GEN (N) (MG/L)	ORGANIC NITRO-GEN (N) (MG/L)	AMMONIA NITRO-GEN (N) (MG/L)	NITRITE (N) (MG/L)	NITRATE (N) (MG/L)	TOTAL KJEL-DAHL NITRO-GEN (N) (MG/L)	NITRITE PLUS NITRATE (N) (MG/L)	DIS-SOLVED ORTHO PHOS-PHATE (PO4) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	AMMONIA (NH4) (MG/L)	NITRATE (NO3) (MG/L)	DIS-SOLVED BORON (B) (UG/L)
NOV.												
16...	--	--	--	--	.00	--	--	--	.010	--	.1	20
DEC.												
15...	--	--	--	--	.2	--	--	--	.000	--	.9	70
JAN.												
18...	--	--	--	--	.2	--	--	--	.010	--	.9	50
FEB.												
22...	--	--	--	--	.1	--	--	--	.010	--	.6	80
MAY												
10...	--	--	--	--	--	--	.00	--	.050	--	--	70
JULY												
12...	--	--	--	--	--	--	.01	--	.020	--	--	50
SEP.												
28...	.96	.92	.01	.000	.00	.93	.03	.03	2.7	.01	--	--

DATE	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L)	DIS-SOLVED SOLIDS (TONS PER DAY)	DIS-SOLVED SOLIDS (TONS PER AC-FT)	HARD-NESS (CA,MG) (MG/L)	NON-CAR-BONATE HARD-NESS (MG/L)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	SPECI-FIC COND-UCTANCE (MICRO-MHOS)	PH (UNITS)	TEMP-ERATURE (DEG C)	COLOR (PLAT-INUM-COBALT UNITS)
NOV.												
16...	264	237	.15	.36	220	32	3	.1	411	8.0	3.5	11
DEC.												
15...	292	281	.22	.40	260	36	3	.1	468	7.9	.0	22
JAN.												
18...	291	288	.16	.40	260	29	3	.1	467	8.2	.0	9
FEB.												
22...	289	280	.29	.39	260	35	3	.1	459	7.8	.0	18
MAY												
10...	258	247	4.42	.34	230	25	2	.1	421	8.4	18.0	20
JULY												
12...	220	218	2.16	.30	200	24	3	.1	373	8.5	25.0	10
SEP.												
28...	282	--	5.99	.38	--	--	--	--	408	7.9	13.5	--

05039100 PELICAN RIVER AT LAKE MELISSA OUTLET NEAR DETROIT LAKES, MINN.

LOCATION.--Lat 46°43'50", long 95°53'40", in NW¼ sec.32, T.138 N., R.41 N., Becker County, at gaging station on left bank 50 ft downstream from Lake Melissa, 400 ft upstream from culvert on county road and 6 miles southwest of city of Detroit Lakes.
PERIOD OF RECORD.--Chemical analyses: August 1968 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DATE	DISCHARGE (CFS)	SILICA (SIO2) (MG/L)	DISSOLVED IRON (FE) (UG/L)	DISSOLVED MANGANESE (MN) (UG/L)	SODIUM (NA) (MG/L)	POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	SULFATE (SO4) (MG/L)	CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)
OCT.												
06...	.10	4.1	50	0	14	6.5	256	0	210	13	13	.2
NOV.												
17...	6.7	16	20	6	12	5.0	214	0	175	16	13	.2
DEC.												
15...	10	16	70	52	16	5.4	242	0	199	20	15	.2
JAN.												
19...	16	16	10	18	16	5.6	254	0	208	20	16	.2
FEB.												
23...	22	16	0	60	17	5.9	255	0	209	20	16	.3
MAR.												
23...	34	16	10	15	16	5.8	257	0	211	20	16	.2
MAY												
12...	55	12	20	20	12	4.1	223	--	183	17	15	.1
JULY												
13...	33	13	10	0	12	4.9	196	14	184	15	14	.2
SEP.												
29...	30	--	--	--	--	--	--	--	--	--	--	--

DATE	TOTAL NITROGEN (N) (MG/L)	ORGANIC NITROGEN (N) (MG/L)	AMMONIA NITROGEN (N) (MG/L)	NITRITE (N) (MG/L)	NITRATE (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	AMMONIA (NH4) (MG/L)	NITRATE (NO3) (MG/L)	DISSOLVED BORON (B) (UG/L)
OCT.												
06...	--	--	--	--	.1	--	--	--	.030	--	.4	40
NOV.												
17...	--	--	--	--	.00	--	--	--	.010	--	.0	30
DEC.												
15...	--	--	--	--	.1	--	--	--	.000	--	.3	70
JAN.												
19...	--	--	--	--	.1	--	--	--	.11	--	.3	70
FEB.												
23...	--	--	--	--	.00	--	--	--	.000	--	.1	60
MAR.												
23...	--	--	--	--	.2	--	--	--	.040	--	.7	60
MAY												
12...	--	--	--	--	--	--	.00	--	.050	--	--	110
JULY												
13...	--	--	--	--	--	--	.00	--	.040	--	--	70
SEP.												
29...	.52	.45	.07	.000	.00	.52	.00	.03	.13	.09	--	--

DATE	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	DISSOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L)	DISSOLVED SOLIDS (TONS PER DAY)	DISSOLVED SOLIDS (TONS PER AC-FT)	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	PERCENT SODIUM	SODIUM ADSORPTION RATIO	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)
OCT.												
06...	259	240	.07	.35	210	0	12	.4	446	7.7	16.0	17
NOV.												
17...	237	222	4.32	.32	180	8	12	.4	402	7.8	2.5	4
DEC.												
15...	247	250	7.07	.34	190	0	15	.5	427	8.0	1.0	6
JAN.												
19...	290	262	12.6	.39	210	1	14	.5	448	8.0	.0	5
FEB.												
23...	329	265	19.8	.45	220	8	14	.5	453	7.8	.5	6
MAR.												
23...	269	264	25.1	.37	210	3	14	.5	454	7.9	1.0	5
MAY												
12...	292	229	34.6	.31	200	15	11	.4	419	8.3	13.5	10
JULY												
13...	232	226	21.0	.32	190	6	12	.4	391	8.6	23.0	10
SEP.												
29...	242	--	20.1	.33	--	--	--	--	382	8.5	14.5	--

05082200 RED LAKE RIVER AT EAST GRAND FORKS, MINN.

LOCATION.--Lat 47°55'24", long 97°00'59", in SW¼SW¼ sec.1, T.151 N., R.50 W., Polk County, at bridge on State Highway 220 at south edge of East Grand Forks and 0.2 mile upstream from mouth.

WATER QUALITY DATA, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DATE	DIS-CHARGE (CFS)	DIS-SOLVED CAL-CIUM (CA) (MG/L)	DIS-SOLVED MAG-NE-SIUM (MG) (MG/L)	SULFATE (SO4) (MG/L)	CHLO-RIDE (CL) (MG/L)	AMMONIA NITRO-GEN (N) (MG/L)	NITRATE (N) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	AMMONIA (NH4) (MG/L)	NITRATE (NO3) (MG/L)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)
OCT.											
13...	707	34	14	11	3.4	.02	.00	.10	--	.1	206
13...	707	--	--	--	--	--	--	--	--	--	--
NOV.											
17...	656	49	17	30	4.2	.14	.1	.11	--	.4	248
17...	656	--	--	--	--	--	--	--	--	--	--
DEC.											
15...	600	51	19	25	3.6	.13	.1	.080	--	.4	268
15...	600	--	--	--	--	--	--	--	--	--	--
15...	600	--	--	--	--	--	--	--	--	--	--
JAN.											
13...	600	54	19	15	3.6	.33	.1	.030	--	.2	300
13...	600	--	--	--	--	--	--	--	--	--	--
FEB.											
17...	950	49	20	17	3.4	.08	.1	.000	--	.6	234
17...	950	--	--	--	--	--	--	--	--	--	--
MAR.											
16...	650	47	16	13	4.6	.02	.2	.060	--	1.0	215
16...	650	--	--	--	--	--	--	--	--	--	--
MAY											
05...	1680	54	19	47	2.6	.16	--	.030	.21	--	260
05...	1680	--	--	--	--	--	--	--	--	--	--
25...	1370	44	16	21	2.3	.41	--	.10	.53	--	224
25...	1370	--	--	--	--	--	--	--	--	--	--
25...	1370	--	--	--	--	--	--	--	--	--	--
JUNE											
23...	1350	46	18	22	3.8	.14	--	.080	.18	--	250
23...	1350	--	--	--	--	--	--	--	--	--	--
JULY											
20...	880	--	--	--	--	--	--	--	--	--	--
21...	880	41	17	15	3.1	.28	--	.15	.36	--	220
AUG.											
17...	790	41	16	33	2.5	.16	--	.080	.21	--	230
17...	790	--	--	--	--	--	--	--	--	--	--
SEP.											
14...	700	53	20	46	4.1	.40	--	.16	.52	--	292
14...	700	--	--	--	--	--	--	--	--	--	--

DATE	DIS-SOLVED CHRO-MIUM (CR) (UG/L)	DIS-SOLVED COPPER (CU) (UG/L)	DIS-SOLVED LEAD (PB) (UG/L)	DIS-SOLVED MOLY-BDENUM (MO) (UG/L)	DIS-SOLVED NICKEL (NI) (UG/L)	DIS-SOLVED SILVER (AG) (UG/L)	DIS-SOLVED ZINC (ZN) (UG/L)	DIS-SOLVED SELE-NIUM (SE) (UG/L)	DIS-SOLVED MERCURY (HG) (UG/L)
NOV.									
17...	--	0	0	0	47	0	20	4	.0
FEB.									
17...	0	0	0	0	0	0	10	0	1.1
MAY									
25...	0	15	4	12	10	0	10	40	.2
AUG.									
17...	0	19	0	0	40	0	0	0	.1

DATE	DIS-CHARGE (CFS)	SODIUM (NA) (MG/L)	SODIUM AD-SORP-TION RATIO	PERCENT SODIUM	DIS-SOLVED MAN-GANESE (MN) (UG/L)	DIS-SOLVED FLUO-RIDE (F) (MG/L)	DIS-SOLVED ARSENIC (AS) (UG/L)	DIS-SOLVED BERYL-LIUM (BE) (UG/L)	DIS-SOLVED BORON (B) (UG/L)	DIS-SOLVED CAD-MIUM (CD) (UG/L)
NOV.										
17...	656	7.2	.2	8	37	.2	0	0	50	1
FEB.										
17...	950	5.8	.2	6	18	.2	0	0	80	0
MAY										
25...	1370	4.8	.2	6	40	.2	0	0	60	1
AUG.										
17...	790	5.0	.2	--	20	.2	3	0	40	1

05082200 RED LAKE RIVER AT EAST GRAND FORKS, MINN.--Continued

DRAINAGE AREA.--5,655 sq mi, approximately.
PERIOD OF RECORD.--Chemical analyses: August 1969 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DATE	DIS-SOLVED SOLIDS (TONS PER DAY)	DIS-SOLVED SOLIDS (TONS PER AC-FT)	HARD-NESS (CA,MG) (MG/L)	SPECI-FIC COND-UCTANCE (MICRO-MHOS)	PH (UNITS)	TEMP-ERATURE (DEG C)	IMME-DIATE COLI-FORM (COL. PER 100 ML)	FECAL COLI-FORM (COL. PER 100 ML)	DIS-SOLVED OXYGEN (MG/L)	BIO-CHEM-ICAL OXYGEN DEMAND (MG/L)
OCT.										
13...	393	.28	140	--	--	5.0	--	--	--	4.4
13...	--	--	--	330	9.7	4.0	800	30	10.4	--
NOV.										
17...	439	.34	190	--	--	.5	--	--	--	2.0
17...	--	--	--	325	9.1	.5	500	25	12.2	--
DEC.										
15...	434	.36	210	--	--	.0	--	--	--	1.5
15...	--	--	--	--	--	--	--	--	--	--
15...	--	--	--	395	9.0	.0	800	220	11.1	--
JAN.										
13...	486	.41	210	--	--	.0	--	--	--	--
13...	--	--	--	382	8.3	--	1130	690	10.0	--
FEB.										
17...	600	.32	200	--	--	.0	--	--	--	--
17...	--	--	--	360	9.4	.0	6500	400	9.2	--
MAR.										
16...	377	.29	180	--	--	.0	--	--	--	2.3
16...	--	--	--	335	8.2	--	2400	350	10.3	--
MAY										
05...	1180	.35	--	--	8.1	12.8	--	--	--	4.9
05...	--	--	--	420	8.4	12.8	--	40	7.9	--
25...	829	.30	180	--	--	12.2	--	--	--	1.4
25...	--	--	--	350	8.1	12.2	610	107	8.7	--
25...	--	--	--	--	--	--	--	--	--	--
JUNE										
23...	911	.34	190	359	--	23.8	--	--	--	2.8
23...	--	--	--	360	8.2	23.8	--	45	6.6	--
JULY										
20...	--	--	--	360	8.7	--	--	340	6.9	--
21...	523	.30	170	339	--	22.1	--	--	--	--
AUG.										
17...	491	.31	170	307	--	23.5	--	--	--	1.4
17...	--	--	--	350	8.1	23.7	--	65	6.7	--
SEP.										
14...	552	.40	210	--	--	17.5	--	--	--	--
14...	--	--	--	435	9.5	17.5	--	80	8.6	--

DATE	DIS-CHARGE (CFS)	ALDRIN (UG/L)	LINDANE (UG/L)	DDD (UG/L)	DDE (UG/L)	DDT (UG/L)	DI-ELDRIN (UG/L)	ENDRIN (UG/L)	ETHION (UG/L)
DEC.									
15...	600	.00	.00	.00	.00	.00	.00	.00	--
a/MAY									
25...	1370	--	--	--	--	--	--	--	.00
b/JULY									
20...	--	.00	.00	.00	.00	.00	.00	.00	--

DATE	HEPTA-CHLOR (UG/L)	MALA-THION (UG/L)	PARA-THION (UG/L)	DI-AZINON (UG/L)	METHYL PARA-THION (UG/L)	2,4-D (UG/L)	2,4,5-T (UG/L)	SILVEX (UG/L)
DEC.								
15...	.00	--	--	--	--	.01	.00	.00
MAY								
25...	--	.00	.00	.00	.00	.02	.00	.00
JULY								
20...	.00	--	--	--	--	.03	.03	.01

a Unable to determine pesticides in presence of polychlorinated biphenyls (PCB_S).
b PCB concentration less than 0.1 µg/l.

05124480 KAWISHIWI RIVER NEAR ELY, MINN.

(Hydrologic bench-mark station)

LOCATION.--Lat 47°55'22", long 91°32'06", in SE¼ sec.24, T.63 N., R.10 N., Lake County, at gaging station on left bank upstream from rapids, 2 miles upstream from South Kawishiwi River, 2.2 miles southwest of Fernberg Lookout Tower and 14 miles east of Ely.
DRAINAGE AREA.--253 sq mi.
PERIOD OF RECORD.--Chemical analyses: October 1967 to current year.
Water temperatures: July 1966 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DATE	DIS-CHARGE (CFS)	SILICA (SIO2) (MG/L)	DIS-SOLVED IRON (FE) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	DIS-SOLVED CAL-CIUM (CA) (MG/L)	DIS-SOLVED MAG-NE-SIUM (MG) (MG/L)	SODIUM (NA) (MG/L)	PO-TAS-SIUM (K) (MG/L)	BICAR-BONATE (HCO3) (MG/L)	CAR-BONATE (CO3) (MG/L)	ALKA-LINITY AS CACO3 (MG/L)
OCT., 1970											
21...	124	3.8	170	37	3.5	1.4	1.7	.3	14	0	11
FEB., 1971											
11...	108	.0	210	22	4.0	1.6	1.3	.5	14	0	11
MAY											
26...	605	5.5	220	10	3.8	1.3	1.2	.5	14	0	11
AUG.											
04...	119	3.8	100	10	7.3	1.8	1.1	.2	12	0	10

DATE	SULFATE (SO4) (MG/L)	CHLO-RIDE (CL) (MG/L)	DIS-SOLVED FLUO-RIDE (F) (MG/L)	NITRATE (N) (MG/L)	NITRATE (NO3) (MG/L)	NITRITE PLUS NITRATE (N) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	DIS-SOLVED BORON (B) (UG/L)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L)
OCT., 1970										
21...	5.2	.0	.0	.00	.1	--	.020	10	40	23
FEB., 1971										
11...	5.4	1.1	.1	.00	.2	--	.050	80	43	21
MAY										
26...	4.3	.8	.0	--	--	.08	.020	60	22	25
AUG.										
04...	3.8	1.6	.1	--	--	.04	.010	40	35	26

05124480 KAWISHIWI RIVER NEAR ELY, MINN.--Continued

(Hydrologic bench-mark station)

EXTREMES, current year.--Water temperatures: Maximum, 24°C Sept. 5, 6; minimum, freezing point on many days during winter period.
EXTREMES, period of record.--Water temperatures: Maximum, 24°C July 24, 25, 1966, Sept. 5, 6, 1971; minimum, freezing point on many days during winter period.
REMARKS.--Recorder stopped Mar. 19 to Apr. 27, range-in-temperature, 1.0°C to 4.5°C; July 9 to Aug. 4.

WATER QUALITY DATA, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DATE	DIS-SOLVED SOLIDS (TONS PER DAY)	DIS-SOLVED SOLIDS (TONS PER AC-FT)	HARD-NESS (CA,MG) (MG/L)	NON-CAR-BONATE HARD-NESS (MG/L)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	SPECI-FIC COND-UCTANCE (MICRO-MHOS)	PH (UNITS)	TEMP-ERATURE (DEG C)	COLOR (PLAT-INUM-COBALT UNITS)
OCT., 1970										
21...	13.4	.05	14	3	20	.2	32	6.7	8.0	45
FEB., 1971										
11...	12.5	.06	17	5	14	.1	38	6.9	.0	48
MAY										
26...	40.8	.03	15	3	14	.1	29	6.7	10.5	30
AUG.										
04...	11.2	.05	26	16	8	.1	19	8.3	19.5	50

DATE	DIS-SOLVED GROSS ALPHA AS U-NAT. (PC/L)	SUS-PENDED GROSS ALPHA AS U-NAT. (PC/L)	DIS-SOLVED GROSS BETA AS CS-137 (PC/L)	SUS-PENDED GROSS BETA AS CS-137 (PC/L)	DIS-SOLVED RA-226 (RADON METHOD) (PC/L)	DIS-SOLVED NATURAL URANIUM (U) (UG/L)	DIS-SOLVED GROSS ALPHA AS U-NAT. (UG/L)	SUS-PENDED GROSS ALPHA AS U-NAT. (UG/L)	DIS-SOLVED GROSS BETA AS SR90 /Y90 (PC/L)	SUS-PENDED GROSS BETA AS SR90 /Y90 (PC/L)
OCT., 1970										
21...	.2	<.1	7.3	<.6	.03	--	.5	<.4	6.0	<.5
FEB., 1971										
11...	--	--	--	--	--	--	--	--	--	--
MAY										
26...	--	--	--	--	--	--	--	--	--	--
AUG.										
04...	--	--	--	--	--	--	--	--	--	--

DATE	TOTAL FILT-RABLE RESIDUE (MG/L)	TOTAL NON-FILT-RABLE RESIDUE (MG/L)	DIS-SOLVED ARSENIC (AS) (UG/L)	DIS-SOLVED CAD-MIUM (CD) (UG/L)	DIS-SOLVED CHRO-MIUM (CR) (UG/L)	HEXA-VALENT CHRO-MIUM (CR6) (UG/L)	DIS-SOLVED COBALT (CO) (UG/L)	DIS-SOLVED LEAD (PB) (UG/L)	DIS-SOLVED ZINC (ZN) (UG/L)	TOTAL MERCURY (HG) (UG/L)
OCT., 1970										
21...	38	<1	0	0	0	0	0	0	24	.1
FEB., 1971										
11...	--	--	--	--	--	--	--	--	--	--
MAY										
26...	--	--	--	--	--	--	--	--	--	--
AUG.										
04...	--	--	--	--	--	--	--	--	--	--

05124480 KAWISHIWI RIVER NEAR ELY, MINN.--Continued

(Hydrologic bench-mark station)

TEMPERATURE (°C) OF WATER, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1971
(WATER-STAGE RECORDER WITH TEMPERATURE ATTACHMENT)

	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
1	13.0	13.0	7.0	7.0	1.0	1.0	0.5	0.5	0.0	0.0	0.5	0.5
2	13.0	12.0	7.0	6.5	1.0	1.0	0.5	0.5	0.0	0.0	0.5	0.5
3	12.0	11.5	6.5	6.5	1.0	1.0	0.5	0.5	0.0	0.0	0.5	0.5
4	11.5	11.0	6.5	6.0	1.0	1.0	0.5	0.5	0.0	0.0	0.5	0.5
5	11.0	11.0	6.0	6.0	1.0	1.0	0.5	0.5	0.0	0.0	0.5	0.5
6	11.0	11.0	6.0	5.5	1.0	1.0	0.5	0.5	0.0	0.0	0.5	0.5
7	11.0	10.5	5.5	5.5	1.0	1.0	0.5	0.5	0.0	0.0	0.5	0.5
8	10.5	10.0	5.5	5.5	1.0	1.0	0.5	0.5	0.0	0.0	0.5	0.5
9	10.0	9.5	5.5	5.5	1.0	1.0	0.5	0.5	0.0	0.0	0.5	0.5
10	9.5	8.5	5.5	5.5	1.0	1.0	0.5	0.5	0.0	0.0	1.0	0.5
11	8.5	8.5	5.5	5.5	1.0	1.0	0.5	0.0	0.0	0.0	1.0	1.0
12	8.5	8.5	5.5	5.0	1.0	1.0	0.0	0.0	0.0	0.0	1.0	1.0
13	8.5	8.5	5.0	4.5	1.0	1.0	0.0	0.0	0.0	0.0	1.0	1.0
14	8.5	8.5	4.5	3.5	1.0	1.0	0.0	0.0	0.0	0.0	1.0	1.0
15	8.5	8.0	3.5	3.5	1.0	1.0	0.0	0.0	0.0	0.0	1.0	1.0
16	8.0	8.0	3.5	3.5	1.0	1.0	0.0	0.0	0.0	0.0	1.0	1.0
17	8.0	8.0	3.5	3.5	1.0	1.0	0.0	0.0	0.0	0.0	1.0	1.0
18	8.0	8.0	3.5	3.5	1.0	1.0	0.0	0.0	0.0	0.0	1.0	1.0
19	8.0	8.0	3.5	3.5	1.0	1.0	0.0	0.0	0.0	0.0	---	---
20	8.0	8.0	3.5	3.0	1.0	1.0	0.0	0.0	0.5	0.0	---	---
21	8.0	8.0	3.0	3.0	1.0	1.0	0.0	0.0	0.5	0.5	---	---
22	8.0	8.0	3.0	2.0	1.0	0.5	0.0	0.0	0.5	0.5	---	---
23	8.0	8.0	2.0	1.5	0.5	0.5	0.0	0.0	0.5	0.5	---	---
24	8.0	8.0	1.5	1.0	0.5	0.5	0.0	0.0	0.5	0.5	---	---
25	8.0	8.0	1.0	1.0	0.5	0.5	0.0	0.0	0.5	0.5	---	---
26	8.0	8.0	1.0	1.0	0.5	0.5	0.0	0.0	0.5	0.5	---	---
27	8.0	8.0	1.0	1.0	0.5	0.5	0.0	0.0	0.5	0.5	---	---
28	8.0	8.0	1.0	1.0	0.5	0.5	0.0	0.0	0.5	0.5	---	---
29	8.0	8.0	1.0	1.0	0.5	0.5	0.0	0.0	---	---	---	---
30	8.0	8.0	1.0	1.0	0.5	0.5	0.0	0.0	---	---	---	---
31	8.0	7.0	---	---	0.5	0.5	0.0	0.0	---	---	---	---
MONTH	13.0	7.0	7.0	1.0	1.0	0.5	0.5	0.0	0.5	0.0	---	---

05124480 KAWISHIWI RIVER NEAR ELY, MINN.--Continued

(Hydrologic bench-mark station)

TEMPERATURE (°C) OF WATER, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1971
(WATER-STAGE RECORDER WITH TEMPERATURE ATTACHMENT)

	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
1	---	---	5.0	5.0	11.5	11.5	19.5	19.5	---	---	21.5	21.0
2	---	---	5.5	5.0	11.5	11.5	19.5	19.5	---	---	21.5	21.0
3	---	---	6.0	5.5	13.0	11.5	19.5	19.5	---	---	22.0	21.5
4	---	---	6.0	5.5	14.0	13.0	20.0	19.5	---	19.5	22.0	22.0
5	---	---	6.5	6.0	14.5	14.0	20.0	20.0	19.5	19.5	24.0	22.0
6	---	---	8.0	6.5	15.5	14.5	20.0	20.0	19.5	19.5	24.0	23.5
7	---	---	8.0	8.0	16.0	15.5	20.0	20.0	20.0	19.5	23.5	23.0
8	---	---	9.0	8.0	16.0	16.0	20.0	20.0	20.0	20.0	23.0	23.0
9	---	---	9.5	9.0	16.0	16.0	---	---	20.5	20.0	23.0	22.0
10	---	---	10.0	9.5	16.0	16.0	---	---	21.0	20.5	22.0	22.0
11	---	---	10.0	10.0	16.5	16.0	---	---	21.0	21.0	22.0	21.5
12	---	---	10.0	9.5	16.5	16.5	---	---	21.0	21.0	21.5	21.5
13	---	---	10.0	9.5	18.0	16.5	---	---	21.5	21.0	21.5	21.5
14	---	---	9.5	9.5	19.0	18.0	---	---	21.5	21.5	21.5	20.5
15	---	---	10.0	9.5	19.5	19.0	---	---	21.5	21.5	20.5	20.0
16	---	---	10.5	10.0	19.5	19.5	---	---	21.5	21.5	20.0	19.5
17	---	---	11.0	10.5	19.5	19.5	---	---	21.5	21.5	19.5	18.5
18	---	---	11.0	11.0	19.5	19.5	---	---	22.0	21.5	18.5	18.5
19	---	---	11.0	11.0	19.5	19.5	---	---	23.0	22.0	18.5	18.0
20	---	---	11.0	11.0	19.5	19.5	---	---	23.5	23.0	18.0	17.0
21	---	---	11.0	10.5	19.5	19.5	---	---	23.5	23.5	17.0	16.5
22	---	---	10.5	10.5	19.5	19.5	---	---	23.5	23.5	16.5	16.0
23	---	---	10.5	10.5	19.5	19.5	---	---	23.5	23.5	16.0	15.5
24	---	---	10.5	10.5	19.5	19.5	---	---	23.5	23.0	15.5	15.0
25	---	---	10.5	10.0	19.5	19.5	---	---	23.0	21.5	15.0	15.0
26	---	---	10.0	10.0	19.5	19.5	---	---	21.5	21.0	15.0	15.0
27	---	---	10.0	10.0	19.5	19.5	---	---	21.5	21.0	15.0	14.5
28	4.5	4.5	10.5	10.0	19.5	19.5	---	---	21.5	21.5	14.5	14.5
29	4.5	4.5	11.0	10.5	19.5	19.5	---	---	21.5	21.5	14.5	14.5
30	5.0	4.5	11.5	11.0	19.5	19.5	---	---	21.5	21.5	14.5	14.5
31	---	---	11.5	11.5	---	---	---	---	21.5	21.5	---	---
MONTH	---	---	11.5	5.0	19.5	11.5	---	---	23.5	19.5	24.0	14.5
YEAR	24.0	0.0										

05316770 MINNESOTA RIVER AT NEW ULM, MINN.

LOCATION.--Lat 44°19'29", long 94°27'09", in NE¼NE¼ sec.20, T.110 N., R.30 W., Nicollet County, at gaging station on left bank, 30 ft downstream from bridge on U.S. Highway 14 at New Ulm, and 6.1 miles upstream from Cottonwood River.

DRAINAGE AREA.--9,530 sq. mi, approximately.

PERIOD OF RECORD.--Water temperatures: October 1967 to current year.
Sediment records: October 1967 to current year.

EXTREMES, current year.--Water temperatures: Maximum, 25°C June 24, 26; minimum, freezing point on many days during winter period.
Sediment concentrations: Maximum daily, 776 mg/l June 6; minimum daily, 29 mg/l Feb. 12.
Sediment loads: Maximum daily, 9,890 tons July 6; minimum daily, 42 tons Feb. 12.

EXTREMES, period of record.--Water temperatures: Maximum, 26°C July 15, 16, Aug. 23, 1968, July 15, 16, 1969; minimum, freezing point on many days during winter period.
Sediment concentrations: Maximum daily, 776 mg/l June 6, 1971; minimum daily, 8 mg/l Feb. 15, 16, 1970.
Sediment loads: Maximum daily, 34,200 tons Apr. 13, 1969, minimum daily, 6.9 tons Feb. 15, 16, 1970.

REMARKS.--Flow affected by ice during winter period.

TEMPERATURE (°C) OF WATER, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971
(ONCE-DAILY MEASUREMENT, BETWEEN 0700 AND 1200)

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	15.0	5.0	0.0	---	---	---	0.0	10.0	16.0	21.0	19.0	20.0
2	16.0	5.0	0.0	0.0	---	---	0.0	10.0	14.0	20.0	20.0	20.0
3	11.0	5.0	0.0	---	---	---	0.0	9.0	14.0	20.0	20.0	21.0
4	10.0	5.0	0.0	---	---	---	0.0	12.0	16.0	21.0	19.0	23.0
5	12.0	5.0	0.0	---	---	---	0.0	12.0	18.0	22.0	19.0	21.0
6	12.0	3.0	---	---	0.0	0.0	1.0	12.0	18.0	22.0	20.0	21.0
7	11.0	3.0	---	---	---	---	4.0	12.0	19.0	21.0	20.0	21.0
8	10.0	4.0	---	---	---	---	8.0	13.0	17.0	22.0	20.0	20.0
9	8.0	4.0	---	0.0	---	---	5.0	14.0	17.0	22.0	21.0	20.0
10	6.0	4.0	---	---	---	---	7.0	14.0	14.0	22.0	21.0	20.0
11	6.0	4.0	---	---	---	---	8.0	15.0	17.0	21.0	22.0	19.0
12	8.0	4.0	0.0	---	0.0	---	9.0	14.0	17.0	22.0	22.0	19.0
13	6.0	4.0	---	---	0.0	0.0	8.0	14.0	20.0	21.0	23.0	19.0
14	6.0	2.0	---	1.0	---	---	7.0	16.0	20.0	20.0	23.0	17.0
15	7.0	2.0	---	---	---	---	8.0	16.0	21.0	21.0	23.0	16.0
16	7.0	1.0	---	0.0	---	---	10.0	16.0	22.0	22.0	22.0	15.0
17	7.0	1.0	---	---	---	---	11.0	17.0	23.0	22.0	22.0	16.0
18	7.0	2.0	---	---	---	---	11.0	16.0	23.0	22.0	22.0	15.0
19	7.0	2.0	0.0	---	---	---	11.0	13.0	23.0	21.0	22.0	14.0
20	8.0	2.0	---	---	0.0	0.0	12.0	11.0	20.0	22.0	20.0	12.0
21	8.0	2.0	---	---	---	0.0	10.0	13.0	23.0	21.0	23.0	13.0
22	10.0	1.0	---	---	---	0.0	12.0	13.0	23.0	22.0	24.0	12.0
23	10.0	0.0	---	0.0	---	0.0	12.0	13.0	24.0	22.0	23.0	12.0
24	11.0	0.0	---	---	---	0.0	12.5	13.0	25.0	21.0	23.0	13.0
25	12.0	0.0	---	---	---	0.0	11.0	12.0	21.5	21.0	22.0	13.0
26	9.0	0.0	0.0	---	---	0.0	11.0	10.0	25.0	21.0	20.0	13.0
27	9.0	0.0	---	---	0.0	0.0	11.0	11.0	24.0	20.0	19.0	14.0
28	8.0	0.0	---	---	---	0.0	10.0	13.0	23.0	20.0	18.0	15.0
29	7.0	0.0	---	---	---	0.0	9.0	15.0	24.0	19.0	20.0	14.0
30	7.0	0.0	---	0.0	---	0.0	10.0	17.0	22.0	17.0	20.0	16.0
31	6.0	---	---	---	---	3.0	---	17.0	---	18.0	19.0	---
MONTH	9.0	2.5	---	---	---	---	7.5	13.5	20.0	21.0	21.0	17.0

05316770 MINNESOTA RIVER AT NEW ULM, MINN.--Continued

SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

	OCTOBER			NOVEMBER			DECEMBER		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	184	137	68	734	115	228	1600	163	704
2	179	150	72	776	97	203	1600	43	186
3	169	160	73	840	63	143	1500	56	227
4	168	142	64	914	47	116	1450	103	403
5	170	159	73	1000	68	184	1400	163	616
6	172	103	48	1110	63	189	1350	163	594
7	175	123	58	1220	70	231	1300	160	562
8	215	130	75	1310	64	226	1250	156	527
9	238	78	50	1630	74	326	1200	152	492
10	270	90	66	2380	249	1600	1150	150	466
11	326	97	85	3050	269	2220	1100	147	437
12	427	62	71	3540	276	2640	1080	145	423
13	508	73	100	3910	202	2130	1060	143	409
14	583	60	94	4040	92	1000	1040	140	393
15	652	54	95	4060	82	899	1020	138	380
16	674	40	73	4100	111	1230	980	135	357
17	662	47	84	3990	168	1810	950	132	339
18	622	37	62	3770	80	814	930	127	319
19	589	53	84	3520	61	580	910	125	307
20	561	82	124	3280	63	558	880	122	290
21	531	90	129	3080	69	574	860	118	274
22	510	116	160	2000	57	308	850	115	264
23	496	140	187	1500	57	231	830	112	251
24	494	113	151	1600	68	294	820	109	241
25	499	94	127	1600	68	294	810	107	234
26	512	107	148	1600	74	320	790	107	228
27	537	87	126	1600	67	289	780	115	242
28	601	83	135	1600	47	203	770	124	258
29	636	62	106	1700	74	340	760	133	273
30	662	74	132	1700	112	514	750	132	267
31	698	88	166	--	--	--	730	150	296
TOTAL	13720	--	3086	67154	--	20694	32500	--	11259

	JANUARY			FEBRUARY			MARCH		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	710	159	305	550	183	272	920	77	191
2	690	165	307	550	180	267	900	77	187
3	680	167	307	540	176	257	900	77	187
4	670	168	304	540	174	254	880	80	190
5	660	169	301	540	173	252	870	84	197
6	650	170	298	540	168	245	860	87	202
7	640	170	294	540	155	226	850	90	207
8	630	170	289	540	135	197	840	93	211
9	620	168	281	540	113	165	840	95	215
10	610	160	264	540	87	127	840	100	227
11	590	150	239	540	53	77	850	108	248
12	580	141	221	540	29	42	850	117	269
13	580	132	207	540	83	121	890	122	293
14	580	123	193	540	93	136	1050	117	332
15	570	132	203	540	93	136	2000	113	610
16	570	153	235	540	93	136	3500	107	1010
17	570	155	239	540	93	136	5400	102	1490
18	560	155	234	540	93	136	7000	95	1800
19	560	156	236	540	93	136	8320	90	2020
20	560	156	236	540	92	134	8400	82	1860
21	560	157	237	540	89	130	8220	68	1510
22	560	158	239	560	87	132	8260	59	1320
23	560	159	240	580	84	132	7940	55	1180
24	560	162	245	660	82	146	7880	52	1110
25	560	164	248	760	80	164	7680	37	767
26	560	167	253	840	78	177	7430	33	662
27	560	170	257	960	77	200	7130	34	655
28	560	177	268	940	77	195	6930	34	636
29	560	185	280	--	--	--	6990	45	849
30	550	190	282	--	--	--	7280	53	1040
31	550	187	278	--	--	--	7560	44	898
TOTAL	18420	--	8020	16660	--	4728	130260	--	22573

05316770 MINNESOTA RIVER AT NEW ULM, MINN.--Continued

SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

	APRIL			MAY			JUNE		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	7640	45	928	2130	138	794	1620	117	543
2	7400	52	1040	2110	142	809	2100	549	3140
3	6930	39	730	2050	128	708	2540	745	5110
4	6500	63	1110	2010	130	706	2790	725	5460
5	6100	100	1650	1970	136	723	2770	748	5590
6	5730	59	913	1920	135	700	2630	776	5510
7	5360	67	970	1870	171	863	2690	754	5480
8	5150	76	1060	1810	117	572	3390	626	5730
9	4950	67	895	1760	102	485	3870	632	6600
10	4760	76	977	1700	103	473	4160	709	7960
11	4500	97	1180	1650	119	530	4520	732	8930
12	4190	106	1200	1610	119	517	4850	711	9310
13	3860	107	1120	1540	102	424	5360	642	9290
14	3530	134	1280	1470	107	425	5860	272	4300
15	3280	114	1010	1380	123	458	5910	242	3860
16	3080	107	890	1280	99	342	5590	225	3400
17	2880	70	544	1200	91	295	5080	237	3250
18	2680	124	897	1100	89	264	4440	247	2960
19	2520	123	837	1080	88	257	3690	323	3220
20	2420	139	908	1090	69	203	2990	363	2930
21	2420	148	967	1110	92	276	2530	213	1460
22	2470	178	1190	1120	97	293	2290	282	1740
23	2490	201	1350	1120	95	287	2150	262	1520
24	2440	190	1250	1210	82	268	2040	282	1550
25	2350	200	1270	1280	77	266	2180	322	1900
26	2250	176	1070	1290	99	345	2240	333	2010
27	2190	156	922	1270	98	336	2110	346	1970
28	2130	205	1180	1260	83	282	1900	625	3210
29	2110	202	1150	1270	72	247	1750	574	2710
30	2130	161	926	1270	58	199	2080	564	3170
31	--	--	--	1260	67	228	--	--	--
TOTAL	116440	--	31414	46190	--	13575	98120	--	123813

	JULY			AUGUST			SEPTEMBER		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	2960	470	3760	1220	152	501	300	161	130
2	3570	645	6220	1140	107	329	333	184	165
3	3990	675	7270	1040	169	475	360	170	165
4	4400	712	8460	944	218	556	357	183	176
5	4850	704	9220	879	214	508	328	163	144
6	5190	706	9890	817	237	523	285	130	100
7	5390	112	1630	733	215	426	263	133	94
8	5380	97	1410	677	224	409	247	108	72
9	5200	98	1380	649	183	321	247	154	103
10	5000	75	1010	612	188	311	245	230	152
11	4870	80	1050	584	214	337	240	192	124
12	4770	92	1180	556	243	365	240	179	116
13	4650	80	1000	534	240	346	238	163	105
14	4490	84	1020	514	251	348	236	175	112
15	4330	97	1130	492	248	329	232	135	85
16	4170	155	1750	472	248	316	230	144	89
17	4010	146	1580	453	230	281	224	170	103
18	3820	132	1360	439	223	264	222	158	95
19	3540	253	2420	444	230	276	224	150	91
20	3230	274	2390	427	212	244	238	190	122
21	2910	211	1660	419	223	252	242	180	118
22	2640	245	1750	433	222	260	247	181	121
23	2420	248	1620	416	213	239	253	130	89
24	2250	288	1750	383	217	224	249	120	81
25	2090	353	1990	349	170	160	251	123	83
26	1930	265	1380	330	193	172	260	130	91
27	1810	260	1270	313	215	182	263	120	85
28	1710	247	1140	298	195	157	260	117	82
29	1660	304	1360	288	147	114	253	117	80
30	1520	305	1250	275	158	117	256	117	81
31	1340	220	796	290	203	159	--	--	--
TOTAL	110090	--	81096	17420	--	9501	7823	--	3254

TOTAL DISCHARGE FOR YEAR (CFS-DAYS) 674797
TOTAL SUSPENDED-SEDIMENT DISCHARGE FOR YEAR (TONS) 333013

05325000 MINNESOTA RIVER AT MANKATO, MINN.

LOCATION.--Lat 44°10'10", long 94°00'15", in sec.7, T.108 N., R.26 W., Nicollet County, at gaging station on left bank at downstream side of Main Street Bridge in Mankato, 1.8 miles downstream from Blue Earth River, and at mile 106.4 upstream from Mississippi River.

DRAINAGE AREA.--14,900 sq mi, approximately.

PERIOD OF RECORD.--Chemical analyses: October 1963 to August 1966.
Water temperatures: October 1967 to current year.
Sediment records: October 1967 to current year.

EXTREMES, current year.--Water temperatures: Maximum, 28°C Sept. 3; minimum, freezing point on many days during winter period.
Sediment concentrations: Maximum daily, 938 mg/l Mar. 18; minimum daily, 15 mg/l Jan. 4.
Sediment loads: Maximum daily, 45,600 tons Mar. 18; minimum daily, 45 tons Sept. 23.

EXTREMES, period of record.--Water temperatures: Maximum 29°C July 15, 16, 1969, July 1, 11, 28, 30, 1970; minimum, freezing point on many days during winter period.
Sediment concentrations: Maximum daily, 2,850 mg/l Aug. 7, 1968; minimum daily, 15 mg/l Jan. 4, 1971.
Sediment loads: Maximum daily, 247,000 tons Apr. 9, 1969; minimum daily, 14 tons Jan. 13, 14, 1968.

REMARKS.--Flow affected by ice during winter periods.

TEMPERATURE (°C) OF WATER, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971
(ONCE-DAILY MEASUREMENT, BETWEEN 0700 AND 1200)

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	17.0	6.0	1.0	1.0	---	---	4.0	13.0	18.0	22.0	20.0	24.0
2	16.0	6.0	1.0	0.0	---	---	---	13.0	17.0	23.0	19.0	26.0
3	13.0	6.0	1.5	0.0	0.0	---	3.0	15.0	17.0	23.0	18.0	28.0
4	14.0	5.0	1.0	0.0	---	---	4.0	17.0	17.0	23.0	19.0	25.0
5	18.0	8.0	1.0	0.0	---	---	5.0	17.0	19.0	23.0	19.0	24.0
6	19.0	7.0	1.0	0.0	---	---	6.0	18.0	20.0	23.5	20.0	23.0
7	15.0	5.0	1.0	---	---	1.0	8.0	18.0	19.0	24.5	20.0	25.0
8	10.0	6.0	2.0	---	---	---	10.0	19.0	18.0	24.0	21.0	22.0
9	8.0	6.0	1.0	---	---	---	11.0	19.0	18.0	24.0	22.0	20.0
10	9.0	7.0	1.0	0.0	0.0	---	10.0	20.0	18.0	23.0	24.0	20.5
11	8.0	6.0	1.0	---	0.0	---	11.0	18.0	19.5	22.0	22.0	22.0
12	11.0	5.0	0.0	---	---	---	11.0	18.0	20.0	22.0	22.0	23.0
13	10.0	5.0	0.0	2.0	---	2.0	10.0	20.0	22.0	22.0	23.0	23.0
14	9.0	4.0	0.0	---	---	2.0	11.0	21.0	22.0	22.0	22.0	21.0
15	9.0	4.0	2.0	---	---	1.0	11.0	21.0	22.0	22.0	21.0	20.0
16	10.0	4.0	0.0	0.0	---	0.0	14.0	18.0	23.0	22.0	21.0	18.0
17	10.0	4.0	1.0	---	1.0	0.0	---	19.0	24.0	23.0	22.0	17.0
18	11.0	5.0	0.0	---	---	1.0	13.0	17.0	24.0	23.0	24.0	16.0
19	11.0	3.0	0.0	---	---	2.0	15.0	16.0	25.0	23.0	23.0	17.0
20	12.0	4.0	0.0	---	---	1.0	17.0	15.0	24.0	23.0	23.0	16.0
21	12.0	3.0	0.0	---	0.0	1.0	14.0	14.0	23.0	22.0	23.0	15.0
22	12.0	1.0	0.0	0.0	---	0.0	15.0	17.0	23.0	24.0	24.0	12.0
23	13.0	1.0	0.0	---	---	1.0	14.5	15.0	22.0	23.0	24.0	15.0
24	13.0	0.0	0.0	---	---	2.0	15.0	13.0	25.5	23.0	24.0	16.0
25	13.0	1.0	0.0	---	---	1.0	15.0	11.0	22.0	24.0	22.0	13.0
26	12.0	2.0	0.0	---	---	1.0	14.0	11.0	24.0	22.0	20.0	15.0
27	11.0	2.0	0.0	---	---	2.0	11.0	13.0	24.0	21.0	19.0	18.0
28	9.0	2.0	0.0	---	1.0	3.0	10.0	13.0	25.0	20.0	19.0	18.0
29	8.5	2.0	0.0	0.0	---	2.0	12.0	14.0	24.0	19.0	20.0	18.0
30	7.0	1.0	0.0	---	---	5.0	13.0	17.0	23.0	18.0	20.0	20.0
31	7.0	---	0.0	---	---	6.0	---	17.0	---	18.0	21.0	---

MINNESOTA RIVER AT MANKATO, MINN.--Continued

SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

	OCTOBER			NOVEMBER			DECEMBER		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	734	74	147	2450	64	423	4900	163	2160
2	668	81	146	2560	67	463	4750	147	1890
3	593	73	117	2860	80	618	4650	155	1950
4	523	56	79	3380	107	976	4350	148	1740
5	487	55	72	3780	126	1290	4300	102	1180
6	450	56	68	4030	122	1330	4000	69	745
7	542	71	104	4110	112	1240	3700	54	539
8	932	71	179	4220	113	1290	3450	50	466
9	2280	560	4230	6060	536	9640	3200	71	613
10	4020	530	5750	8530	495	11400	3050	77	634
11	4940	436	5820	9980	500	13500	2860	56	432
12	5340	384	5540	10900	485	14300	2700	45	328
13	5230	340	4800	11000	415	12300	2600	33	232
14	4830	256	3340	10600	314	8990	2500	52	351
15	4470	170	2050	10200	313	8620	2350	65	412
16	4160	131	1470	9770	249	6570	2250	36	219
17	3810	123	1270	9310	220	5530	2150	48	279
18	3470	103	965	8860	198	4740	2100	25	142
19	3150	100	851	8390	171	3870	2000	27	146
20	2870	114	883	7910	161	3440	1900	29	149
21	2640	106	756	7450	149	3000	1850	43	215
22	2450	102	675	7150	153	2950	1800	61	296
23	2320	93	583	6000	140	2270	1750	49	232
24	2220	100	599	6050	98	1600	1700	32	147
25	2140	106	612	6100	63	1040	1600	49	212
26	2120	103	590	6200	75	1260	1600	37	160
27	2130	93	535	6000	85	1380	1550	45	188
28	2130	82	472	5700	78	1200	1500	30	122
29	2180	82	483	5500	85	1260	1450	70	274
30	2270	63	386	5200	110	1540	1400	53	200
31	2360	65	414	--	--	--	1350	33	120
TOTAL	78459	--	43986	200250	--	128030	81310	--	16773

	JANUARY			FEBRUARY			MARCH		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	1300	27	95	750	45	91	2350	50	317
2	1300	25	88	735	48	95	2250	48	292
3	1250	18	61	725	49	96	2150	48	279
4	1250	15	51	715	48	93	2050	46	255
5	1200	22	71	705	47	89	1950	45	237
6	1200	28	91	695	45	84	1850	43	215
7	1150	25	78	685	42	78	1800	40	194
8	1150	23	71	675	38	69	1750	37	175
9	1100	22	65	670	34	62	1650	35	156
10	1100	22	65	665	30	54	1600	35	151
11	1060	43	123	660	35	62	1640	32	142
12	1060	98	280	660	37	66	1680	28	127
13	1040	143	402	650	38	67	1720	36	167
14	1020	100	275	650	38	67	2000	345	1860
15	1000	48	130	640	39	67	3000	563	4560
16	990	23	61	640	40	69	10000	410	11100
17	980	24	64	640	43	74	15000	740	30000
18	960	25	65	660	45	80	18000	938	45600
19	940	25	63	670	45	81	20500	436	24100
20	930	25	63	720	44	86	20000	483	26100
21	910	25	61	770	43	89	20800	438	24600
22	900	26	63	830	45	101	20900	372	21000
23	880	28	67	960	47	122	19700	354	18800
24	860	33	77	1100	48	143	18500	296	14800
25	850	35	80	1300	48	168	17900	286	13800
26	840	37	84	1600	49	212	17200	315	14600
27	820	37	82	2000	50	270	16300	353	15500
28	800	37	80	2200	50	297	17000	502	23000
29	790	35	75	--	--	--	17200	487	22600
30	770	37	77	--	--	--	17500	460	21700
31	760	41	84	--	--	--	18500	467	23300
TOTAL	31160	--	3092	24370	--	2932	314440	--	359727

MINNESOTA RIVER AT MANKATO, MINN.--Continued

SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

	APRIL			MAY			JUNE		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	19700	465	24700	4350	130	1530	3410	202	1860
2	19900	403	21700	4250	128	1470	4020	254	2760
3	18800	346	17600	4100	157	1740	5410	463	6760
4	17400	384	18000	4000	136	1470	6580	735	13100
5	16200	456	19900	3850	115	1200	6950	518	9720
6	14900	332	13400	3700	125	1250	6430	410	7120
7	13800	268	9990	3550	118	1130	6230	410	6900
8	12900	298	10400	3450	105	978	7190	617	12000
9	12000	268	8680	3300	103	918	8650	593	13800
10	11300	290	8850	3150	112	953	9560	572	14800
11	10600	290	8300	3040	126	1030	10200	570	15700
12	10000	272	7340	2910	112	880	11100	665	19900
13	9420	275	6990	2770	108	808	10900	642	18900
14	8720	235	5530	2580	117	815	10900	433	12700
15	8040	234	5080	2420	102	666	10800	361	10500
16	7440	212	4260	2240	93	562	10500	329	9330
17	7070	201	3840	2090	86	485	9790	336	8880
18	6630	215	3850	1980	105	561	9180	351	8700
19	6400	257	4440	2110	127	724	8360	380	8580
20	6100	190	3130	2260	115	702	7480	478	9650
21	5800	133	2080	2410	103	670	6520	407	7160
22	5650	178	2720	2470	82	547	5800	412	6450
23	5350	215	3110	2610	86	606	5290	430	6140
24	5200	213	2990	3440	263	2440	4910	350	4640
25	5100	185	2550	4300	539	6260	4710	402	5110
26	4900	240	3180	4680	326	4120	4640	423	5300
27	4800	214	2770	4720	320	4080	4790	390	5040
28	4700	160	2030	4440	282	3380	4670	490	6180
29	4600	157	1950	4110	220	2440	4360	594	6990
30	4500	142	1730	3830	212	2190	4750	460	5900
31	--	--	--	3580	203	1960	--	--	--
TOTAL	287920	--	231090	102690	--	48565	214080	--	270570

	JULY			AUGUST			SEPTEMBER		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	5760	587	9130	1690	140	639	431	107	125
2	6830	565	10400	1560	133	560	408	48	53
3	7390	265	5290	1500	143	579	486	40	52
4	7560	420	8570	1400	147	556	587	87	138
5	7570	368	7520	1240	133	445	504	70	95
6	7640	343	7080	1140	154	474	447	55	66
7	7930	341	7300	1070	156	451	455	60	74
8	8160	437	9630	949	150	384	375	62	63
9	7910	353	7540	861	147	342	416	66	74
10	7520	302	6130	806	142	309	447	96	116
11	7260	350	6860	751	163	331	388	88	92
12	7140	320	6170	696	172	323	368	95	94
13	7020	331	6270	663	170	304	368	99	98
14	6780	320	5860	620	172	288	355	91	87
15	6530	293	5170	576	157	244	337	83	76
16	6210	365	6120	576	143	222	331	84	75
17	5870	375	5940	495	146	195	325	75	66
18	5540	396	5920	495	123	164	315	59	50
19	5180	378	5290	540	145	211	304	69	57
20	4760	347	4460	559	120	181	310	77	64
21	4290	350	4050	540	128	187	310	56	47
22	3840	360	3730	522	133	187	382	50	52
23	3420	338	3120	522	135	190	331	50	45
24	3090	352	2940	513	125	173	368	52	52
25	2900	335	2620	470	145	184	349	56	53
26	2700	265	1930	431	132	154	349	54	51
27	2470	268	1790	408	137	151	382	55	57
28	2330	278	1750	395	135	144	382	51	53
29	2230	238	1430	375	128	130	355	66	63
30	2170	222	1300	362	114	111	362	70	68
31	1990	193	1040	349	120	113	--	--	--
TOTAL	167990	--	162350	23074	--	8926	11527	--	2156

TOTAL DISCHARGE FOR YEAR (CFS-DAYS) 1537270
TOTAL SUSPENDED-SEDIMENT DISCHARGE FOR YEAR (TONS) 1278197

05331000 MISSISSIPPI RIVER AT ST. PAUL, MINN.

LOCATION.--Lat 44°56'40", long 93°05'20", in SE¼NE¼ sec.6, T.28 N., R.22 W., Ramsey County, temperature recorder at gaging station on left bank in St. Paul, 300 ft upstream from Robert Street Bridge, 1.1 miles downstream from Northern States Power Company steam generating plant, 6 miles downstream from Minnesota River, and at mile 839.3 upstream from Ohio River.
DRAINAGE AREA.--36,800 sq mi, approximately.
PERIOD OF RECORD.--Water temperatures: October 1956 to current year.

TEMPERATURE (°C) OF WATER, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971
(WATER-STAGE RECORDER WITH TEMPERATURE ATTACHMENT)

	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
1	18.0	17.0	11.5	8.5	1.0	0.0	3.5	3.0	3.0	2.0	4.5	3.5
2	18.0	17.0	11.0	8.0	1.5	0.0	3.5	1.5	3.0	2.0	4.5	3.5
3	17.0	16.5	10.5	8.0	2.0	0.0	3.5	2.0	3.0	1.5	4.5	3.5
4	17.0	16.5	10.5	7.0	1.5	0.0	3.5	1.0	3.0	2.0	4.5	3.5
5	17.0	16.5	10.0	7.0	2.0	0.0	3.5	1.5	3.0	1.0	4.5	4.0
6	18.0	17.0	10.0	7.0	3.0	0.0	3.5	1.5	3.5	3.0	5.0	4.0
7	18.0	17.0	10.0	6.5	3.0	0.5	3.5	1.0	3.5	3.0	4.5	3.5
8	17.0	14.5	10.0	6.5	3.0	0.0	3.5	1.0	3.5	2.0	5.0	4.0
9	16.0	15.0	9.0	6.0	2.0	0.0	3.5	1.5	3.5	3.0	4.5	3.5
10	16.0	14.5	9.0	6.0	3.0	0.0	3.0	1.0	3.5	2.0	5.0	3.5
11	16.0	13.5	8.0	5.5	3.0	0.0	3.0	1.5	3.5	2.0	5.5	4.0
12	15.5	13.5	7.0	5.5	3.0	1.0	3.0	1.5	3.5	2.0	5.0	4.0
13	15.0	12.0	7.0	5.0	3.5	0.5	3.0	0.5	3.5	2.0	5.0	3.5
14	14.5	11.5	6.0	4.5	3.5	1.0	3.0	1.0	4.0	3.5	4.5	4.0
15	14.5	12.0	6.0	4.5	3.5	1.0	3.0	1.0	3.5	3.0	4.5	4.0
16	14.0	11.5	6.5	3.5	3.5	1.0	3.0	1.5	4.0	3.0	4.0	3.5
17	14.0	11.0	5.5	3.0	3.5	1.0	3.0	1.0	4.0	3.0	3.5	3.5
18	14.0	11.0	5.5	3.0	3.5	1.0	3.5	1.5	4.5	4.0	3.5	3.5
19	14.0	11.5	---	---	3.5	2.0	3.0	1.5	4.5	3.0	3.5	3.5
20	13.5	11.0	---	---	4.0	1.5	3.0	1.5	4.5	4.0	3.5	3.0
21	13.0	11.0	---	---	4.0	3.0	3.0	1.5	4.5	4.0	3.0	2.0
22	13.0	11.0	---	---	4.0	1.5	3.0	1.0	4.5	3.0	2.0	1.5
23	13.0	11.5	---	---	3.5	1.5	2.0	1.5	3.5	2.0	1.5	1.5
24	13.0	11.5	---	---	3.5	1.5	3.0	2.0	4.0	3.0	3.0	1.5
25	13.0	12.0	---	---	3.5	3.5	3.5	1.5	4.0	3.0	3.0	3.0
26	13.0	12.0	2.0	0.0	3.5	1.5	3.0	1.0	4.5	3.5	3.0	2.0
27	12.0	11.5	1.5	0.0	3.5	1.5	2.0	1.5	4.5	3.5	2.0	2.0
28	12.0	11.5	1.5	0.0	4.0	0.5	3.5	2.0	4.5	3.5	2.0	2.0
29	12.0	11.0	0.0	0.0	3.5	0.5	3.5	1.5	---	---	2.0	2.0
30	12.0	10.0	1.0	0.0	3.0	1.5	3.0	2.0	---	---	2.0	2.0
31	11.5	9.5	---	---	3.5	1.5	3.0	1.5	---	---	3.0	2.0
MONTH	18.0	9.5	---	---	4.0	0.0	3.5	0.5	4.5	1.0	5.5	1.5

05331000 MISSISSIPPI RIVER AT ST. PAUL, MINN.--Continued

EXTREMES, current year.--Water temperatures: Maximum recorded, 28°C June 15, 25, 28, July 1, 2; minimum, freezing point on many days during winter period.
EXTREMES, period of record.--Water temperatures: Maximum, 31°C July 24-28, 1964; minimum, freezing point on many days during winter period.
REMARKS.--Recorder stopped Nov. 19-25, May 9, 10, June 16-24, 29, 30, July 3-8.

TEMPERATURE (°C) OF WATER, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971
(WATER-STAGE RECORDER WITH TEMPERATURE ATTACHMENT)

	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
1	3.0	3.0	13.5	13.0	20.5	20.0	28.0	26.5	21.0	21.0	23.5	22.0
2	3.5	3.0	13.5	13.5	20.0	19.5	28.0	26.5	21.0	21.0	23.5	22.0
3	3.5	3.5	14.5	13.5	22.0	20.0	---	---	21.0	21.0	24.0	23.0
4	3.5	3.5	15.5	14.5	23.5	21.0	---	---	21.0	20.5	24.5	23.0
5	4.0	3.5	16.0	15.0	24.5	23.0	---	---	21.0	21.0	24.5	23.5
6	4.0	4.0	16.5	15.5	25.0	24.0	---	---	22.0	21.0	23.5	23.0
7	5.0	4.0	17.0	16.0	25.0	24.5	---	---	23.5	22.0	23.5	23.0
8	5.0	5.0	18.0	16.5	24.5	24.0	---	---	24.0	22.0	23.0	22.0
9	5.5	5.0	---	---	24.5	24.0	25.0	24.5	25.5	23.0	22.0	21.5
10	6.0	5.5	---	---	24.5	23.5	24.5	24.5	25.5	24.0	21.5	21.0
11	6.5	6.0	18.5	17.0	24.5	23.5	24.5	23.5	25.5	24.0	21.5	21.5
12	6.5	6.5	18.0	18.0	25.0	24.0	24.0	23.5	25.5	24.5	21.5	21.0
13	8.0	7.0	19.0	18.0	26.0	25.0	23.5	23.0	25.5	24.5	21.5	21.0
14	8.5	8.0	20.0	18.5	26.5	25.5	23.5	22.0	25.5	23.5	21.0	20.5
15	9.0	8.5	20.0	19.0	28.0	26.0	23.5	23.0	24.5	23.5	20.5	20.5
16	9.5	9.0	20.5	19.0	---	---	24.5	23.5	25.0	23.5	20.5	20.0
17	10.0	9.5	20.5	19.5	---	---	24.5	23.5	25.5	24.0	20.0	19.5
18	10.5	10.0	20.5	19.0	---	---	24.5	24.5	25.5	24.5	19.5	18.0
19	11.0	10.5	20.0	18.0	---	---	24.5	23.5	25.5	24.5	18.5	18.0
20	11.0	11.0	18.0	16.5	---	---	24.5	23.5	26.5	24.5	18.0	18.0
21	12.0	11.0	18.5	16.5	---	---	25.5	24.0	26.5	25.0	18.0	16.5
22	12.0	12.0	18.5	18.0	---	---	25.5	24.5	27.0	25.0	17.0	16.0
23	12.0	12.0	18.0	17.0	---	---	25.5	24.5	26.5	25.0	16.5	16.0
24	13.0	12.0	18.0	16.5	---	---	25.5	24.5	25.5	24.5	16.5	15.5
25	13.0	13.0	17.0	16.5	28.0	26.5	25.0	24.5	25.5	24.0	16.0	15.5
26	13.0	13.0	16.5	16.5	26.5	25.5	25.0	24.0	24.0	23.5	16.5	15.5
27	13.0	13.0	18.5	16.5	27.0	25.5	23.5	23.0	24.0	23.5	16.5	15.5
28	13.0	13.0	19.0	18.0	28.0	26.5	22.0	22.0	24.5	23.5	15.5	15.5
29	13.0	13.0	20.0	18.0	---	---	22.0	21.0	24.5	23.5	16.0	15.5
30	13.0	13.0	20.5	19.5	---	---	21.0	20.5	24.5	24.0	16.5	16.0
31	---	---	21.0	20.0	---	---	21.0	20.5	24.5	23.5	---	---
MONTH	13.0	3.0	21.0	13.0	---	---	28.0	20.5	27.0	20.5	24.5	15.5
YEAR	28.0	0.0										

05344980 MISSISSIPPI RIVER AT LOCK AND DAM 3, NEAR RED WING, MINN.

LOCATION.--Lat 44°36'36", long 92°36'36", in SW¼NW¼ sec.10, T.113 N., R.15 W., Goodhue County, on right bank on downstream side of dam, 5 miles northwest of Red Wing, and at mile 796.7 upstream from Ohio River.
DRAINAGE AREA.--46,600 sq mi, approximately.
PERIOD OF RECORD.--Chemical analyses: July 1969 to current year.
Water temperatures: August 1969 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DATE	DIS-CHARGE (CFS)	ALKA-LINITY AS CACO3 (MG/L)	SULFATE (SO4) (MG/L)	CHLO-RIDE (CL) (MG/L)	TEMP-ERATURE (DEG C)	COLOR (PLAT-INUM-COBALT UNITS)	PH (UNITS)	TUR-BID-ITY (JTU)	DIS-SOLVED OXYGEN (MG/L)	BIO-CHEM-ICAL OXYGEN DEMAND (MG/L)
OCT.										
06...	4400	--	--	--	16.5	--	--	--	--	--
06-11	--	--	--	--	--	--	--	--	--	--
07...	7600	155	36	18	16.0	20	8.0	35	8.5	4.3
14...	17400	149	31	17	12.0	20	7.8	25	7.2	3.0
21...	10600	156	42	14	12.0	20	7.9	35	9.7	2.7
28...	12800	170	55	15	12.0	20	8.0	20	8.1	2.1
NOV.										
03-10	--	--	--	--	--	--	--	--	--	--
06...	19100	--	--	--	8.0	--	--	--	--	--
09...	20200	161	56	14	8.0	30	8.1	20	10.6	3.2
23...	19900	171	119	12	.0	35	8.0	90	14.2	4.2
DEC.										
01-08	--	--	--	--	--	--	--	--	--	--
07...	11000	182	103	16	.0	45	7.9	10	13.0	2.2
14...	15100	--	--	--	.5	--	--	--	--	--
21...	12000	194	92	16	1.0	35	7.8	5	11.8	2.0
JAN.										
04...	11400	190	66	13	.0	45	7.7	6	10.9	1.1
05-12	--	--	--	--	--	--	--	--	--	--
14...	9200	--	--	--	.0	--	--	--	--	--
18...	9100	178	62	15	.1	35	7.4	10	9.3	1.6
FEB.										
02-09	--	--	--	--	--	--	--	--	--	--
08...	8000	179	43	15	.0	25	7.5	4	12.2	2.6
19...	10000	--	--	--	.5	--	--	--	--	--
MAR.										
02-09	--	--	--	--	--	--	--	--	--	--
15...	17700	160	45	16	2.0	25	7.6	5	7.5	3.8
APR.										
12...	72800	125	46	8.3	8.0	35	7.8	40	10.0	2.7
13...	74500	--	--	--	7.5	--	--	--	--	--
JUNE										
14...	29000	162	71	13	23.0	50	7.9	65	6.2	2.6
18...	28000	--	--	--	25.0	--	--	--	--	--
AUG.										
16...	6000	--	--	--	23.7	--	--	--	--	--
23...	9100	--	--	--	--	--	--	--	--	--
23...	--	154	--	15	23.0	30	8.2	20	7.6	3.1
SEP.										
15...	7800	--	--	--	21.0	--	--	--	--	--

DATE	DIS-CHARGE (CFS)	ALKA-LINITY AS CACO3 (MG/L)	SULFATE (SO4) (MG/L)	CHLO-RIDE (CL) (MG/L)	TEMP-ERATURE (DEG C)	COLOR (PLAT-INUM-COBALT UNITS)	PH (UNITS)	TUR-BID-ITY (JTU)	DIS-SOLVED OXYGEN (MG/L)	BIO-CHEM-ICAL OXYGEN DEMAND (MG/L)	COLI-FORM (MPN)	HARD-NESS (CA,MG) (MG/L)
SEP.												
20...	5300	147	29	14	17.0	25	8.0	25	8.0	4.6	790	380

05344980 MISSISSIPPI RIVER AT LOCK AND DAM 3, NEAR RED WING, MINN.--Continued

EXTREMES, current year.--Water temperatures: Maximum, 26°C on many days during June and July; minimum, freezing point on many days during winter period.
EXTREMES, period of record.--Water temperatures: Maximum, 28°C July 2, 14, 17, 30, 1970; minimum, freezing point on many days during winter period.
REMARKS.--Recorder stopped June 8-14. Some analyses furnished by Metropolitan Wastewater Treatment Plant and Water Quality office, Environmental Protection Agency. Water discharges furnished by the St. Paul District, Corps of Engineers.

WATER QUALITY DATA, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DATE	COLI-FORM (MPN)	HARD-NESS (CA,MG) (MG/L)	SODIUM (NA) (MG/L)	PO-TAS-SIUM (K) (MG/L)	DIS-SOLVED FLUO-RIDE (F) (MG/L)	TOTAL NITRO-GEN (N) (MG/L)	ORGANIC NITRO-GEN (N) (MG/L)	AMMONIA NITRO-GEN (N) (MG/L)	NITRATE (N) (MG/L)	TOTAL KJEL-DAHL NITRO-GEN (N) (MG/L)
OCT.										
06...	--	--	16	3.2	.3	--	.84	.63	.4	--
06-11	--	--	--	--	--	--	--	--	--	--
07...	330	176	--	--	--	--	--	--	--	--
14...	1700	174	--	--	--	--	--	--	--	--
21...	330	202	--	--	--	--	--	--	--	--
28...	2200	226	--	--	--	--	--	--	--	--
NOV.										
03-10	--	--	--	--	--	--	--	--	--	--
06...	--	--	--	--	--	--	.90	.58	1.7	--
09...	49000	216	--	--	--	--	--	--	--	--
23...	170000	286	--	--	--	--	--	--	--	--
DEC.										
01-08	--	--	--	--	--	--	--	--	--	--
07...	130000	293	--	--	--	--	--	--	--	--
14...	--	--	--	--	--	--	.94	.53	3.1	--
21...	23000	296	--	--	--	--	--	--	--	--
JAN.										
04...	33000	315	--	--	--	--	--	--	--	--
05-12	--	--	--	--	--	--	--	--	--	--
14...	--	--	--	--	--	--	.69	.72	1.5	--
18...	--	234	--	--	--	--	--	--	--	--
FEB.										
02-09	--	--	--	--	--	--	--	--	--	--
08...	13000	412	--	--	--	--	--	--	--	--
19...	--	--	--	--	--	--	.55	.79	.9	--
MAR.										
02-09	--	--	--	--	--	--	--	--	--	--
15...	240000	202	--	--	--	--	--	--	--	--
APR.										
12...	22000	372	--	--	--	--	--	--	--	--
13...	--	--	--	--	--	--	.97	.31	1.6	--
JUNE										
14...	1700	379	--	--	--	--	--	--	--	--
18...	--	--	10	3.1	.7	--	--	.37	--	--
AUG.										
16...	--	--	--	--	--	2.0	.11	.61	--	.72
23...	--	--	--	--	--	--	--	--	--	--
23...	450	183	--	--	--	--	--	--	--	--
SEP.										
15...	--	--	--	--	--	--	--	.85	--	--

05344980 MISSISSIPPI RIVER AT LOCK AND DAM 3, NEAR RED WING, MINN.--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DATE	NITRITE PLUS NITRATE (N) (MG/L)	AMMONIA (NH4) (MG/L)	NITRATE (NO3) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	DIS-SOL-VED-PHOS-PHORUS (P) (MG/L)	METHY-LENE BLUE ACTIVE SUB-STANCE (MG/L)	SAMPLE SIZE (GALS)	TOTAL CARBON EX-TRACT ABLES (UG/L)	CARBON ALCOHOL EX-TRACT ABLES (UG/L)	CARBON CHLORO-FORM EX-TRACT ABLES (UG/L)
OCT.										
06...	--	--	1.9	.46	.43	.04	--	--	--	--
06-11	--	--	--	--	--	--	1456	706	539	167
07...	--	--	--	--	--	--	--	--	--	--
14...	--	--	--	--	--	--	--	--	--	--
21...	--	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--	--
NOV.										
03-10	--	--	--	--	--	--	2898	365	296	69
06...	--	--	7.4	.24	.21	.03	--	--	--	--
09...	--	--	--	--	--	--	--	--	--	--
23...	--	--	--	--	--	--	--	--	--	--
DEC.										
01-08	--	--	--	--	--	--	4494	--	154	67
07...	--	--	--	--	--	--	--	--	--	--
14...	--	--	14	.28	.23	.11	--	--	--	--
21...	--	--	--	--	--	--	--	--	--	--
JAN.										
04...	--	--	--	--	--	--	--	--	--	--
05-12	--	--	--	--	--	--	4462	282	198	84
14...	--	--	6.6	.28	--	.08	--	--	--	--
18...	--	--	--	--	--	--	--	--	--	--
FEB.										
02-09	--	--	--	--	--	--	4063	324	213	111
08...	--	--	--	--	--	--	--	--	--	--
19...	--	--	3.9	.28	.26	.02	--	--	--	--
MAR.										
02-09	--	--	--	--	--	--	1190	1792	798	994
15...	--	--	--	--	--	--	--	--	--	--
APR.										
12...	--	--	--	--	--	--	--	--	--	--
13...	--	--	7.0	.22	--	.06	--	--	--	--
JUNE										
14...	--	--	--	--	--	--	--	--	--	--
18...	3.8	.48	--	.20	.20	--	--	--	--	--
AUG.										
16...	1.3	.79	--	.30	.20	.00	--	--	--	--
23...	--	--	--	--	--	--	--	--	--	--
23...	--	--	--	--	--	--	--	--	--	--
SEP.										
15...	.36	1.1	--	.35	.23	.00	--	--	--	--

05344980 MISSISSIPPI RIVER AT LOCK AND DAM 3, NEAR RED WING, MINN.--Continued

TEMPERATURE (°C) OF WATER, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
1	17.0	17.0	10.0	9.5	1.0	1.0	0.5	0.5	0.0	0.0	1.0	0.5
2	17.0	16.0	9.5	9.0	1.0	0.5	0.5	0.5	0.0	0.0	1.0	0.5
3	16.0	15.0	9.0	8.5	1.5	1.0	0.5	0.5	0.0	0.0	1.0	0.5
4	15.5	14.5	8.5	8.0	1.0	1.0	0.5	0.0	0.5	0.0	1.0	0.5
5	16.0	15.5	8.0	7.5	1.0	0.0	0.0	0.0	0.5	0.0	1.0	1.0
6	17.0	16.0	8.0	8.0	0.5	0.0	0.0	0.0	0.0	0.0	1.0	1.0
7	17.0	16.0	8.0	7.5	0.5	0.5	0.0	0.0	0.0	0.0	1.0	0.5
8	16.0	14.5	8.0	7.5	0.5	0.5	0.0	0.0	0.0	0.0	1.0	0.5
9	14.5	13.5	7.5	7.5	0.5	0.5	0.5	0.0	0.0	0.0	1.0	0.5
10	13.5	13.0	7.5	7.0	0.5	0.5	0.5	0.0	0.5	0.0	1.0	0.5
11	13.5	13.0	7.5	7.0	0.5	0.5	0.5	0.0	0.5	0.5	1.0	1.0
12	13.0	13.0	7.0	6.5	0.5	0.5	0.0	0.0	0.5	0.0	1.5	1.0
13	13.0	13.0	6.5	6.0	0.5	0.5	0.5	0.0	0.5	0.0	2.0	1.0
14	13.0	12.5	6.0	5.0	0.5	0.5	0.5	0.0	0.5	0.0	2.0	2.0
15	12.5	12.0	5.0	4.5	0.5	0.5	0.0	0.0	0.5	0.5	2.0	1.5
16	12.0	11.5	5.0	4.5	0.5	0.5	0.0	0.0	0.5	0.5	2.0	1.5
17	12.0	11.0	5.0	4.5	0.5	0.5	0.5	0.0	0.5	0.5	2.0	1.0
18	12.0	11.5	4.5	4.5	0.5	0.5	0.5	0.0	1.0	0.5	2.0	1.5
19	12.0	11.5	4.5	4.0	0.5	0.5	0.0	0.0	0.5	0.5	1.5	1.0
20	12.0	12.0	4.0	3.5	0.5	0.0	0.5	0.0	0.5	0.5	2.0	1.0
21	12.0	12.0	4.0	3.5	0.5	0.0	0.5	0.5	0.5	0.5	1.5	1.0
22	12.0	12.0	4.0	1.0	0.5	0.5	0.5	0.5	0.5	0.5	1.0	0.5
23	12.0	12.0	1.0	0.5	0.5	0.0	0.5	0.5	1.0	0.5	1.0	0.5
24	12.5	12.0	1.0	0.5	0.5	0.0	0.5	0.5	1.0	0.5	1.0	0.5
25	13.0	12.5	1.0	0.5	0.5	0.0	0.5	0.5	1.0	1.0	1.0	0.5
26	13.0	12.5	1.0	0.5	0.5	0.0	0.5	0.0	1.0	1.0	1.0	1.0
27	13.0	12.5	0.5	0.5	0.5	0.5	0.0	0.0	1.0	0.5	2.0	1.0
28	12.5	12.0	1.0	0.5	0.5	0.0	0.0	0.0	1.0	0.5	1.5	1.5
29	12.0	11.5	1.0	0.5	0.5	0.0	0.5	0.0	---	---	2.0	1.0
30	11.5	10.5	1.0	0.5	0.5	0.0	0.0	0.0	---	---	2.5	2.0
31	10.5	10.0	---	---	0.5	0.5	0.0	0.0	---	---	4.0	2.5
MONTH	17.0	10.0	10.0	0.5	1.5	0.0	0.5	0.0	1.0	0.0	4.0	0.5

	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
1	3.5	2.0	11.5	10.5	18.0	16.5	25.5	25.0	22.5	21.5	22.5	21.5
2	2.0	1.0	12.0	10.5	18.5	16.5	26.0	24.5	22.0	22.0	23.0	22.0
3	2.5	1.0	13.0	11.0	20.0	17.5	25.5	25.0	22.0	21.5	23.5	22.5
4	3.0	1.5	14.0	12.0	20.5	19.0	25.5	24.5	22.0	21.0	23.5	23.5
5	3.5	2.0	15.0	13.0	22.0	20.0	26.0	25.0	22.5	21.5	23.5	23.5
6	4.0	3.0	15.5	13.5	22.0	21.0	26.0	25.0	23.0	22.0	23.5	23.0
7	5.5	3.5	16.5	14.0	21.5	21.0	26.0	25.0	23.5	22.5	23.5	22.5
8	6.5	5.0	16.5	15.0	---	---	25.5	24.5	24.0	23.0	23.0	22.5
9	7.0	6.0	17.0	15.0	---	---	25.5	24.5	25.0	23.5	22.5	22.0
10	7.5	6.5	18.0	15.5	---	---	25.5	24.5	25.0	24.0	22.5	21.5
11	8.5	7.5	17.0	16.0	---	---	25.0	24.0	25.0	23.5	22.5	21.5
12	8.5	7.5	16.0	14.5	---	---	24.5	23.5	24.5	24.0	22.5	21.5
13	8.5	7.5	17.0	15.0	---	---	24.5	23.0	25.0	24.0	23.0	22.0
14	8.0	7.0	18.0	16.5	---	---	24.5	23.0	24.5	23.5	22.5	22.0
15	9.0	7.5	18.5	17.0	26.0	24.0	24.5	23.5	24.0	23.5	22.0	21.0
16	10.0	8.5	19.0	17.5	26.0	25.0	25.0	23.5	24.5	23.5	21.0	20.5
17	11.0	9.0	18.5	17.5	26.0	25.0	25.5	24.0	24.5	23.5	20.5	19.5
18	10.5	10.0	17.5	16.5	26.0	24.5	25.5	24.5	24.0	24.0	19.5	19.0
19	11.0	10.0	16.5	14.0	26.0	25.0	24.5	23.5	24.5	23.5	19.0	19.0
20	12.5	11.0	14.5	13.5	25.5	24.5	25.0	23.5	25.0	24.0	18.5	18.0
21	12.5	11.5	16.5	14.5	25.5	24.5	26.0	24.5	25.0	24.0	18.0	18.0
22	12.5	10.5	16.5	15.0	26.0	24.5	26.0	25.0	25.5	24.5	18.0	17.0
23	13.0	12.0	15.0	14.5	26.0	25.0	26.0	25.5	25.0	23.5	17.0	16.5
24	12.5	11.5	15.0	14.5	25.5	25.0	26.0	25.0	23.5	23.0	17.0	16.5
25	13.0	11.5	14.5	13.0	25.0	24.0	25.5	25.0	23.5	22.5	16.5	16.5
26	13.5	12.0	14.5	13.0	24.0	23.5	25.0	23.0	22.5	22.0	16.5	16.0
27	13.0	11.0	16.0	13.5	25.5	23.5	23.0	22.5	23.0	22.0	17.0	16.5
28	11.0	10.5	17.0	15.0	26.0	24.5	22.5	21.5	23.0	22.0	17.5	17.0
29	11.0	10.5	17.5	15.5	25.5	25.0	22.0	21.0	23.0	22.0	17.5	17.0
30	11.5	10.5	18.5	16.5	26.0	25.0	21.5	21.0	23.0	22.5	18.5	17.5
31	---	---	18.5	17.0	---	---	22.0	21.0	22.5	22.0	---	---
MONTH	13.5	1.0	19.0	10.5	---	---	26.0	21.0	25.5	21.0	23.5	16.0
YEAR	26.0	0.0										

05376000 NORTH FORK WHITEWATER RIVER NEAR ELBA, MINN.

(Hydrolic bench-mark station)

LOCATION.--Lat 44°05'30", long 92°03'57", in sec.7, T.107 N., R.10 W., Winona County, at gaging station on left bank, 2.3 miles upstream from Middle Fork, 2.4 miles west of Elba, and 3.5 miles upstream from confluence with South Fork.

WATER QUALITY DATA, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DATE	DIS-CHARGE (CFS)	SILICA (SIO2) (MG/L)	DIS-SOLVED IRON (FE) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	DIS-SOLVED CAL-CIUM (CA) (MG/L)	DIS-SOLVED MAG-NE-SIUM (MG) (MG/L)	SODIUM (NA) (MG/L)	PO-TAS-SIUM (K) (MG/L)	BICAR-BONATE (HCO3) (MG/L)	CAR-BONATE (CO3) (MG/L)	ALKA-LINITY AS CACO3 (MG/L)	SULFATE (SO4) (MG/L)
OCT.												
15...	30	--	--	--	--	--	--	--	--	--	--	--
29...	45	--	--	--	--	--	--	--	--	--	--	--
29...	45	--	--	--	--	--	--	--	--	--	--	--
29...	45	17	--	--	65	20	4.0	5.3	278	0	228	19
DEC.												
03...	37	16	--	--	75	22	4.5	2.2	316	0	259	19
03...	37	--	--	--	--	--	--	--	--	--	--	--
JAN.												
21...	25	16	--	--	71	25	5.3	2.4	319	0	261	17
21...	25	--	--	--	--	--	--	--	--	--	--	--
FEB.												
11...	22	15	--	--	72	24	5.0	1.6	328	0	269	17
11...	22	--	--	--	--	--	--	--	--	--	--	--
MAR.												
18...	52	11	--	--	50	16	4.0	5.1	222	0	182	15
18...	53	--	--	--	--	--	--	--	--	--	--	--
31...	383	6.1	--	--	25	8.0	1.9	5.1	112	0	92	9.9
APR.												
26...	45	--	--	--	--	--	--	--	--	--	--	--
26...	45	7.7	20	40	65	23	5.3	3.1	286	--	235	21
27...	47	--	--	--	--	--	--	--	--	--	--	--
JUNE												
03...	44	--	--	--	--	--	--	--	--	--	--	--
03...	44	14	30	110	77	25	4.5	1.9	330	0	271	17
28...	39	19	20	50	74	25	4.2	2.4	324	--	266	19
28...	39	--	--	--	--	--	--	--	--	--	--	--
AUG.												
05...	34	16	90	40	74	25	4.4	1.6	335	0	275	18
05...	34	--	--	--	--	--	--	--	--	--	--	--
SEP.												
16...	26	16	20	50	73	24	4.7	2.4	348	0	285	20
16...	26	--	--	--	--	--	--	--	--	--	--	--

ANALYSIS OF ADDITIONAL SAMPLES

DATE	DIS-CHARGE (CFS)	TEMP-ERATURE (DEG C)	DIS-SOLVED ARSENIC (AS) (UG/L)	DIS-SOLVED CAD-MIUM (CD) (UG/L)	DIS-SOLVED CHRO-MIUM (CR) (UG/L)	HEXA-VALENT CHRO-MIUM (CR6) (UG/L)	DIS-SOLVED COBALT (CO) (UG/L)	DIS-SOLVED COPPER (CU) (UG/L)	DIS-SOLVED LEAD (PB) (UG/L)
OCT.									
15...	30	8.0	0	1	0	0	0	--	5
JUNE									
28...	39	22.0	2	0	--	0	0	6	50

05376000 NORTH FORK WHITEWATER RIVER NEAR ELBA, MINN.--Continued

(Hydrologic bench-mark station)

DRAINAGE AREA.--101 sq mi.
PERIOD OF RECORD.--Chemical analyses: August 1967 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DATE	CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)	NITRATE (N) (MG/L)	NITRATE (NO3) (MG/L)	NITRITE PLUS NITRATE (N) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	DISSOLVED BORON (B) (UG/L)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	DISSOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L)	DISSOLVED SOLIDS (TONS PER DAY)	DISSOLVED SOLIDS (TONS PER AC-FT)
OCT.											
15...	--	--	--	--	--	--	--	--	--	--	--
29...	--	--	--	--	--	--	--	--	--	--	--
29...	--	--	--	--	--	--	--	--	--	--	--
29...	6.9	.2	1.7	7.4	--	.50	0	307	282	37.4	.42
DEC.											
03...	5.4	.2	3.0	13	--	.010	20	340	313	34.0	.46
03...	--	--	--	--	--	--	--	--	--	--	--
JAN.											
21...	5.8	.1	2.1	9.3	--	.21	60	329	308	22.6	.45
21...	--	--	--	--	--	--	--	--	--	--	--
FEB.											
11...	5.0	.2	2.3	10	--	.21	10	330	312	20.3	.45
11...	--	--	--	--	--	--	--	--	--	--	--
MAR.											
18...	7.5	.0	1.6	7.2	--	.34	0	233	226	33.0	.32
18...	--	--	--	--	--	--	--	--	--	--	--
31...	5.9	.2	1.7	7.4	--	2.1	--	125	125	129	.17
APR.											
26...	--	--	--	--	--	--	--	--	--	--	--
26...	7.2	.2	--	--	1.0	.10	0	272	278	34.1	.38
27...	--	--	--	--	--	--	--	--	--	--	--
JUNE											
03...	--	--	--	--	--	--	--	--	--	--	--
03...	5.6	.2	--	--	2.1	.20	10	306	317	36.7	.43
28...	7.3	.0	--	--	3.5	.40	20	344	326	36.5	.47
28...	--	--	--	--	--	--	--	--	--	--	--
AUG.											
05...	6.2	.2	--	--	2.4	.20	30	320	321	30.1	.44
05...	--	--	--	--	--	--	--	--	--	--	--
SEP.											
16...	4.0	.2	--	--	1.9	.29	60	320	324	23.1	.44
16...	--	--	--	--	--	--	--	--	--	--	--

ANALYSIS OF ADDITIONAL SAMPLES

DATE	DISSOLVED MOLYBDENUM (MO) (UG/L)	DISSOLVED NICKEL (NI) (UG/L)	DISSOLVED STRONTIUM (SR) (UG/L)	DISSOLVED VANADIUM (V) (UG/L)	DISSOLVED ZINC (ZN) (UG/L)	DISSOLVED LITHIUM (LI) (UG/L)	DISSOLVED SELENIUM (SE) (UG/L)	TOTAL MERCURY (HG) (UG/L)
OCT.								
15...	--	--	--	--	20	--	--	.2
JUNE								
28...	6	0	130	2.0	30	5	0	--

05376000 NORTH FORK WHITEWATER RIVER NEAR ELBA, MINN.--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DATE	HARD-NESS (CA,MG) (MG/L)	NON-CAR-BONATE HARD-NESS (MG/L)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	SPECI-FIC COND-UCTANCE (MICRO-MHOS)	PH (UNITS)	TEMP-ERATURE (DEG C)	COLOR (PLAT-INUM-COBALT UNITS)	DIS-SOLVED OXYGEN (MG/L)	BIO-CHEM-ICAL OXYGEN DEMAND (MG/L)	IMMF-DIATE COLI-FORM (COL. PER 100 ML)
OCT.											
15...	--	--	--	--	--	--	8.0	--	--	--	--
29...	--	--	--	--	445	7.6	9.0	--	9.7	--	19000
29...	--	--	--	--	--	--	9.0	--	--	--	--
29...	250	17	3	.1	481	8.1	9.0	66	--	2.4	--
DEC.											
03...	280	20	3	.1	529	8.3	4.0	3	--	1.1	--
03...	--	--	--	--	520	8.2	4.0	--	11.4	--	720
JAN.											
21...	280	16	4	.1	518	8.1	1.0	2	--	1.1	--
21...	--	--	--	--	555	8.3	1.0	--	12.6	--	15
FEB.											
11...	280	10	4	.1	530	7.9	1.0	5	--	.7	--
11...	--	--	--	--	505	8.2	1.0	--	12.2	--	22
MAR.											
18...	190	9	4	.1	400	7.7	2.5	25	--	4.8	--
18...	--	--	--	--	410	8.1	2.5	--	12.3	--	2000
31...	95	3	4	.1	239	7.5	5.0	--	--	8.8	--
APR.											
26...	--	--	--	--	490	8.3	12.0	--	14.0	--	300
26...	260	22	4	.1	488	8.3	12.0	5	--	--	--
27...	--	--	--	--	--	--	8.0	--	--	1.4	--
JUNE											
03...	--	--	--	--	530	8.3	14.5	--	10.0	--	60
03...	300	25	3	.1	545	7.9	14.5	10	--	.9	--
28...	290	22	3	.1	543	7.2	22.0	9	--	6.4	--
28...	--	--	--	--	--	8.0	22.0	--	8.5	--	700
AUG.											
05...	290	13	3	.1	516	7.9	14.5	7	--	--	--
05...	--	--	--	--	540	8.2	14.5	--	10.2	--	350
SEP.											
16...	280	0	3	.1	533	8.0	11.0	7	--	1.2	--
16...	--	--	--	--	535	8.3	11.0	--	11.3	--	290

ANALYSIS OF ADDITIONAL SAMPLES

DATE	DIS-CHARGE (CFS)	TEMP-ERATURE (DEG C)	DIS-SOLVED GROSS ALPHA AS U-NAT. (PC/L)	SUS-PENDED GROSS ALPHA AS U-NAT. (PC/L)	DIS-SOLVED GROSS BETA AS CS-137 (PC/L)	SUS-PENDED GROSS BETA AS CS-137 (PC/L)	DIS-SOLVED RA-226 (RADON METHOD) (PC/L)
OCT.							
29...	45	9.0	<1.3	.9	7.5	5.3	.08

DATE	DIS-SOLVED GROSS ALPHA AS U-NAT. (UG/L)	SUS-PENDED GROSS ALPHA AS U-NAT. (UG/L)	DIS-SOLVED GROSS BETA AS SR90 /Y90 (PC/L)	SUS-PENDED GROSS BETA AS SR90 /Y90 (PC/L)	DIS-SOLVED NATURAL URANIUM (U) (UG/L)	TOTAL FILT-RABLE RESIDUE (MG/L)	TOTAL NON-FILT-RABLE RESIDUE (MG/L)
OCT.							
29...	<3.8	2.6	6.0	4.4	.7	290	100

05376000 NORTH FORK WHITEWATER RIVER NEAR ELBA, MINN.--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DATE	DIS-CHARGE (CFS)	TEMP-ERATURE (DEG C)	ALDRIN (UG/L)	ALDRIN IN BOTTOM DE-POSITS (UG/KG)	LINDANE (UG/L)	LINDANE IN BOTTOM DE-POSITS (UG/KG)	CHLOR-DANE (UG/L)	DDD (UG/L)	DDD IN BOTTOM DE-POSITS (UG/KG)	DDE (UG/L)
ANALYSIS OF ADDITIONAL SAMPLES										
OCT. 29...	45	9.0	.00	.00	.00	.00	.00	.00	.80	.00

DATE	DDE IN BOTTOM DE-POSITS (UG/KG)	DDT (UG/L)	DDT IN BOTTOM DE-POSITS (UG/KG)	DI-ELDRIN (UG/L)	DI-ELDRIN IN BOTTOM DE-POSITS (UG/KG)	ENDRIN (UG/L)	ENDRIN IN BOTTOM DE-POSITS (UG/KG)	HEPTA-CHLOR (UG/L)	HEPTA-CHLOR IN BOTTOM DE-POSITS (UG/KG)
ANALYSIS OF ADDITIONAL SAMPLES									
OCT. 29...	.50	.00	.00	.01	4.5	.00	.00	.00	.00

DATE	HEPTA-CHLOR EPOXIDE (UG/L)	HEPTA-CHLOR EPOXIDE IN BOT-TOM DE-POSITS (UG/KG)	MALA-THION (UG/L)	PARA-THION (UG/L)	DI-AZINON (UG/L)	METHYL PARA-THION (UG/L)	2,4-D (UG/L)	2,4,5-T (UG/L)	SILVEX (UG/L)
ANALYSIS OF ADDITIONAL SAMPLES									
OCT. 29...	.00	.00	.00	.00	.00	.00	.00	.00	.00

DATE	TIME	DIS-CHARGE (CFS)	TEMP-ERATURE (DEG C)	SUS-PENDED SEDI-MENT (MG/L)	SUS-PENDED SEDI-MENT DIS-CHARGE (T/DAY)
OCT. 29...	1015	45	9.0	126	15
DEC. 03...	1452	37	4.0	30	3.0
JAN. 21...	1055	26	1.0	8	.60
FEB. 11...	1135	23	1.0	11	.70
MAR. 18...	1115	52	2.5	24	3.4
31...	1245	386	5.0	1610	1680
APR. 01...	1115	459	1.0	1320	1640
JUNE 03...	1000	44	14.5	38	4.5
28...	1512	39	22.0	172	18
AUG. 05...	1145	35	14.5	84	7.9
SEP. 16...	1345	27	11.0	28	2.0

DATE	DIS-CHARGE (CFS)	SILICA (SIO2) (MG/L)	DIS-SOLVED IRON (FE) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	DIS-SOLVED CAL-CIUM (CA) (MG/L)	DIS-SOLVED MAG-NE-SIUM (MG) (MG/L)	SODIUM (NA) (MG/L)	PO-TAS-SIUM (K) (MG/L)	BICAR-BONATE (HCO3) (MG/L)	CAR-BONATE (CO3) (MG/L)	ALKA-LINITY AS CACO3 (MG/L)
04018750 - ST LOUIS RIVER AT FORBES, MINN (LAT 47 21 48 LONG 092 35 56)											
NOV., 1970											
19...	936	11	520	18	11	6.1	3.7	1.3	42	0	34
FEB., 1971											
03...	109	13	690	220	21	10	7.4	2.7	82	0	67
JUNE											
07...	931	7.1	660	40	11	4.9	4.2	2.3	43	0	35
SEP.											
14...	185	11	440	60	24	13	8.8	3.3	103	0	84
04024000 - ST. LOUIS RIVER AT SCANLON, MINN. (LAT 46 42 12 LONG 092 25 07)											
NOV.											
17...	3700	11	470	0	14	6.1	5.5	1.2	46	0	37
FEB., 1971											
11...	1380	8.4	620	110	19	6.8	8.9	1.2	61	0	50
JUNE											
08...	3800	7.0	800	50	14	5.1	5.7	1.2	54	0	44
SEP.											
14...	1440	10	1300	130	25	8.0	9.2	1.4	94	0	77

DATE	DIS-SOLVED SOLIDS (TONS PER DAY)	DIS-SOLVED SOLIDS (TONS PER AC-FT)	HARD-NESS (CA,MG) (MG/L)	NON-CAR-BONATE HARD-NESS (MG/L)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	SPECI-FIC COND-UCTANCE (MICRO-MHOS)	PH (UNITS)	TEMP-ERATURE (DEG C)	COLOR (PLAT-INUM-COBALT UNITS)
04018750 - ST LOUIS RIVER AT FORBES, MINN (LAT 47 21 48 LONG 092 35 56)										
NOV., 1970										
19...	306	.16	53	19	13	.2	123	6.9	1.0	60
FEB., 1971										
03...	45.0	.21	94	27	14	.3	214	7.8	1.0	55
JUNE										
07...	382	.21	48	12	15	.3	116	6.6	18.0	100
SEP.										
14...	84.9	.23	110	29	14	.4	258	7.3	17.5	100
04024000 - ST. LOUIS RIVER AT SCANLON, MINN. (LAT 46 42 12 LONG 092 25 07)										
NOV.										
17...	1530	.21	60	23	16	.3	150	7.9	1.0	100
FEB., 1971										
11...	544	.20	74	25	20	.4	185	7.3	--	110
JUNE										
08...	1680	.22	56	12	18	.3	135	6.7	18.0	200
SEP.										
14...	832	.29	95	18	17	.4	210	6.3	19.0	200

DATE	SULFATE (SO4) (MG/L)	CHLO-RIDE (CL) (MG/L)	DIS-SOLVED FLUO-RIDE (F) (MG/L)	NITRATE (N) (MG/L)	NITRATE (NO3) (MG/L)	NITRITE PLUS NITRATE (N) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	DIS-SOLVED BORON (B) (UG/L)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L)
04018750 - ST LOUIS RIVER AT FORBES, MINN (LAT 47 21 48 LONG 092 35 56)										
NOV., 1970										
19...	23	4.4	.2	.3	1.2	--	.090	40	121	84
FEB., 1971										
03...	29	7.1	.2	.9	4.1	--	.000	60	153	136
JUNE										
07...	13	4.7	.2	--	--	.36	.050	190	152	71
SEP.										
14...	39	8.9	.3	--	--	.27	.10	170	170	161
04024000 - ST. LOUIS RIVER AT SCANLON, MINN. (LAT 46 42 12 LONG 092 25 07)										
NOV.										
17...	26	8.0	.3	.4	1.6	--	.14	40	153	96
FEB., 1971										
11...	24	11	.3	.1	.4	--	.020	130	146	111
JUNE										
08...	16	7.4	.2	--	--	.10	.050	250	164	85
SEP.										
14...	22	13	.4	--	--	.01	.10	280	214	137

DATE	DIS-CHARGE (CFS)	TOTAL NITRO-GEN (N) (MG/L)	ORGANIC NITRO-GEN (N) (MG/L)	AMMONIA NITRO-GEN (N) (MG/L)	NITRITE (N) (MG/L)	NITRATE (N) (MG/L)	TOTAL KJEL-DAHL NITRO-GEN (N) (MG/L)	NITRITE PLUS NITRATE (N) (MG/L)
05033900 - PELICAN RIVER AT DETROIT LAKES, MINN. (LAT 46 48 37 LONG 095 49 42)								
SEP., 1971								
28...	30	1.0	.94	.06	.000	.00	1.0	.04
05035500 - ST. CLAIR LAKE OUTLET NEAR DETROIT LAKES,MINN (LAT 46 48 03 LONG 095 52 37)								
SEP., 1971								
29...	6.0	1.5	.79	.61	.000	.1	1.4	.05

DATE	DIS-CHARGE (CFS)	SILICA (SIO2) (MG/L)	DIS-SOLVED IRON (FE) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	DIS-SOLVED CAL-CIUM (CA) (MG/L)	DIS-SOLVED MAG-NE-SIUM (MG) (MG/L)	SODIUM (NA) (MG/L)	PO-TAS-SIUM (K) (MG/L)	BICAR-BONATE (HCO3) (MG/L)	CAR-BONATE (CO3) (MG/L)	ALKA-LINITY AS CACO3 (MG/L)
05131500 - LITTLE FORK R AT LITTLEFORK, MN. (LAT 48 23 55 LONG 093 33 56)											
FEB., 1971											
18...	132	14	590	70	28	10	5.2	2.1	134	0	110
APR.											
19...	14400	7.1	390	10	17	4.0	1.6	2.2	58	--	48
05132000 - BIG FORK RIVER AT BIG FALLS, MINN. (LAT 48 11 45 LONG 093 48 25)											
FEB., 1971											
19...	172	12	260	92	42	13	3.9	2.4	189	0	155
APR.											
19...	625	7.6	240	0	14	4.6	.9	1.5	52	--	43

DATE	DIS-SOLVED SOLIDS (TONS PER DAY)	DIS-SOLVED SOLIDS (TONS PER AC-FT)	HARD-NESS (CA,MG) (MG/L)	NON-CAR-BONATE HARD-NESS (MG/L)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	SPECI-FIC COND-UCTANCE (MICRO-MHOS)	PH (UNITS)	TEMP-ERATURE (DEG C)	COLOR (PLAT-INUM-COBALT UNITS)
05131500 - LITTLE FORK R AT LITTLEFORK, MN. (LAT 48 23 55 LONG 093 33 56)										
FEB., 1971										
18...	61.7	.24	110	1	9	.2	236	8.0	.0	60
APR.										
19...	3810	--	59	11	5	.1	107	7.7	5.0	200
05132000 - BIG FORK RIVER AT BIG FALLS, MINN. (LAT 48 11 45 LONG 093 48 25)										
FEB., 1971										
19...	93.8	.27	160	2	5	.1	303	8.2	.0	25
APR.										
19...	159	--	54	11	3	.1	99	7.5	5.0	100

DATE	DIS-SOLVED ORTHO PHOS-PHATE (PO4) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	TOTAL ORTHO PHOS-PHORUS (P) (MG/L)	AMMONIA (NH4) (MG/L)	SPECI-FIC COND-UCTANCE (MICRO-MHOS)	PH (UNITS)	TEMP-ERATURE (DEG C)
05033900 - PELICAN RIVER AT DETROIT LAKES, MINN. (LAT 46 48 37 LONG 095 49 42)							
SEP., 1971							
28...	.09	.12	--	.08	491	7.3	13.5
05035500 - ST. CLAIR LAKE OUTLET NEAR DETROIT LAKES,MINN (LAT 46 48 03 LONG 095 52 37)							
SEP., 1971							
29...	2.1	1.1	--	.79	713	8.4	12.5

DATE	SULFATE (SO4) (MG/L)	CHLO-RIDE (CL) (MG/L)	DIS-SOLVED FLUO-RIDE (F) (MG/L)	NITRATE (N) (MG/L)	NITRATE (NO3) (MG/L)	NITRITE PLUS NITRATE (N) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	TOTAL ORTHO PHOS-PHORUS (P) (MG/L)	DIS-SOLVED BORON (B) (UG/L)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L)
05131500 - LITTLE FORK R AT LITTLEFORK, MN. (LAT 48 23 55 LONG 093 33 56)											
FEB., 1971											
18...	15	2.6	.2	.1	.6	--	.000	--	50	173	145
APR.											
19...	5.0	3.6	.2	--	--	.10	.30	--	70	98	71
05132000 - BIG FORK RIVER AT BIG FALLS, MINN. (LAT 48 11 45 LONG 093 48 25)											
FEB., 1971											
19...	9.6	2.3	.1	.2	.8	--	.000	--	20	202	179
APR.											
19...	8.5	2.0	.2	--	--	.60	.10	--	70	94	68

DATE	DIS-CHARGE (CFS)	SILICA (SIO2) (MG/L)	DIS-SOLVED IRON (FE) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	DIS-SOLVED CAL-CIUM (CA) (MG/L)	DIS-SOLVED MAG-NE-SIUM (MG) (MG/L)	SODIUM (NA) (MG/L)	PO-TAS-SIUM (K) (MG/L)	BICAR-BONATE (HCO3) (MG/L)	CAR-BONATE (CO3) (MG/L)
05244360 - LEAF RIVER NEAR VERNDALE, MINN. (LAT 46 29 24 LONG 095 00 27)										
MAY , 1971										
13...	124	12	160	120	61	23	6.3	2.0	307	--
SEP.										
15...	59	20	20	80	66	24	6.0	2.3	332	0
05244370 - WING RIVER NEAR HEWITT,MINN. (LAT 46 21 16 LONG 095 05 35)										
SEP., 1971										
15...	18	22	20	60	77	23	4.2	2.1	355	0
05244400 - WING RIVER BELOW VERNDALE,MINN. (LAT 46 26 28 LONG 095 00 02)										
MAY , 1971										
13...	45	8.5	40	60	68	23	4.3	1.6	305	--
SEP.										
15...	30	22	20	50	74	22	4.1	2.1	342	0
05244420 - REDEYE RIVER NEAR ALDRICH,MINN. (LAT 46 29 55 LONG 094 54 30)										
MAY , 1971										
14...	73	9.9	90	90	61	18	5.5	1.6	269	--
SEP.										
15...	31	19	30	50	70	20	5.5	2.3	329	0
05244440 - LEAF RIVER NEAR ALDRICH,MINN. (LAT 46 27 24 LONG 094 50 29)										
SEP., 1971										
15...	142	17	40	90	78	20	10	3.1	326	0
05244470 - PARTRIDGE RIVER NEAR ALDRICH,MINN. (LAT 46 25 02 LONG 094 50 28)										
MAY , 1971										
14...	19	2.5	140	80	74	21	9.0	2.1	312	--
SEP.										
15...	12	20	20	60	69	22	5.2	2.2	334	0

DATE	DIS-SOLVED SOLIDS (TONS PER AC-FT)	HARD-NESS (CA,MG) (MG/L)	NON-CAR-BONATE HARD-NESS (MG/L)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	SPECI-FIC COND-UCTANCE (MICRO-MHOS)	PH (UNITS)	TEMP-ERATURE (DEG C)	COLOR (PLAT-INUM-COBALT UNITS)
05244360 - LEAF RIVER NEAR VERNDALE, MINN. (LAT 46 29 24 LONG 095 00 27)									
MAY , 1971									
13...	.38	250	0	5	.2	505	8.0	15.0	20
SEP.									
15...	.39	260	0	S	.2	501	7.9	14.0	20
05244370 - WING RIVER NEAR HEWITT,MINN. (LAT 46 21 16 LONG 095 05 35)									
SEP., 1971									
15...	.42	290	0	3	.1	518	8.1	14.S	20
05244400 - WING RIVER BELOW VERNDALE,MINN. (LAT 46 26 28 LONG 095 00 02)									
MAY , 1971									
13...	.39	260	14	3	.1	505	8.1	15.0	20
SEP.									
15...	.42	280	0	3	.1	521	8.0	14.5	20
05244420 - REDEYE RIVER NEAR ALDRICH,MINN. (LAT 46 29 55 LONG 094 54 30)									
MAY , 1971									
14...	.32	230	6	5	.2	433	8.0	15.0	30
SEP.									
15...	.38	260	0	4	.2	473	8.0	12.5	30
05244440 - LEAF RIVER NEAR ALDRICH,MINN. (LAT 46 27 24 LONG 094 50 29)									
SEP., 1971									
15...	.44	280	10	7	.3	493	7.9	14.0	20
05244470 - PARTRIDGE RIVER NEAR ALDRICH,MINN. (LAT 46 25 02 LONG 094 50 28)									
MAY , 1971									
14...	.41	270	15	7	.2	542	7.9	14.0	50
SEP.									
15...	.40	260	0	4	.1	536	8.0	13.0	50

DATE	ALKA-LINITY AS CACO3 (MG/L)	SULFATE (SO4) (MG/L)	CHLO-RIDE (CL) (MG/L)	DIS-SOLVED FLUO-RIDE (F) (MG/L)	NITRITE PLUS NITRATE (N) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	DIS-SOLVED BORON (B) (UG/L)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L)	DIS-SOLVED SOLIDS (TONS PER DAY)
05244360 - LEAF RIVER NEAR VERNDALE, MINN. (LAT 46 29 24 LONG 095 00 27)										
MAY , 1971										
13...	252	16	6.3	.2	.20	.10	50	312	279	93.4
SEP.										
15...	272	10	6.4	.2	.33	.14	70	288	300	46.5
05244370 - WING RIVER NEAR HEWITT,MINN. (LAT 46 21 16 LONG 095 05 35)										
SEP., 1971										
15...	291	12	4.6	.2	.13	.10	70	312	320	15.6
05244400 - WING RIVER BELOW VERNDALE,MINN. (LAT 46 26 28 LONG 095 00 02)										
MAY , 1971										
13...	250	22	5.1	.3	1.0	.050	50	286	287	35.0
SEP.										
15...	281	14	5.4	.2	1.4	.080	50	308	318	25.6
05244420 - REDEYE RIVER NEAR ALDRICH,MINN. (LAT 46 29 55 LONG 094 54 30)										
MAY , 1971										
14...	221	6.5	3.3	.1	.00	.080	70	248	238	48.9
SEP.										
15...	270	6.5	3.6	.2	.19	.13	60	282	290	24.3
05244440 - LEAF RIVER NEAR ALDRICH.MINN. (LAT 46 27 24 LONG 094 50 29)										
SEP., 1971										
15...	267	9.5	10	.3	.35	.15	110	322	310	123
05244470 - PARTRIDGE RIVER NEAR ALDRICH,MINN. (LAT 46 25 02 LONG 094 50 28)										
MAY , 1971										
14...	256	29	8.1	.1	.10	.10	110	356	300	15.7
SEP.										
15...	274	12	6.5	.2	.53	.26	110	292	304	9.46

DATE	DIS-CHARGE (CFS)	SILICA (SIO2) (MG/L)	DIS-SOLVED IRON (FE) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	DIS-SOLVED CAL-CIUM (CA) (MG/L)	DIS-SOLVED MAG-NE-SIUM (MG) (MG/L)	SODIUM (NA) (MG/L)	PO-TAS-SIUM (K) (MG/L)	BICAR-BONATE (HCO3) (MG/L)	CAR-BONATE (CO3) (MG/L)	ALKA-LINITY AS CACO3 (MG/L)
05270130 - ASHLEY CREEK AT WESTPORT, MINN. (LAT 45 43 07 LONG 095 09 36)											
MAY , 1971											
12...	13	11	50	63	49	22	3.3	2.8	241	--	198
05270500 - SAUK RIVER NEAR ST. CLOUD, MINN. (LAT 45 33 35 LONG 094 14 00)											
APR., 1971											
06...	1780	7.1	80	120	37	10	3.8	6.8	128	0	105
05275000 - ELK RIVER NEAR BIG LAKE, MINN. (LAT 45 20 02 LONG 093 40 00)											
OCT., 1970											
01...	79	11	50	75	43	14	3.7	1.4	184	0	151
JUNE, 1971											
14...	292	9.2	160	40	43	13	4.4	1.5	194	0	159

DATE	SULFATE (SO4) (MG/L)	CHLO-RIDE (CL) (MG/L)	DIS-SOLVED FLUO-RIDE (F) (MG/L)	NITRATE (N) (MG/L)	NITRATE (NO3) (MG/L)	NITRITE PLUS NITRATE (N) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	DIS-SOLVED BORON (B) (UG/L)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L)
05270130 - ASHLEY CREEK AT WESTPORT, MINN. (LAT 45 43 07 LONG 095 09 36)										
MAY , 1971										
12...	12	3.2	.3	--	--	.00	.10	0	220	222
05270500 - SAUK RIVER NEAR ST. CLOUD, MINN. (LAT 45 33 35 LONG 094 14 00)										
APR., 1971										
06...	24	5.3	.2	3.1	14	--	.28	30	168	172
05275000 - ELK RIVER NEAR BIG LAKE, MINN. (LAT 45 20 02 LONG 093 40 00)										
OCT., 1970										
01...	13	2.9	.1	.5	2.0	--	.010	0	188	182
JUNE, 1971										
14...	15	4.3	.2	--	--	.67	.10	70	230	189

DATE	DIS-SOLVED SOLIDS (TONS PER DAY)	DIS-SOLVED SOLIDS (TONS PER AC-FT)	HARD-NESS (CA,MG) (MG/L)	NON-CAR-BONATE HARD-NESS (MG/L)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	SPECI-FIC COND-UCTANCE (MICRO-MHOS)	PH (UNITS)	TEMP-ERATURE (DEG C)	COLOR (PLAT-INUM-COBALT UNITS)
05270130 - ASHLEY CREEK AT WESTPORT, MINN. (LAT 45 43 07 LONG 095 09 36)										
MAY , 1971										
12...	8.03	.30	210	15	3	.1	391	7.9	13.0	5
05270500 - SAUK RIVER NEAR ST. CLOUD, MINN. (LAT 45 33 35 LONG 094 14 00)										
APR., 1971										
06...	807	.23	140	30	5	.1	265	7.5	2.0	25
05275000 - ELK RIVER NEAR BIG LAKE, MINN. (LAT 45 20 02 LONG 093 40 00)										
OCT., 1970										
01...	40.3	.26	160	12	5	.1	322	7.7	16.0	9
JUNE, 1971										
14...	181	.31	160	2	6	.2	333	7.6	24.0	40

DATE	DIS-CHARGE (CFS)	SILICA (SIO2) (MG/L)	DIS-SOLVED IRON (FE) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	DIS-SOLVED CAL-CIUM (CA) (MG/L)	DIS-SOLVED MAG-NE-SIUM (MG) (MG/L)	SODIUM (NA) (MG/L)	SODIUM (NA) (MG/L)	BICAR-BONATE (HCO3) (MG/L)	CAR-BONATE (CO3) (MG/L)	ALKA-LINITY AS CACO3 (MG/L)
05275970 - NORTH FORK CROW RIVER NEAR GEORGEVILLE, MINN. (LAT 45 29 07 LONG 094 55 37)											
MAY , 1971											
12...	43	8.3	80	92	69	25	5.5	--	321	--	263
SEP.											
20...	6.9	18	20	130	73	28	6.3	--	327	0	268
05276000 - NORTH FORK CROW RIVER NEAR REGAL, MINN. (LAT 45 22 55 LONG 094 47 40)											
MAY , 1971											
12...	48	6.3	70	100	68	26	5.9	--	329	--	270
05278000 - MIDDLE FORK CROW RIVER NEAR SPICER, MINN. (LAT 45 15 45 LONG 094 48 10)											
SEP., 1971											
20...	39	16	30	40	28	29	5.2	--	213	0	175
05278340 - NORTH FORK CROW RIVER NEAR DELANO, MINN. (LAT 45 05 22 LONG 093 52 07)											
SEP., 1971											
21...	146	14	10	50	57	29	9.4	--	289	0	237
05278590 - SOUTH FORK CROW RIVER AT BISCAY, MINN. (LAT 44 50 11 LONG 094 17 16)											
SEP., 1971											
21...	27	21	100	50	82	42	39	--	333	0	273
05278830 - BUFFALO CREEK NEAR BUFFALO LAKE, MINN. (LAT 44 46 05 LONG 094 32 55)											
SEP., 1971											
21...	1.6	14	10	70	110	66	18	--	260	0	213
05278835 - BUFFALO CREEK TRIB NEAR BUFFALO LAKE, MINN. (LAT 44 46 05 LONG 094 32 55)											
SEP., 1971											
21...	2.9	11	20	20	130	72	45	--	254	44	282

DATE	DIS-SOLVED SOLIDS (TONS PER DAY)	DIS-SOLVED SOLIDS (TONS PER AC-FT)	HARD-NESS (CA,MG) (MG/L)	NON-CAR-BONATE HARD-NESS (MG/L)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	SPECI-FIC COND-UCTANCE (MICRO-MHOS)	PH (UNITS)	TEMP-ERATURE (DEG C)	COLOR (PLAT-INUM-COBALT UNITS)
05275970 - NORTH FORK CROW RIVER NEAR GEORGEVILLE, MINN. (LAT 45 29 07 LONG 094 55 37)										
MAY , 1971										
12...	36.2	.42	280	12	4	.1	539	7.9	13.0	20
SEP.										
20...	6.75	.49	300	29	4	.2	544	8.0	11.0	20
05276000 - NORTH FORK CROW RIVER NEAR REGAL, MINN. (LAT 45 22 55 LONG 094 47 40)										
MAY , 1971										
12...	40.0	.42	280	7	4	.2	541	8.1	15.0	20
05278000 - MIDDLE FORK CROW RIVER NEAR SPICER, MINN. (LAT 45 15 45 LONG 094 48 10)										
SEP., 1971										
20...	24.2	.31	190	15	6	.2	361	8.3	11.0	10
05278340 - NORTH FORK CROW RIVER NEAR DELANO, MINN. (LAT 45 05 22 LONG 093 52 07)										
SEP., 1971										
21...	126	.44	260	25	7	.3	505	8.1	13.0	30
05278590 - SOUTH FORK CROW RIVER AT BISCAY, MINN. (LAT 44 50 11 LONG 094 17 16)										
SEP., 1971										
21...	41.4	.77	380	100	18	.9	853	7.9	15.0	30
05278830 - BUFFALO CREEK NEAR BUFFALO LAKE, MINN. (LAT 44 46 05 LONG 094 32 55)										
SEP., 1971										
21...	3.28	1.03	550	330	7	.3	1000	8.0	16.0	20
05278835 - BUFFALO CREEK TRIB NEAR BUFFALO LAKE, MINN. (LAT 44 46 05 LONG 094 32 55)										
SEP., 1971										
21...	7.20	1.25	620	340	14	.8	1260	8.6	16.0	30

DATE	SULFATE (SO4) (MG/L)	CHLO-RIDE (CL) (MG/L)	DIS-SOLVED FLUO-RIDE (F) (MG/L)	NITRATE (N) (MG/L)	NITRATE (NO3) (MG/L)	NITRITE PLUS NITRATE (N) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	DIS-SOLVED BORON (B) (UG/L)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L)
05275970 - NORTH FORK CROW RIVER NEAR GEORGEVILLE, MINN. (LAT 45 29 07 LONG 094 55 37)										
MAY , 1971										
12...	30	5.1	.4	--	--	.10	.10	0	310	306
SEP.										
20...	39	4.9	.4	--	--	.54	.060	920	358	337
05276000 - NORTH FORK CROW RIVER NEAR REGAL, MINN. (LAT 45 22 55 LONG 094 47 40)										
MAY , 1971										
12...	29	5.6	.4	--	--	.00	.090	0	330	308
05278000 - MIDDLE FORK CROW RIVER NEAR SPICER, MINN. (LAT 45 15 45 LONG 094 48 10)										
SEP., 1971										
20...	23	4.6	.4	--	--	.05	.040	90	230	215
05278340 - NORTH FORK CROW RIVER NEAR DELANO, MINN. (LAT 45 05 22 LONG 093 52 07)										
SEP., 1971										
21...	39	7.9	.5	--	--	.31	.14	100	320	305
05278590 - SOUTH FORK CROW RIVER AT BISCAY, MINN. (LAT 44 50 11 LONG 094 17 16)										
SEP., 1971										
21...	130	45	.7	--	--	1.1	.58	230	564	538
05278830 - BUFFALO CREEK NEAR BUFFALO LAKE, MINN. (LAT 44 46 05 LONG 094 32 55)										
SEP., 1971										
21...	330	17	.5	--	--	1.0	.050	160	760	694
05278835 - BUFFALO CREEK TRIB NEAR BUFFALO LAKE, MINN. (LAT 44 46 05 LONG 094 32 55)										
SEP., 1971										
21...	350	40	.7	--	--	11	.34	320	916	872

DATE	DIS-CHARGE (CFS)	SILICA (SIO2) (MG/L)	DIS-SOLVED IRON (FE) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	DIS-SOLVED CAL-CIUM (CA) (MG/L)	DIS-SOLVED MAG-NE-SIUM (MG) (MG/L)	SODIUM (NA) (MG/L)	SODIUM (NA) (MG/L)	BICAR-BONATE (HCO3) (MG/L)	CAR-BONATE (CO3) (MG/L)	ALKA-LINITY AS CACO3 (MG/L)
05278950 - BUFFALO CREEK NEAR PLATO, MINN. (LAT 44 48 03 LONG 094 02 24)											
SEP., 1971											
21...	7.2	16	20	50	120	54	58	--	377	0	309
05279000 - SOUTH FORK CROW RIVER NEAR MAYER, MINN. (LAT 44 54 20 LONG 093 53 05)											
SEP., 1971											
22...	43	17	0	110	91	42	31	--	344	0	282
05280000 - CROW RIVER AT ROCKFORD, MINN. (LAT 45 05 12 LONG 093 44 02)											
APR., 1971											
28...	1990	6.9	0	10	57	22	10	--	246	--	202

DATE	DIS-CHARGE (CFS)	SILICA (SIO2) (MG/L)	DIS-SOLVED IRON (FE) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	DIS-SOLVED CAL-CIUM (CA) (MG/L)	DIS-SOLVED MAG-NE-SIUM (MG) (MG/L)	SODIUM (NA) (MG/L)	PO-TAS-SIUM (K) (MG/L)	BICAR-BONATE (HCO3) (MG/L)	CAR-BONATE (CO3) (MG/L)
05303280 - EAST BRANCH CHIPPEWA RIVER AT TERRACE, MINN. (LAT 45 30 34 LONG 095 19 24)										
MAY , 1971										
12...	33	11	70	59	55	22	3.6	4.8	254	--
05355280 - HAY CREEK NEAR RED WING, MINN. (LAT 44 33 08 LONG 092 33 45)										
AUG., 1971										
13...	19	14	200	40	72	32	110	2.8	330	0

DATE	DIS-SOLVED SOLIDS (TONS PER DAY)	DIS-SOLVED SOLIDS (TONS PER AC-FT)	HARD-NESS (CA,MG) (MG/L)	NON-CAR-BONATE HARD-NESS (MG/L)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	SPECI-FIC COND-UCTANCE (MICRO-MHOS)	PH (UNITS)	TEMP-ERATURE (DEG C)	COLOR (PLAT-INUM-COBALT UNITS)
05278950 - BUFFALO CREEK NEAR PLATO, MINN. (LAT 44 48 03 LONG 094 02 24)										
SEP., 1971										
21...	15.9	1.11	520	210	19	1.1	1190	8.3	14.0	30
05279000 - SOUTH FORK CROW RIVER NEAR MAYER, MINN. (LAT 44 54 20 LONG 093 53 05)										
SEP., 1971										
22...	67.7	.79	400	120	14	.7	860	8.3	13.0	30
05280000 - CROW RIVER AT ROCKFORD, MINN. (LAT 45 05 12 LONG 093 44 02)										
APR., 1971										
28...	1700	.43	230	31	8	.3	540	8.0	9.0	5

DATE	DIS-SOLVED SOLIDS (TONS PER AC-FT)	HARD-NESS (CA,MG) (MG/L)	NON-CAR-BONATE HARD-NESS (MG/L)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	SPECI-FIC COND-UCTANCE (MICRO-MHOS)	PH (UNITS)	TEMP-ERATURE (DEG C)	COLOR (PLAT-INUM-COBALT UNITS)
05303280 - EAST BRANCH CHIPPEWA RIVER AT TERRACE, MINN. (LAT 45 30 34 LONG 095 19 24)									
MAY , 1971									
12...	.34	230	20	3	.1	424	7.9	17.0	5
05355280 - HAY CREEK NEAR RED WING, MINN. (LAT 44 33 08 LONG 092 33 45)									
AUG., 1971									
13...	.91	310	41	43	2.7	1040	7.6	17.0	100

DATE	SULFATE (SO4) (MG/L)	CHLO-RIDE (CL) (MG/L)	DIS-SOLVED FLUO-RIDE (F) (MG/L)	NITRATE (N) (MG/L)	NITRATE (NO3) (MG/L)	NITRITE PLUS NITRATE (N) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	DIS-SOLVED BORON (B) (UG/L)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L)
05278950 - BUFFALO CREEK NEAR PLATO, MINN. (LAT 44 48 03 LONG 094 02 24)										
SEP., 1971										
21...	250	68	.7	--	--	3.7	.78	220	816	775
05279000 - SOUTH FORK CROW RIVER NEAR MAYER, MINN. (LAT 44 54 20 LONG 093 53 05)										
SEP., 1971										
22...	140	40	.6	--	--	1.1	.37	200	580	543
05280000 - CROW RIVER AT ROCKFORD, MINN. (LAT 45 05 12 LONG 093 44 02)										
APR., 1971										
28...	73	15	.2	--	--	.90	.19	70	310	317

DATE	ALKA-LINITY AS CACO3 (MG/L)	SULFATE (SO4) (MG/L)	CHLO-RIDE (CL) (MG/L)	DIS-SOLVED FLUO-RIDE (F) (MG/L)	NITRITE PLUS NITRATE (N) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	DIS-SOLVED BORON (B) (UG/L)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L)	DIS-SOLVED SOLIDS (TONS PER DAY)
05303280 - EAST BRANCH CHIPPEWA RIVER AT TERRACE, MINN. (LAT 45 30 34 LONG 095 19 24)										
MAY , 1971										
12...	208	21	4.2	.4	.10	.10	0	230	247	22.2
05355280 - HAY CREEK NEAR RED WING, MINN. (LAT 44 33 08 LONG 092 33 45)										
AUG., 1971										
13...	271	77	140	.2	.99	.20	1200	666	616	34.9

DATE	DIS-CHARGE (CFS)	SILICA (SIO2) (MG/L)	DIS-SOLVED IRON (FE) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	DIS-SOLVED CAL-CIUM (CA) (MG/L)	DIS-SOLVED MAG-NE-SIUM (MG) (MG/L)	SODIUM (NA) (MG/L)
05372990 - CASCADE CREEK AT ROCHESTER, MINN. (LAT 44 01 51 LONG 092 28 18)							
AUG., 1971							
10...	3.6	11	100	130	120	36	7.3

DATE	NITRITE PLUS NITRATE (N) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	DIS-SOLVED BORON (B) (UG/L)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L)	DIS-SOLVED SOLIDS (TONS PER DAY)	DIS-SOLVED SOLIDS (TONS PER AC-FT)	HARD-NESS (CA,MG) (MG/L)
05372990 - CASCADE CREEK AT ROCHESTER, MINN. (LAT 44 01 51 LONG 092 28 18)								
AUG., 1971								
10...	.54	.080	20	630	510	6.28	.86	450

DATE	DIS-CHARGE (CFS)	SILICA (SID2) (MG/L)	DIS-SOLVED IRON (FE) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	DIS-SOLVED CAL-CIUM (CA) (MG/L)	DIS-SOLVED MAG-NE-SIUM (MG) (MG/L)	SODIUM (NA) (MG/L)	PO-TAS-SIUM (K) (MG/L)	BICAR-BONATE (HCO3) (MG/L)	CAR-BONATE (CO3) (MG/L)
05373000 - SOUTH FORK ZUMBRO RIVER NEAR ROCHESTER, MINN. (LAT 44 04 00 LONG 092 27 55)										
OCT., 1970										
15...	188	--	--	--	--	--	--	--	--	--
AUG., 1971										
11...	78	11	10	50	84	24	28	3.3	298	0

DATE	DIS-SOLVED SOLIDS (TONS PER DAY)	DIS-SOLVED SOLIDS (TONS PER AC-FT)	HARD-NESS (CA,MG) (MG/L)	NON-CAR-BONATE HARD-NESS (MG/L)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	SPECI-FIC COND-UCTANCE (MICRO-MHOS)	PH (UNITS)	TEMP-ERATURE (DEG C)
05373000 - SOUTH FORK ZUMBRO RIVER NEAR ROCHESTER, MINN. (LAT 44 04 00 LONG 092 27 55)									
OCT., 1970									
15...	--	--	--	--	--	--	--	--	.0
AUG., 1971									
11...	87.2	.56	310	64	16	.7	643	7.2	--

DATE	POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	SULFATE (SO4) (MG/L)	CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)
05372990 - CASCADE CREEK AT ROCHESTER, MINN. (LAT 44 01 51 LONG 092 28 18)							
AUG., 1971							
10...	1.9	314	0	258	160	16	.3

DATE	NONCARBONATE HARDNESS (MG/L)	PERCENT SODIUM	SODIUM ADSORPTION RATIO	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)
05372990 - CASCADE CREEK AT ROCHESTER, MINN. (LAT 44 01 51 LONG 092 28 18)							
AUG., 1971							
10...	190	3	.2	775	7.6	21.0	10

DATE	ALKALINITY AS CACO3 (MG/L)	SULFATE (SO4) (MG/L)	CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)	NITRITE PLUS NITRATE (N) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	DISSOLVED BORON (B) (UG/L)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	DISSOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L)
05373000 - SOUTH FORK ZUMBRO RIVER NEAR ROCHESTER, MINN. (LAT 44 04 00 LONG 092 27 55)									
OCT., 1970									
15...	--	--	--	--	--	--	--	--	--
AUG., 1971									
11...	244	44	37	.4	4.7	1.3	80	414	399

DATE	COLOR (PLATINUM-COBALT UNITS)	TOTAL MERCURY (HG) (UG/L)	DISSOLVED ARSENIC (AS) (UG/L)	DISSOLVED CADMIUM (CD) (UG/L)	DISSOLVED CHROMIUM (CR) (UG/L)	HEXAVALENT CHROMIUM (CR6) (UG/L)	DISSOLVED COBALT (CO) (UG/L)	DISSOLVED LEAD (PB) (UG/L)	DISSOLVED ZINC (ZN) (UG/L)
05373000 - SOUTH FORK ZUMBRO RIVER NEAR ROCHESTER, MINN. (LAT 44 04 00 LONG 092 27 55)									
OCT., 1970									
15...	--	.1	0	1	0	0	0	0	19
AUG., 1971									
11...	10	--	--	--	--	--	--	--	--

DATE	DIS-CHARGE (CFS)	SILICA (SIO2) (MG/L)	DIS-SOLVED IRON (FE) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	DIS-SOLVED CAL-CIUM (CA) (MG/L)	DIS-SOLVED MAG-NE-SIUM (MG) (MG/L)	SODIUM (NA) (MG/L)	PO-TAS-SIUM (K) (MG/L)	BICAR-BONATE (HCO3) (MG/L)	CAR-BONATE (CO3) (MG/L)
05373130 - MIDDLE FORK ZUMBRO RIVER NEAR ORONOCO, MINN. (LAT 44 10 10 LONG 092 34 24)										
AUG., 1971										
11...	8.3	7.8	10	40	66	24	8.9	2.1	284	0
05373200 - DODGE CENTER CREEK NEAR DODGE CENTER, MINN. (LAT 44 01 48 LONG 092 53 14)										
AUG., 1971										
10...	3.8	3.4	210	170	77	30	55	7.0	285	0
05373850 - NORTH FORK ZUMBRO RIVER AT MAZEPPA, MINN. (LAT 44 16 00 LONG 092 32 58)										
AUG., 1971										
12...	37	8.3	60	210	80	28	11	2.3	324	0
05374000 - ZUMBRO RIVER AT ZUMBRO FALLS, MINN. (LAT 44 17 12 LONG 092 25 56)										
AUG., 1971										
12...	168	9.4	40	20	68	23	7.0	2.0	286	0
05374700 - ZUMBRO RIVER AT KELLOGG, MINN. (LAT 44 18 53 LONG 091 59 46)										
AUG., 1971										
12...	440	9.5	30	20	65	25	7.1	2.3	298	0

DATE	DIS-SOLVED SOLIDS (TONS PER AC-FT)	HARD-NESS (CA,MG) (MG/L)	NON-CAR-BONATE HARD-NESS (MG/L)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	SPECI-FIC COND-UCTANCE (MICRO-MHOS)	PH (UNITS)	TEMP-ERATURE (DEG C)	COLOR (PLAT-INUM-COBALT UNITS)
05373130 - MIDDLE FORK ZUMBRO RIVER NEAR ORONOCO, MINN. (LAT 44 10 10 LONG 092 34 24)									
AUG., 1971									
11...	.46	260	31	7	.2	479	7.7	21.0	10
05373200 - DODGE CENTER CREEK NEAR DODGE CENTER, MINN. (LAT 44 01 48 LONG 092 53 14)									
AUG., 1971									
10...	.74	320	82	27	1.3	816	7.8	22.0	20
05373850 - NORTH FORK ZUMBRO RIVER AT MAZEPPA, MINN. (LAT 44 16 00 LONG 092 32 58)									
AUG., 1971									
12...	.52	310	49	7	.3	561	7.8	15.0	8
05374000 - ZUMBRO RIVER AT ZUMBRO FALLS, MINN. (LAT 44 17 12 LONG 092 25 56)									
AUG., 1971									
12...	.45	260	30	5	.2	469	7.9	17.0	6
05374700 - ZUMBRO RIVER AT KELLOGG, MINN. (LAT 44 18 53 LONG 091 59 46)									
AUG., 1971									
12...	.57	270	21	5	.2	490	8.0	23.0	8

DATE	ALKA-LINITY AS CACO3 (MG/L)	SULFATE (SO4) (MG/L)	CHLO-RIDE (CL) (MG/L)	DIS-SOLVED FLUO-RIDE (F) (MG/L)	NITRITE PLUS NITRATE (N) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	DIS-SOLVED BORON (B) (UG/L)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L)	DIS-SOLVED SOLIDS (TONS PER DAY)
05373130 - MIDDLE FORK ZUMBRO RIVER NEAR ORONOCO, MINN. (LAT 44 10 10 LONG 092 34 24)										
AUG., 1971 11...	233	29	12	.2	1.1	.30	10	338	295	7.66
05373200 - DODGE CENTER CREEK NEAR DODGE CENTER, MINN. (LAT 44 01 48 LONG 092 53 14)										
AUG., 1971 10...	234	41	110	.3	.63	.14	10	546	467	5.63
05373850 - NORTH FORK ZUMBRO RIVER AT MAZEPPA, MINN. (LAT 44 16 00 LONG 092 32 58)										
AUG., 1971 12...	266	38	13	.2	1.0	.24	10	380	345	38.1
05374000 - ZUMBRO RIVER AT ZUMBRO FALLS, MINN. (LAT 44 17 12 LONG 092 25 56)										
AUG., 1971 12...	235	19	9.8	.2	1.5	.090	0	334	286	152
05374700 - ZUMBRO RIVER AT KELLOGG, MINN. (LAT 44 18 53 LONG 091 59 46)										
AUG., 1971 12...	244	27	9.3	.2	1.3	.13	10	420	298	499

DATE	DIS-CHARGE (CFS)	SILICA (SIO2) (MG/L)	DIS-SOLVED IRON (FE) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	DIS-SOLVED CAL-CIUM (CA) (MG/L)	DIS-SOLVED MAG-NE-SIUM (MG) (MG/L)	SODIUM (NA) (MG/L)	PO-TAS-SIUM (K) (MG/L)	BICAR-BONATE (HCO3) (MG/L)	CAR-BONATE (CO3) (MG/L)
05377510 - WHITEWATER RIVER AT WEAVER, MINN. (LAT 44 12 42 LONG 091 55 36)										
AUG., 1971										
20...	117	11	50	20	67	26	3.6	1.5	306	0

DATE	DIS-CHARGE (CFS)	SILICA (SIO2) (MG/L)	DIS-SOLVED IRON (FE) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	DIS-SOLVED CAL-CIUM (CA) (MG/L)	DIS-SOLVED MAG-NE-SIUM (MG) (MG/L)	SODIUM (NA) (MG/L)	PO-TAS-SIUM (K) (MG/L)	BICAR-BONATE (HCO3) (MG/L)	CAR-BONATE (CO3) (MG/L)	ALKA-LINITY AS CACO3 (MG/L)
05378500 - MISSISSIPPI RIVER AT WINONA, MINN. (LAT 44 03 20 LONG 091 38 15)											
DEC., 1970											
03...	38800	13	160	120	57	18	8.9	2.9	179	0	147
MAR., 1971											
26...	48800	13	110	120	44	17	16	3.5	182	0	149
JUNE											
02...	56500	4.8	120	20	36	15	7.9	2.2	151	0	124

DATE	DIS-SOLVED SOLIDS (TONS PER AC-FT)	HARD-NESS (CA,MG) (MG/L)	NON-CAR-BONATE HARD-NESS (MG/L)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	SPECI-FIC COND-UCTANCE (MICRO-MHOS)	PH (UNITS)	TEMP-ERATURE (DEG C)	COLOR (PLAT-INUM-COBALT UNITS)
05377510 - WHITEWATER RIVER AT WEAVER, MINN. (LAT 44 12 42 LONG 091 55 36)									
AUG., 1971									
20...	.36	270	23	3	.1	481	8.0	17.0	7

DATE	DIS-SOLVED SOLIDS (TONS PER DAY)	DIS-SOLVED SOLIDS (TONS PER AC-FT)	HARD-NESS (CA,MG) (MG/L)	NON-CAR-BONATE HARD-NESS (MG/L)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	SPECI-FIC COND-UCTANCE (MICRO-MHOS)	PH (UNITS)	TEMP-ERATURE (DEG C)	COLOR (PLAT-INUM-COBALT UNITS)
05378500 - MISSISSIPPI RIVER AT WINONA, MINN. (LAT 44 03 20 LONG 091 38 15)										
DEC., 1970										
03...	34600	.45	220	69	8	.3	416	7.3	3.0	13
MAR., 1971										
26...	34300	.35	180	29	16	.5	410	7.7	.5	9
JUNE										
02...	28200	.25	150	28	10	.3	326	7.4	15.5	40

DATE	ALKA-LINITY AS CACO3 (MG/L)	SULFATE (SO4) (MG/L)	CHLO-RIDE (CL) (MG/L)	DIS-SOLVED FLUO-RIDE (F) (MG/L)	NITRITE PLUS NITRATE (N) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	DIS-SOLVED BORON (B) (UG/L)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L)	DIS-SOLVED SOLIDS (TONS PER DAY)
05377510 - WHITEWATER RIVER AT WEAVER, MINN. (LAT 44 12 42 LONG 091 55 36)										
AUG., 1971										
20...	251	16	4.4	.0	1.4	.11	20	268	286	84.7

DATE	SULFATE (SO4) (MG/L)	CHLO-RIDE (CL) (MG/L)	DIS-SOLVED FLUO-RIDE (F) (MG/L)	NITRATE (N) (MG/L)	NITRATE (NO3) (MG/L)	NITRITE PLUS NITRATE (N) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	DIS-SOLVED BORON (B) (UG/L)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L)
05378500 - MISSISSIPPI RIVER AT WINONA, MINN. (LAT 44 03 20 LONG 091 38 15)										
DEC., 1970										
03...	62	10	.2	3.1	14	--	.040	50	330	274
MAR., 1971										
26...	33	18	.1	3.0	13	--	.17	50	260	247
JUNE										
02...	34	7.9	.2	--	--	.49	.11	70	178	185

DATE	DIS-CHARGE (CFS)	SILICA (SIO2) (MG/L)	DIS-SOLVED IRON (FE) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	DIS-SOLVED CAL-CIUM (CA) (MG/L)	DIS-SOLVED MAG-NE-SIUM (MG) (MG/L)	SODIUM (NA) (MG/L)	PO-TAS-SIUM (K) (MG/L)	BICAR-BONATE (HCO3) (MG/L)	CAR-BONATE (CO3) (MG/L)	ALKA-LINITY AS CACO3 (MG/L)
05383740 - NORTH BRANCH ROOT RIVER NEAR CHATFIELD, MINN. (LAT 43 49 21 LONG 092 10 24)											
AUG., 1971											
17...	39	8.8	10	140	74	21	5.0	1.9	294	0	241
05383900 - MIDDLE BRANCH ROOT RIVER NEAR CHATFIELD, MINN. (LAT 43 48 24 LONG 092 11 18)											
AUG., 1971											
17...	36	8.3	10	70	63	24	5.2	2.0	282	0	231
05384000 - ROOT RIVER NEAR LANESBORO, MINN. (LAT 43 44 58 LONG 091 58 43)											
AUG., 1971											
13...	--	3.1	20	30	47	23	4.3	1.8	227	0	186
05385000 - ROOT RIVER NEAR HOUSTON, MINN (LAT 43 46 05 LONG 091 35 11)											
APR., 1971											
02...	8160	6.8	90	30	64	8.0	2.0	3.1	199	0	163
JUNE											
30...	5490	15	20	120	75	24	3.8	2.0	308	0	253
AUG.											
18...	1.3	4.3	10	0	53	24	3.9	1.5	256	0	210
05386100 - ROOT RIVER AT HOKAH, MINN. (LAT 43 45 57 LONG 091 20 42)											
AUG., 1971											
18...	599	5.5	40	10	54	25	3.7	1.5	267	0	219

DATE	DIS-SOLVED SOLIDS (TONS PER DAY)	DIS-SOLVED SOLIDS (TONS PER AC-FT)	HARD-NESS (CA,MG) (MG/L)	NON-CAR-BONATE HARD-NESS (MG/L)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	SPECI-FIC COND-UCTANCE (MICRO-MHOS)	PH (UNITS)	TEMP-ERATURE (DEG C)	COLOR (PLAT-INUM-COBALT UNITS)
05383740 - NORTH BRANCH ROOT RIVER NEAR CHATFIELD, MINN. (LAT 43 49 21 LONG 092 10 24)										
AUG., 1971										
17...	29.7	.38	270	30	4	.1	498	7.8	17.0	10
05383900 - MIDDLE BRANCH ROOT RIVER NEAR CHATFIELD, MINN. (LAT 43 48 24 LONG 092 11 18)										
AUG., 1971										
17...	25.0	.35	260	25	4	.1	474	8.1	21.0	7
05384000 - ROOT RIVER NEAR LANESBORO, MINN. (LAT 43 44 58 LONG 091 58 43)										
AUG., 1971										
13...	--	.26	210	26	4	.1	386	7.7	23.0	10
05385000 - ROOT RIVER NEAR HOUSTON, MINN (LAT 43 46 05 LONG 091 35 11)										
APR., 1971										
02...	5220	.32	190	30	2	.1	354	7.5	1.0	9
JUNE										
30...	4630	.42	290	33	3	.1	513	7.9	25.0	7
AUG.										
18...	.77	.28	230	21	4	.1	416	7.7	22.0	10
05386100 - ROOT RIVER AT HOKAH, MINN. (LAT 43 45 57 LONG 091 20 42)										
AUG., 1971										
18...	336	.28	240	19	3	.1	423	7.7	25.0	5

DATE	SULFATE (SO4) (MG/L)	CHLO-RIDE (CL) (MG/L)	DIS-SOLVED FLUO-RIDE (F) (MG/L)	NITRATE (N) (MG/L)	NITRATE (NO3) (MG/L)	NITRITE PLUS NITRATE (N) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	DIS-SOLVED BORON (B) (UG/L)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L)
05383740 - NORTH BRANCH ROOT RIVER NEAR CHATFIELD, MINN. (LAT 43 49 21 LONG 092 10 24)										
AUG., 1971										
17...	23	8.7	.0	--	--	1.4	.10	30	276	293
05383900 - MIDDLE BRANCH ROOT RIVER NEAR CHATFIELD, MINN. (LAT 43 48 24 LONG 092 11 18)										
AUG., 1971										
17...	25	9.8	.0	--	--	1.0	.12	20	254	281
05384000 - ROOT RIVER NEAR LANESBORO, MINN. (LAT 43 44 58 LONG 091 58 43)										
AUG., 1971										
13...	19	6.5	.0	--	--	.45	.050	20	190	218
05385000 - ROOT RIVER NEAR HOUSTON, MINN (LAT 43 46 05 LONG 091 35 11)										
APR., 1971										
02...	18	5.4	.1	2.5	11	--	.91	0	237	216
JUNE										
30...	33	5.5	.0	--	--	2.2	.40	70	312	320
AUG.										
18...	18	5.7	.0	--	--	.54	.070	0	206	239
05386100 - ROOT RIVER AT HOKAH, MINN. (LAT 43 45 57 LONG 091 20 42)										
AUG., 1971										
18...	17	4.8	.0	--	--	.47	.15	20	208	245

DATE	DIS-CHARGE (CFS)	SILICA (SIO2) (MG/L)	DIS-SOLVED IRON (FE) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	DIS-SOLVED CAL-CIUM (CA) (MG/L)	DIS-SOLVED MAG-NE-SIUM (MG) (MG/L)	SODIUM (NA) (MG/L)	PO-TAS-SIUM (K) (MG/L)	BICAR-BONATE (HCO3) (MG/L)	CAR-BONATE (CO3) (MG/L)
05387240 - UPPER IOWA RIVER NEAR LEROY, MINN. (LAT 43 31 38 LONG 092 32 12)										
SEP., 1971										
15...	2.3	16	100	70	63	15	4.7	1.6	254	0
CEDAR RIVER NEAR AUSTIN, MINN. (LAT 43 42 25 LONG 092 57 37)										
SEP., 1971										
14...	68	13	30	90	67	24	36	3.7	301	0
05457000 - CEDAR RIVER NEAR AUSTIN, MINN. (LAT 43 38 10 LONG 092 58 20)										
OCT., 1970										
27...	319	15	70	13	61	19	20	3.9	216	0
MAY , 1971										
25...	233	15	340	200	79	27	23	3.0	278	0
CEDAR RIVER NEAR LYLE, MINN. (LAT 43 30 00 LONG 093 00 07)										
SEP., 1971										
14...	16	6.8	20	10	55	20	10	2.3	263	0
05458970 - SHELL ROCK RIVER AT GORDONSVILLE, MINN. (LAT 43 30 51 LONG 093 16 06)										
SEP., 1971										
15...	11	29	20	10	50	25	26	3.7	238	0
05459040 - LIME CREEK NEAR EMMONS, MINN. (LAT 43 30 00 LONG 093 33 29)										
SEP., 1971										
15...	2.7	26	10	800	100	30	8.1	3.5	345	0

DATE	DIS-SOLVED SOLIDS (TONS PER AC-FT)	HARD-NESS (CA,MG) (MG/L)	NON-CAR-BONATE HARD-NESS (MG/L)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	SPECI-FIC COND-UCTANCE (MICRO-MHOS)	PH (UNITS)	TEMP-ERATURE (DEG C)	COLOR (PLAT-INUM-COBALT UNITS)
05387240 - UPPER IOWA RIVER NEAR LEROY, MINN. (LAT 43 31 38 LONG 092 32 12)									
SEP., 1971									
15...	.37	220	11	4	.1	427	7.8	17.0	9
CEDAR RIVER NEAR AUSTIN, MINN. (LAT 43 42 25 LONG 092 57 37)									
SEP., 1971									
14...	.54	270	19	22	1.0	656	7.7	19.0	20
05457000 - CEDAR RIVER NEAR AUSTIN, MINN. (LAT 43 38 10 LONG 092 58 20)									
OCT., 1970									
27...	.49	230	54	16	.6	541	7.7	11.0	9
MAY , 1971									
25...	.56	310	80	14	.6	708	7.7	12.0	20
CEDAR RIVER NEAR LYLE, MINN. (LAT 43 30 00 LONG 093 00 07)									
SEP., 1971									
14...	.36	220	4	9	.3	453	7.4	18.0	10
05458970 - SHELL ROCK RIVER AT GORDONSVILLE, MINN. (LAT 43 30 51 LONG 093 16 06)									
SEP., 1971									
15...	.50	230	33	20	.8	572	7.2	13.0	60
05459040 - LIME CREEK NEAR EMMONS, MINN. (LAT 43 30 00 LONG 093 33 29)									
SEP., 1971									
15...	.67	370	90	4	.2	733	7.7	11.0	20

DATE	ALKA-LINITY AS CACO3 (MG/L)	SULFATE (SO4) (MG/L)	CHLO-RIDE (CL) (MG/L)	DIS-SOLVED FLUO-RIDE (F) (MG/L)	NITRITE PLUS NITRATE (N) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	DIS-SOLVED BORON (B) (UG/L)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L)	DIS-SOLVED SOLIDS (TONS PER DAY)
05387240 - UPPER IOWA RIVER NEAR LEROY, MINN. (LAT 43 31 38 LONG 092 32 12)										
SEP., 1971 15...	208	22	8.1	.2	1.8	.090	60	272	264	1.74
CEDAR RIVER NEAR AUSTIN, MINN. (LAT 43 42 25 LONG 092 57 37)										
SEP., 1971 14...	247	35	49	.3	2.5	.85	100	396	387	73.3
05457000 - CEDAR RIVER NEAR AUSTIN, MINN. (LAT 43 38 10 LONG 092 58 20)										
OCT., 1970 27...	177	42	34	.0	--	.49	110	363	328	313
MAY , 1971 25...	228	62	39	.2	6.5	.52	60	568	414	260
CEDAR RIVER NEAR LYLE, MINN. (LAT 43 30 00 LONG 093 00 07)										
SEP., 1971 14...	216	24	10	.2	.03	.26	70	266	258	11.9
05458970 - SHELL ROCK RIVER AT GORDONSVILLE, MINN. (LAT 43 30 51 LONG 093 16 06)										
SEP., 1971 15...	195	56	38	.3	.02	.41	110	368	345	11.5
05459040 - LIME CREEK NEAR EMMONS, MINN. (LAT 43 30 00 LONG 093 33 29)										
SEP., 1971 15...	283	110	18	.2	.46	.16	70	490	468	3.59

MINOR ELEMENT RECONNAISSANCE, OCTOBER 1970

A nationwide reconnaissance of selected minor elements in water resources was made by the U.S. Geological Survey in cooperation with the U.S. Bureau of Sport Fisheries and Wildlife during autumn, 1970. The sites selected for sampling in Minnesota and the results of the analyses are given in the table below. Additional sites sampled and the results of these analyses can be found in other sections of this report. The results of the nationwide reconnaissance were published in "Reconnaissance of Selected Minor Elements in Surface Waters of the United States, October 1970", Geological Survey Circular 643 which can be obtained free on application to the U.S. Geological Survey, Washington, D. C. 20242.

DATE	DIS-CHARGE (CFS)	TEMP-ERATURE (DEG C)	TOTAL MERCURY (HG) (UG/L)	DIS-SOLVED ARSENIC (AS) (UG/L)	DIS-SOLVED CAD-MIUM (CD) (UG/L)	DIS-SOLVED CHRO-MIUM (CR) (UG/L)	HEXA-VALENT CHRO-MIUM (CR6) (UG/L)	DIS-SOLVED COBALT (CO) (UG/L)	DIS-SOLVED LEAD (PB) (UG/L)	DIS-SOLVED ZINC (ZN) (UG/L)
04024000 - ST. LOUIS RIVER AT SCANLON, MINN. (LAT 46 42 12 LONG 092 25 07)										
OCT., 1970										
19...	1220	8.5	.6	0	0	0	0	0	0	16
04024040 - ST. LOUIS RIVER BLW MORGAN PARK, AT DULUTH, MINN (LAT 46 41 57 LONG 092 12 01)										
OCT., 1970										
19...	1220	7.5	.0	2	0	0	0	0	17	43
05129400 - RAINY LAKE AT INTERNATIONAL FALLS, MINN. (LAT 48 38 30 LONG 093 20 00)										
OCT., 1970										
06...	--	13.0	.2	0	0	0	0	0	0	309
05129500 - RAINY RIVER AT INTERNATIONAL FALLS, MINN. (LAT 48 36 30 LONG 093 24 10)										
OCT., 1970										
06...	6840	13.0	.1	6	0	0	0	0	0	20
05270600 - MISSISSIPPI RIVER AT SAUK RAPIDS, MINN. (LAT 45 35 12 LONG 094 10 06)										
OCT., 1970										
13...	2200	--	.0	0	0	0	0	0	0	21
05270700 - MISSISSIPPI RIVER AT ST. CLOUD, MINN. (LAT 45 32 58 LONG 093 17 48)										
OCT., 1970										
13...	2200	--	.0	0	1	0	0	0	0	19
05288500 - MISSISSIPPI RIVER NEAR ANOKA, MINN. (LAT 45 07 36 LONG 093 17 48)										
OCT., 1970										
13...	3460	--	.0	0	1	0	0	0	0	18
05330910 - MINNESOTA RIVER AT BLOOMINGTON, MINN. (LAT 44 49 36 LONG 093 13 55)										
OCT., 1970										
28...	2520	11.0	.0	0	2	0	0	0	2	21
05331580 - MISSISSIPPI R BLW L & D NO. 2 AT HASTINGS, MINN. (LAT 44 46 LONG 092 52)										
OCT., 1970										
06...	3100	--	.3	3	0	0	0	0	0	21

NOTE.--Additional analyses during this reconnaissance can be found on pages 219, 229, 244, 245, 261.

05317000 COTTONWOOD RIVER NEAR NEW ULM, MINN.

TEMPERATURE (°C) OF WATER, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	0.0	0.0	---	0.0	0.0	9.0	---	---	---	---
2	---	---	0.0	0.0	---	0.0	0.0	---	16.0	---	---	---
3	12.0	---	0.0	0.0	---	0.0	0.0	---	15.0	20.0	---	---
4	---	---	0.0	0.0	---	0.0	0.0	---	17.0	---	---	21.0
5	---	---	0.0	---	---	0.0	2.0	---	17.0	---	---	---
6	---	---	0.0	---	0.0	0.0	5.0	---	17.0	---	---	---
7	---	2.0	0.0	---	---	0.0	4.0	---	17.0	---	20.0	---
8	---	3.0	0.0	---	---	0.0	6.0	17.0	17.0	---	---	---
9	---	3.0	0.0	0.0	---	0.0	5.0	---	17.0	---	---	18.0
10	5.0	4.0	0.0	---	---	0.0	7.0	---	14.0	21.0	---	---
11	---	4.0	0.0	---	---	0.0	8.0	---	16.0	---	---	19.0
12	---	4.0	0.0	---	---	0.0	9.0	---	18.0	---	---	---
13	---	4.0	0.0	2.0	0.0	0.0	8.0	---	18.0	---	---	---
14	---	2.0	0.0	---	---	0.0	7.0	---	21.0	---	21.0	---
15	---	1.0	0.0	---	---	0.0	8.0	14.0	21.0	---	---	---
16	---	1.0	0.0	0.0	---	0.0	10.0	---	23.0	21.0	---	---
17	8.0	1.0	0.0	---	---	0.0	11.0	---	23.0	---	---	---
18	---	2.0	0.0	---	---	0.0	---	---	22.0	---	---	14.0
19	---	2.0	0.0	---	---	0.5	---	---	22.0	---	---	---
20	---	2.0	0.0	---	0.0	0.0	---	---	22.0	---	---	---
21	---	2.0	0.0	---	---	0.0	---	---	23.0	---	21.0	---
22	---	1.0	0.0	---	---	0.0	---	12.0	23.0	---	---	---
23	---	0.0	0.0	0.0	---	0.0	15.0	---	24.0	---	---	---
24	12.0	0.0	0.0	---	---	0.0	12.0	---	26.5	22.0	---	---
25	---	0.0	0.0	---	---	0.0	---	---	20.0	---	---	14.0
26	---	0.0	0.0	---	---	0.0	---	17.0	23.0	---	---	---
27	---	0.0	0.0	---	0.0	0.0	---	---	24.0	---	---	---
28	---	0.0	0.0	---	---	0.0	---	---	---	---	17.0	---
29	6.0	0.0	0.0	---	---	0.0	---	14.0	---	---	---	---
30	---	0.0	0.0	0.0	---	0.0	---	---	---	---	---	---
31	4.0	---	0.0	---	---	2.0	---	---	---	15.0	---	---
MONTH	---	1.5	0.0	---	---	0.0	---	---	20.0	---	---	---

05476000 DES MOINES RIVER AT JACKSON, MINN.

TEMPERATURE (°C) OF WATER, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	2.0	---	---	---	3.0	---	---	22.0	---	---
2	---	---	1.0	---	---	---	2.0	---	---	24.0	---	---
3	---	5.0	1.0	---	---	---	1.0	13.0	---	24.0	---	---
4	---	---	1.0	---	---	---	1.0	13.0	---	24.0	---	---
5	---	---	1.0	---	---	---	3.0	15.0	---	22.0	---	---
6	---	---	0.0	---	---	---	5.0	14.0	---	24.0	---	---
7	---	---	1.0	---	---	---	6.0	15.0	18.0	21.0	---	---
8	---	---	1.0	---	---	---	8.0	14.0	18.0	24.0	---	---
9	---	6.0	0.0	---	---	---	9.0	15.0	18.0	24.0	---	---
10	---	5.0	0.0	---	---	---	9.0	16.0	18.0	24.0	---	---
11	---	5.0	---	---	---	---	11.0	15.0	20.0	22.0	---	---
12	---	4.0	0.0	---	---	---	10.0	---	23.0	22.0	---	---
13	---	4.0	0.0	---	---	---	10.0	---	25.0	22.0	---	---
14	---	2.0	0.0	---	---	---	9.0	---	24.0	23.0	---	---
15	---	1.0	0.0	---	---	---	9.0	---	24.0	23.0	---	---
16	---	1.0	0.0	---	---	---	12.0	---	24.0	24.0	---	---
17	---	2.0	0.0	---	0.0	---	12.0	---	25.0	23.0	---	---
18	---	2.0	0.0	---	---	---	13.0	16.0	26.0	25.0	---	---
19	---	3.0	0.0	---	---	---	13.0	---	25.0	22.0	---	---
20	---	5.0	0.0	---	---	---	15.0	---	23.0	22.0	---	---
21	---	1.0	0.0	---	---	---	16.0	---	23.0	22.0	---	---
22	---	0.0	0.0	---	---	0.0	14.0	---	22.0	22.0	---	---
23	---	---	0.0	---	---	0.0	12.0	---	22.0	23.0	---	---
24	---	---	0.0	---	---	0.0	13.0	---	23.0	24.0	---	---
25	---	---	0.0	---	---	0.0	12.0	---	23.0	23.0	---	---
26	---	---	0.0	---	---	1.0	12.0	---	26.0	21.0	---	---
27	---	---	---	---	---	0.0	11.0	---	26.0	20.0	---	---
28	---	---	---	---	---	0.0	9.0	---	25.0	---	---	---
29	---	---	---	---	---	1.0	8.0	---	25.0	---	---	---
30	---	1.0	---	---	---	2.0	10.0	---	25.0	---	23.0	---
31	---	---	---	---	---	1.0	---	---	---	---	21.0	---
MONTH	---	---	0.5	---	---	---	9.5	---	23.0	23.0	---	---

05270500 SAUK RIVER NEAR ST. CLOUD, MINN.

SPECIFIC CONDUCTANCE (MICROMHOS AT 25°C), WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
1	---	---	---	---	---	---	---	---	---	---	---	---
2	---	---	---	---	---	---	---	---	---	---	---	---
3	---	---	485	475	---	---	---	---	---	---	---	---
4	---	---	475	475	---	---	---	---	---	---	---	---
5	---	---	475	475	---	---	---	---	---	---	---	---
6	440	415	475	475	---	---	---	---	---	---	---	---
7	450	420	480	475	---	---	---	---	---	---	---	---
8	455	330	480	445	---	---	---	---	---	---	---	---
9	410	355	455	445	---	---	---	---	---	---	---	---
10	405	360	465	455	---	---	---	---	---	---	---	---
11	450	405	470	465	---	---	---	---	---	---	---	---
12	455	450	475	470	---	---	---	---	---	---	---	---
13	460	455	475	475	---	---	---	---	---	---	---	---
14	460	460	475	475	---	---	---	---	---	---	---	---
15	460	460	475	475	---	---	---	---	---	---	---	---
16	460	455	485	475	---	---	---	---	---	---	---	---
17	455	450	490	485	---	---	---	---	---	---	---	---
18	450	450	495	490	---	---	---	---	---	---	---	---
19	450	450	495	495	---	---	---	---	---	---	---	---
20	450	450	495	495	---	---	---	---	---	---	---	---
21	450	450	495	495	---	---	---	---	---	---	---	---
22	450	450	500	495	---	---	---	---	---	---	---	---
23	450	450	500	500	---	---	---	---	---	---	---	---
24	450	450	500	500	---	---	---	---	---	---	---	---
25	450	450	500	500	---	---	---	---	---	---	---	---
26	460	450	500	500	---	---	---	---	---	---	---	---
27	450	450	500	500	---	---	---	---	---	---	---	---
28	---	---	500	500	---	---	---	---	---	---	---	---
29	---	---	500	495	---	---	---	---	---	---	---	---
30	---	---	495	495	---	---	---	---	---	---	---	---
31	---	---	---	---	---	---	---	---	---	---	---	---
MONTH	---	---	500	445	---	---	---	---	---	---	---	---

	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
1	---	---	---	---	---	---	400	390	---	---	380	375
2	---	---	---	---	---	---	400	400	---	---	380	375
3	---	---	---	---	---	---	400	390	---	---	370	370
4	---	---	---	---	---	---	390	385	---	---	370	250
5	---	---	---	---	---	---	385	380	---	---	360	345
6	---	---	---	---	---	---	390	385	---	---	365	360
7	---	---	---	---	---	---	390	360	---	---	365	365
8	---	---	---	---	---	---	385	375	---	---	365	335
9	---	---	---	---	---	---	390	385	---	---	370	335
10	---	---	---	---	---	---	390	390	---	---	370	365
11	---	---	---	---	---	---	390	390	---	---	380	375
12	---	---	---	---	---	---	390	380	---	---	380	380
13	---	---	---	---	---	---	385	385	---	---	380	380
14	---	---	---	---	---	---	385	380	---	---	380	380
15	---	---	---	---	---	---	380	380	---	---	380	375
16	---	---	---	---	---	---	390	380	---	---	380	375
17	---	---	---	---	---	---	400	385	---	---	380	380
18	---	---	---	---	---	---	385	380	---	---	380	380
19	---	---	---	---	---	---	385	380	---	---	380	380
20	---	---	---	---	---	---	385	385	---	---	385	380
21	---	---	---	---	---	---	395	385	---	---	380	380
22	---	---	---	---	---	---	415	395	---	---	380	380
23	---	---	---	---	---	---	415	415	---	---	380	380
24	---	---	---	---	---	---	---	---	---	---	380	380
25	---	---	---	---	430	430	---	---	---	---	380	380
26	---	---	---	---	430	430	---	---	---	---	380	380
27	---	---	---	---	435	430	---	---	---	---	380	380
28	---	---	---	---	430	430	---	---	---	---	395	380
29	---	---	---	---	430	315	---	---	---	---	400	400
30	---	---	---	---	390	340	---	---	---	---	405	400
31	---	---	---	---	---	---	---	---	---	---	---	---
MONTH	---	---	---	---	---	---	---	---	---	---	405	250

05280000 CROW RIVER AT ROCKFORD, MINN.

SPECIFIC CONDUCTANCE (MICROMHOS AT 25°C), WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
1	700	690	---	---	705	655	655	655	665	665	630	630
2	690	680	---	---	695	690	655	655	665	665	630	630
3	680	675	---	---	690	665	660	655	665	665	---	---
4	675	670	800	770	665	655	665	660	665	665	---	---
5	680	670	773	750	655	650	665	665	665	665	---	---
6	685	680	750	735	650	645	670	665	660	660	---	---
7	680	645	750	735	675	650	670	665	660	660	---	---
8	645	620	750	725	690	675	665	665	655	655	---	---
9	620	590	725	620	690	690	665	660	655	655	---	---
10	650	595	620	520	690	690	660	655	660	660	---	---
11	730	650	585	520	690	680	655	655	660	660	---	---
12	730	660	600	580	690	690	655	655	660	660	---	---
13	660	635	575	565	695	690	655	655	660	660	---	---
14	650	630	585	575	---	---	655	655	660	660	---	---
15	650	650	---	---	---	---	660	655	660	660	---	---
16	---	---	---	---	---	---	660	660	665	665	---	---
17	---	---	---	---	---	---	665	660	665	665	---	---
18	---	---	---	---	---	---	665	665	665	665	---	---
19	---	---	---	---	---	---	670	665	665	665	---	---
20	---	---	---	---	---	---	670	670	665	660	---	---
21	---	---	---	---	---	---	675	670	660	660	---	---
22	---	---	---	---	---	---	675	670	655	655	---	---
23	---	---	---	---	---	---	670	670	655	655	---	---
24	---	---	---	---	---	---	670	665	655	655	---	---
25	---	---	685	655	---	---	665	655	655	640	---	---
26	---	---	720	685	---	---	---	---	640	640	---	---
27	---	---	730	710	---	---	660	660	640	635	---	---
28	---	---	730	705	---	---	660	660	635	630	---	---
29	---	---	730	715	---	---	660	660	---	---	---	---
30	---	---	715	705	655	655	665	660	---	---	---	---
31	---	---	---	---	655	655	665	665	---	---	---	---
MONTH	---	---	---	---	---	---	675	655	665	630	---	---

	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
1	---	---	---	---	---	---	---	---	---	---	600	575
2	---	---	---	---	---	---	---	---	---	---	600	600
3	---	---	---	---	---	---	---	---	---	---	600	590
4	---	---	---	---	---	---	---	---	---	---	600	550
5	---	---	---	---	---	---	---	---	---	---	610	580
6	---	---	---	---	---	---	---	---	---	---	600	575
7	---	---	---	---	---	---	---	---	---	---	620	600
8	---	---	---	---	---	---	---	---	---	---	610	590
9	---	---	---	---	---	---	---	---	---	---	580	570
10	---	---	---	---	---	---	---	---	---	---	610	570
11	---	---	---	---	---	---	---	---	---	---	625	610
12	---	---	---	---	---	---	---	---	---	---	610	605
13	---	---	---	---	---	---	---	---	---	---	605	570
14	---	---	---	---	---	---	---	---	---	---	570	570
15	---	---	---	---	---	---	---	---	---	---	570	570
16	---	---	---	---	---	---	---	---	---	---	570	560
17	---	---	---	---	---	---	---	---	---	---	560	555
18	---	---	---	---	---	---	---	---	---	---	555	555
19	---	---	---	---	---	---	---	---	---	---	555	555
20	---	---	---	---	---	---	---	---	---	---	555	550
21	---	---	---	---	---	---	---	---	---	---	550	550
22	---	---	---	---	---	---	---	---	---	---	550	525
23	---	---	---	---	---	---	---	---	---	---	530	520
24	---	---	---	---	---	---	---	---	---	---	530	530
25	---	---	---	---	---	---	---	---	---	---	530	530
26	---	---	---	---	---	---	---	---	---	---	535	535
27	---	---	---	---	---	---	---	---	---	---	535	535
28	---	---	---	---	---	---	---	---	---	---	540	535
29	---	---	---	---	---	---	---	---	---	---	550	540
30	---	---	---	---	---	---	---	---	---	---	550	550
31	---	---	---	---	---	---	---	---	---	---	---	---
MONTH	---	---	---	---	---	---	---	---	---	---	625	520

05374000 ZUMBRO RIVER AT ZUMBRO FALLS, MINN.

SPECIFIC CONDUCTANCE (MICROMHOS AT 25°C), WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
1	555	555	535	530	---	---	---	---	---	---	---	---
2	555	555	530	520	---	---	---	---	---	---	---	---
3	555	555	520	470	---	---	---	---	---	---	---	---
4	555	555	470	430	---	---	---	---	---	---	---	---
5	560	555	430	430	---	---	---	---	---	---	---	---
6	560	560	430	425	---	---	---	---	---	---	---	---
7	560	550	425	420	---	---	---	---	---	---	---	---
8	550	525	420	415	---	---	---	---	---	---	---	---
9	525	390	415	360	---	---	---	---	---	---	---	---
10	500	425	350	340	---	---	---	---	---	---	---	---
11	515	500	350	350	---	---	590	580	---	---	---	---
12	515	510	360	350	---	---	595	585	---	---	---	---
13	515	500	---	---	---	---	595	580	---	---	---	---
14	500	480	---	---	---	---	600	580	---	---	---	---
15	485	480	---	---	---	---	600	590	---	---	---	---
16	535	485	---	---	---	---	600	595	---	---	---	---
17	540	500	---	---	---	---	595	570	---	---	---	---
18	535	510	---	---	---	---	610	570	---	---	---	---
19	530	505	---	---	---	---	605	600	---	---	---	---
20	540	520	---	---	---	---	605	600	---	---	---	---
21	540	510	---	---	---	---	600	585	---	---	---	---
22	530	510	---	---	---	---	600	575	---	---	---	---
23	530	525	---	---	---	---	595	580	---	---	---	---
24	530	530	---	---	---	---	590	570	---	---	---	---
25	535	530	---	---	---	---	590	570	---	---	---	---
26	520	520	---	---	---	---	600	585	---	---	---	---
27	---	---	---	---	---	---	---	---	---	---	---	---
28	---	---	---	---	---	---	---	---	---	---	---	---
29	---	---	---	---	---	---	---	---	---	---	---	---
30	540	540	---	---	---	---	---	---	---	---	---	---
31	540	535	---	---	---	---	---	---	---	---	---	---
MONTH	560	390	---	---	---	---	---	---	---	---	---	---

	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
1	---	---	540	540	---	---	515	515	520	505	510	500
2	---	---	535	535	---	---	520	515	505	505	500	500
3	---	---	535	535	530	525	535	520	505	500	510	500
4	---	---	540	525	535	535	535	535	510	500	505	480
5	---	---	525	520	540	535	550	535	505	500	495	485
6	---	---	520	515	540	535	570	550	505	500	525	495
7	---	---	515	510	540	540	570	570	505	500	520	520
8	---	---	505	505	550	545	580	570	510	505	520	520
9	---	---	505	505	550	550	600	585	510	495	520	520
10	---	---	510	505	550	550	600	595	500	495	520	520
11	---	---	510	510	570	550	595	595	520	485	520	520
12	---	---	510	510	570	465	600	465	495	420	520	520
13	---	---	510	510	465	410	560	495	475	425	520	520
14	---	---	510	510	410	400	590	560	485	475	520	515
15	---	---	510	510	415	400	595	590	500	485	515	515
16	---	---	510	510	415	415	590	590	495	490	515	515
17	---	---	510	510	420	415	605	590	495	490	515	515
18	---	---	510	510	425	425	655	605	490	490	515	515
19	---	---	510	510	450	425	650	650	490	485	515	515
20	---	---	---	---	460	445	650	650	490	490	520	515
21	---	---	---	---	480	460	650	645	500	490	520	520
22	---	---	---	---	530	480	645	575	500	475	520	520
23	---	---	---	---	500	500	---	---	500	460	525	525
24	---	---	---	---	520	500	---	---	495	465	535	530
25	---	---	---	---	525	520	---	---	510	490	540	540
26	---	---	---	---	530	520	525	515	520	510	540	540
27	---	---	---	---	520	520	520	485	520	520	535	535
28	---	---	---	---	515	515	495	485	520	520	535	535
29	---	---	---	---	515	515	510	490	520	520	530	530
30	---	---	---	---	515	515	510	490	520	520	530	530
31	---	---	---	---	---	---	520	505	520	515	---	---
MONTH	---	---	---	---	570	400	655	465	520	420	540	480

05062000 BUFFALO RIVER NEAR DILWORTH, MINN.

PERIODIC DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DATE	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	LOAD (TONS)
Mar. 30, 1971.	130	19	6.7
Apr. 6.....	300	31	25
Apr. 7.....	320	46	40
Apr. 8.....	400	212	229
Apr. 9.....	450	128	156
Apr. 10.....	485	130	170
Apr. 11.....	465	136	171
Apr. 12.....	380	107	110
Apr. 13.....	307	101	84
Apr. 14.....	256	94	65
Apr. 15.....	217	60	35
Apr. 16.....	190	60	31
Apr. 17.....	175	69	33
Apr. 20.....	155	76	32
Apr. 21.....	151	85	35
Apr. 22.....	152	103	42
Apr. 23.....	146	90	35
Apr. 28.....	120	93	30
Apr. 29.....	123	106	35
Apr. 30.....	125	127	43
May 1.....	130	168	59
May 2.....	130	107	38
May 3.....	129	90	31
May 4.....	123	85	28
May 5.....	117	92	29
May 6.....	110	149	44
May 7.....	105	141	40
May 16.....	68	81	15
June 10.....	51	158	22
July 13.....	216	90	52
July 16.....	139	120	45
July 19.....	97	235	62
Aug. 17.....	14	87	3.3
Sept. 6.....	257	153	106
Sept. 7.....	363	137	134
Sept. 8.....	358	111	107
Sept. 9.....	322	91	79
Sept. 10.....	284	102	78
Sept. 11.....	251	93	63
Sept. 12.....	212	82	47
Sept. 13.....	169	78	36
Sept. 14.....	141	80	30
Sept. 15.....	124	69	23
Sept. 16.....	108	60	17
Sept. 17.....	96	60	16
Sept. 23.....	66	69	12

05062500 WILD RICE RIVER AT TWIN VALLEY, MINN.

PERIODIC DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DATE	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	LOAD (TONS)
Mar. 31, 1971.	600	270	437
Apr. 2.....	645	120	209
Apr. 3.....	600	87	141
Apr. 4.....	545	85	125
Apr. 5.....	510	133	183
Apr. 6.....	540	139	203
Apr. 7.....	690	518	965
Apr. 8.....	842	671	1520
Apr. 9.....	866	550	1290
Apr. 10.....	941	650	1650
Apr. 11.....	882	636	1510
Apr. 12.....	785	430	911
Apr. 13.....	671	319	578
Apr. 14.....	617	235	391
Apr. 15.....	600	217	352
Apr. 16.....	589	223	355
Apr. 17.....	569	222	341
Apr. 18.....	568	207	317
Apr. 19.....	567	195	298
Apr. 20.....	576	207	322
Apr. 21.....	576	228	355
Apr. 22.....	554	200	299
Apr. 23.....	525	175	248
Apr. 24.....	495	162	216
Apr. 25.....	468	131	166
Apr. 26.....	441	123	146
Apr. 27.....	429	120	139
Apr. 28.....	426	96	110
Apr. 29.....	431	87	101
Apr. 30.....	433	87	102
May 1.....	422	106	121
May 2.....	411	88	98
May 3.....	396	77	82
May 4.....	385	79	82
May 5.....	378	82	84
May 6.....	376	81	82
May 7.....	365	82	81
May 8.....	352	83	79
May 9.....	339	76	70
May 10.....	320	78	67
May 11.....	308	80	66
May 12.....	299	75	60
May 13.....	282	73	56
May 14.....	267	68	49
May 15.....	252	58	39
June 16.....	106	30	8.6
July 13.....	41	16	1.8
Aug. 18.....	37	12	1.2
Sept. 22.....	33	11	1.0

05131500 LITTLE FORK RIVER AT LITTLEFORK, MINN.

PERIODIC DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DATE	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	LOAD (TONS)	DATE	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	LOAD (TONS)
Apr. 14, 1971.	6000	296	4800	May 30.....	4600	67	832
Apr. 15.....	7000	276	5220	May 31.....	3840	57	591
Apr. 16.....	9000	373	9060	June 1.....	3200	53	458
Apr. 17.....	11500	470	14600	June 2.....	2720	58	426
Apr. 18.....	13000	477	16700	June 3.....	2340	43	272
Apr. 19.....	14400	383	14900	June 4.....	2030	57	312
Apr. 20.....	14800	282	11300	June 5.....	1810	30	146
Apr. 21.....	14600	254	10000	June 6.....	1670	32	144
Apr. 22.....	12700	262	8980	June 7.....	1530	29	120
Apr. 23.....	10500	181	5130	June 8.....	1370	20	74
Apr. 24.....	8530	145	3340	June 9.....	1250	33	111
Apr. 25.....	7120	126	2420	June 10.....	1140	40	123
Apr. 26.....	6040	92	1500	June 11.....	1080	26	76
Apr. 27.....	5210	89	1250	June 12.....	1050	26	74
Apr. 28.....	4650	83	1040	June 13.....	1090	45	132
Apr. 29.....	4240	78	893	June 14.....	1090	20	59
Apr. 30.....	3930	78	828	June 28.....	2010	35	190
May 1.....	3700	80	799	June 29.....	1620	33	144
May 2.....	3510	56	531	June 30.....	1370	33	122
May 3.....	3320	26	233	July 1.....	1290	32	111
May 24.....	5290	235	3360	July 2.....	1350	27	98
May 25.....	8250	373	8310	July 3.....	1280	29	100
May 26.....	8900	373	8960	July 4.....	1160	32	100
May 27.....	7980	188	4050	July 5.....	1010	30	82
May 28.....	6700	131	2370	July 6.....	884	23	55
May 29.....	5550	97	1450	Sept. 7.....	238	9	5.8

05315000 REDWOOD RIVER AT MARSHALL, MINN.

PERIODIC DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DATE	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	LOAD (TONS)
Nov. 4, 1970.	12	65	2.1
Dec. 15.....	8.5	134	3.1
Jan. 13, 1971.	3.1	133	1.1
Feb. 18.....	112	54	15
Mar. 17.....	160	204	88
Mar. 18.....	156	132	56
Mar. 27.....	97	80	21
Mar. 28.....	90	70	17
Mar. 29.....	83	60	13
Mar. 30.....	78	68	14
Mar. 31.....	74	73	15
Apr. 1.....	70	66	12
Apr. 2.....	66	76	14
Apr. 3.....	66	103	18
Apr. 29.....	23	53	33
May 19.....	10	80	2.2
June 9.....	62	184	31
June 10.....	65	198	35
June 11.....	62	177	30
June 12.....	56	167	25
June 13.....	50	171	23
June 14.....	36	185	18
June 15.....	29	184	14
June 16.....	29	176	14
June 17.....	20	130	7
June 19.....	153	460	190
June 20.....	116	404	127
June 21.....	96	360	93
June 22.....	89	322	77
June 23.....	65	280	49
June 24.....	50	277	37
June 25.....	43	270	31
June 30.....	197	745	396
July 1.....	248	534	358
July 2.....	329	460	409
July 3.....	292	348	274
July 4.....	292	288	227
July 5.....	296	267	213
July 6.....	306	260	215
July 7.....	440	360	428
July 8.....	394	372	396
July 9.....	118	168	54
July 10.....	27	170	12
July 11.....	28	176	13
July 12.....	28	152	11
July 13.....	29	150	12
July 14.....	29	150	12
July 15.....	37	168	17
July 16.....	39	180	19
July 17.....	41	204	23
July 18.....	43	200	23
July 19.....	44	185	22
July 20.....	53	172	25
July 28.....	35	92	8.7
Sept. 1.....	5.1	104	1.4

05317000 COTTONWOOD RIVER NEAR NEW ULM, MINN.

PERIODIC DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

	OCTOBER			NOVEMBER			DECEMBER		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	--	--	--	--	--	--	335	93	84
2	--	--	--	--	--	--	330	83	74
3	42	87	9.9	--	--	--	320	65	56
4	--	--	--	--	--	--	310	133	111
5	--	--	--	--	--	--	305	148	122
6	--	--	--	--	--	--	290	130	102
7	--	--	--	317	176	151	280	112	85
8	--	--	--	345	154	143	265	164	117
9	--	--	--	568	264	405	250	172	116
10	161	230	100	958	463	1200	240	192	124
11	--	--	--	1140	445	1370	225	177	108
12	--	--	--	1340	358	1300	220	167	99
13	--	--	--	1310	338	1200	210	175	99
14	--	--	--	1180	299	953	200	168	91
15	--	--	--	1020	378	1040	195	153	81
16	--	--	--	890	652	1570	190	150	77
17	224	158	96	832	786	1770	180	138	67
18	--	--	--	744	294	591	170	150	69
19	--	--	--	673	188	342	168	162	73
20	--	--	--	624	175	295	162	165	72
21	--	--	--	578	154	240	158	166	71
22	--	--	--	528	188	268	150	165	67
23	--	--	--	500	163	220	148	167	67
24	143	134	52	455	172	211	142	155	59
25	--	--	--	420	150	170	138	150	56
26	--	--	--	400	158	171	132	145	52
27	--	--	--	380	103	106	128	132	46
28	--	--	--	370	54	54	124	136	46
29	--	--	--	360	102	99	122	148	49
30	158	68	29	345	163	152	118	198	63
31	172	148	69	--	--	--	115	192	60

	JANUARY			FEBRUARY			MARCH		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	112	173	52	--	--	--	410	18	20
2	108	133	39	--	--	--	390	19	20
3	106	146	42	--	--	--	380	18	18
4	104	168	47	--	--	--	370	19	19
5	--	--	--	--	--	--	360	31	30
6	--	--	--	61	134	22	360	97	94
7	--	--	--	--	--	--	355	91	87
8	--	--	--	--	--	--	350	52	49
9	91	155	38	--	--	--	350	18	17
10	--	--	--	--	--	--	350	49	46
11	--	--	--	60	69	11	350	52	49
12	--	--	--	60	124	20	350	85	80
13	83	202	45	59	200	32	410	85	94
14	--	--	--	--	--	--	1000	117	316
15	--	--	--	--	--	--	2600	108	758
16	77	135	28	--	--	--	5940	413	6620
17	--	--	--	--	--	--	4500	163	1980
18	--	--	--	--	--	--	3600	283	2750
19	--	--	--	--	--	--	2780	396	2970
20	--	--	--	58	180	28	2200	282	1680
21	--	--	--	--	--	--	1900	124	636
22	--	--	--	--	--	--	1600	123	531
23	70	161	30	--	--	--	1400	127	480
24	--	--	--	--	--	--	1200	94	305
25	--	--	--	--	--	--	1100	105	312
26	--	--	--	--	--	--	1000	98	265
27	--	--	--	450	136	165	1040	105	295
28	--	--	--	430	28	33	1270	100	343
29	--	--	--	--	--	--	1720	330	1530
30	64	145	25	--	--	--	2140	393	2270
31	--	--	--	--	--	--	2210	616	3680

05317000 COTTONWOOD RIVER NEAR NEW ULM, MINN.--Continued

PERIODIC DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

	APRIL			MAY			JUNE		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	1990	698	3750	354	130	124	--	--	--
2	1620	693	3030	--	--	--	738	404	805
3	1220	600	1980	--	--	--	747	383	772
4	1060	250	716	--	--	--	645	392	683
5	968	220	575	--	--	--	561	433	656
6	888	188	451	--	--	--	603	472	768
7	693	180	337	--	--	--	723	517	1010
8	784	168	356	249	100	67	1360	565	2070
9	750	155	314	--	--	--	1880	638	3240
10	684	161	297	--	--	--	1820	635	3120
11	627	158	267	--	--	--	1570	646	2740
12	579	185	289	--	--	--	1320	637	2270
13	534	165	238	--	--	--	1120	597	1810
14	499	145	191	--	--	--	960	518	1340
15	463	153	191	185	81	40	808	441	962
16	443	145	173	--	--	--	687	429	796
17	425	144	165	--	--	--	591	473	755
18	--	--	--	--	--	--	534	543	783
19	--	--	--	--	--	--	519	520	729
20	--	--	--	--	--	--	498	440	592
21	--	--	--	--	--	--	495	393	525
22	--	--	--	201	107	58	534	385	555
23	468	123	155	--	--	--	603	393	640
24	450	165	200	--	--	--	540	452	659
25	--	--	--	--	--	--	564	405	617
26	--	--	--	--	--	--	494	378	504
27	--	--	--	356	108	104	423	407	465
28	--	--	--	--	--	--	--	--	--
29	--	--	--	296	134	107	--	--	--
30	--	--	--	--	--	--	--	--	--
31	--	--	--	--	--	--	--	--	--

	JULY			AUGUST			SEPTEMBER		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	--	--	--	--	--	--	--	--	--
2	--	--	--	--	--	--	--	--	--
3	--	--	--	--	--	--	--	--	--
4	--	--	--	--	--	--	44	128	15
5	--	--	--	76	87	18	--	--	--
6	--	--	--	--	--	--	--	--	--
7	--	--	--	70	137	26	--	--	--
8	--	--	--	--	--	--	--	--	--
9	--	--	--	--	--	--	30	94	7.6
10	405	279	305	--	--	--	--	--	--
11	--	--	--	--	--	--	27	104	7.6
12	--	--	--	--	--	--	--	--	--
13	--	--	--	--	--	--	--	--	--
14	--	--	--	42	132	15	--	--	--
15	--	--	--	--	--	--	--	--	--
16	374	357	360	--	--	--	--	--	--
17	--	--	--	--	--	--	--	--	--
18	--	--	--	--	--	--	20	105	5.7
19	--	--	--	--	--	--	--	--	--
20	--	--	--	--	--	--	--	--	--
21	--	--	--	42	63	7.1	--	--	--
22	--	--	--	--	--	--	--	--	--
23	--	--	--	--	--	--	--	--	--
24	167	143	64	--	--	--	--	--	--
25	--	--	--	--	--	--	--	--	--
26	--	--	--	--	--	--	--	--	--
27	--	--	--	--	--	--	26	92	6.5
28	--	--	--	29	108	8.5	--	--	--
29	--	--	--	--	--	--	--	--	--
30	--	--	--	--	--	--	--	--	--
31	103	69	19	--	--	--	--	--	--

05317000 COTTONWOOD RIVER NEAR NEW ULM, MINN.--Continued

PARTICLE SIZE OF BED MATERIAL, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DATE	TIME	TEMP-ERATURE (DEG C) 00010	DIS-CHARGE (CFS) 00060	NUMBER OF SAM-PLING POINTS 00063	BED MAT. FALL DIAM. % FINER THAN .062 MM 80158	BED MAT. FALL DIAM. % FINER THAN .125 MM 80159	BED MAT. FALL DIAM. % FINER THAN .250 MM 80160	BED MAT. FALL DIAM. % FINER THAN .500 MM 80161	BED MAT. FALL DIAM. % FINER THAN 1.00 MM 80162	BED MAT. SIEVE DIAM. % FINER THAN 2.00 MM 80169	BED MAT. SIEVE DIAM. % FINER THAN 4.00 MM 80170
MAY 27...	1630	17.0	385	4	1	1	4	42	86	93	97

05353800 STRAIGHT RIVER NEAR FARIBAULT, MINN.

PERIODIC DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

	OCTOBER			NOVEMBER			DECEMBER		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	--	--	--	--	--	--	270	82	60
2	--	--	--	--	--	--	--	--	--
3	--	--	--	--	--	--	--	--	--
4	--	--	--	643	160	278	--	--	--
5	--	--	--	640	120	207	--	--	--
6	--	--	--	--	--	--	--	--	--
7	--	--	--	--	--	--	--	--	--
8	--	--	--	--	--	--	--	--	--
9	1000	302	830	722	432	842	--	--	--
10	1290	176	613	929	277	695	--	--	--
11	1040	245	688	946	204	521	--	--	--
12	735	110	218	890	170	409	--	--	--
13	531	71	102	780	143	301	--	--	--
14	412	57	63	740	136	272	--	--	--
15	337	42	38	710	135	259	--	--	--
16	282	34	26	670	154	279	--	--	--
17	245	40	26	660	184	328	--	--	--
18	--	--	--	640	161	278	--	--	--
19	--	--	--	--	--	--	--	--	--
20	--	--	--	--	--	--	--	--	--
21	--	--	--	--	--	--	--	--	--
22	--	--	--	--	--	--	--	--	--
23	--	--	--	--	--	--	--	--	--
24	--	--	--	--	--	--	--	--	--
25	--	--	--	--	--	--	--	--	--
26	199	85	46	--	--	--	--	--	--
27	386	168	175	--	--	--	--	--	--
28	478	206	266	--	--	--	--	--	--
29	--	--	--	--	--	--	--	--	--
30	--	--	--	--	--	--	--	--	--
31	--	--	--	--	--	--	--	--	--

	JANUARY			FEBRUARY			MARCH		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	--	--	--	--	--	--	--	--	--
2	--	--	--	--	--	--	--	--	--
3	--	--	--	--	--	--	--	--	--
4	--	--	--	--	--	--	--	--	--
5	113	44	13	--	--	--	--	--	--
6	--	--	--	--	--	--	--	--	--
7	--	--	--	--	--	--	--	--	--
8	--	--	--	44	16	1.9	--	--	--
9	--	--	--	--	--	--	--	--	--
10	--	--	--	--	--	--	--	--	--
11	--	--	--	--	--	--	--	--	--
12	--	--	--	--	--	--	--	--	--
13	--	--	--	--	--	--	--	--	--
14	--	--	--	--	--	--	--	--	--
15	--	--	--	--	--	--	--	--	--
16	--	--	--	--	--	--	1870	120	606
17	--	--	--	--	--	--	--	--	--
18	--	--	--	--	--	--	--	--	--
19	--	--	--	--	--	--	--	--	--
20	--	--	--	--	--	--	1700	190	872
21	--	--	--	--	--	--	1550	135	565
22	--	--	--	--	--	--	1430	120	463
23	--	--	--	--	--	--	1350	121	441
24	--	--	--	--	--	--	1300	122	428
25	--	--	--	--	--	--	1250	141	476
26	--	--	--	--	--	--	1200	178	577
27	--	--	--	--	--	--	1200	216	700
28	--	--	--	--	--	--	1700	187	858
29	--	--	--	--	--	--	2200	175	1040
30	--	--	--	--	--	--	2100	230	1300
31	--	--	--	--	--	--	--	--	--

05353800 STRAIGHT RIVER NEAR FARIBAULT, MINN.--Continued

PERIODIC DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

	APRIL			MAY			JUNE		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	--	--	--	296	30	24	196	45	24
2	--	--	--	266	36	26	189	47	24
3	--	--	--	246	48	32	174	42	20
4	--	--	--	244	40	26	162	63	28
5	--	--	--	237	42	27	161	140	61
6	--	--	--	218	41	24	148	140	56
7	853	67	154	205	36	20	201	141	77
8	770	70	146	193	36	19	283	124	95
9	710	61	117	183	36	18	290	127	99
10	650	58	102	178	34	16	249	111	75
11	600	58	94	171	30	14	724	133	306
12	560	60	91	172	38	18	2020	715	3950
13	520	57	80	170	41	19	1350	548	2040
14	480	52	67	--	--	--	813	204	455
15	--	--	--	--	--	--	544	178	261
16	--	--	--	--	--	--	414	200	224
17	--	--	--	--	--	--	332	170	152
18	--	--	--	--	--	--	293	156	123
19	355	56	54	187	52	26	283	175	146
20	334	102	92	242	90	59	507	520	712
21	336	92	83	249	93	63	386	380	396
22	327	57	50	210	57	32	304	210	172
23	303	49	40	221	66	43	243	140	92
24	284	42	32	635	340	588	352	208	293
25	256	37	26	619	175	292	640	350	605
26	232	48	30	508	94	129	376	238	242
27	251	57	39	409	58	64	283	216	165
28	315	50	43	336	66	60	219	208	123
29	339	36	33	284	78	60	234	200	126
30	323	31	27	241	61	40	265	211	151
31	--	--	--	212	50	29	--	--	--
TOTAL	8798	--	1400	7132	--	1768	12635	--	11293

	JULY			AUGUST			SEPTEMBER		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	247	210	140	--	--	--	--	--	--
2	202	145	79	--	--	--	--	--	--
3	--	--	--	--	--	--	--	--	--
4	--	--	--	--	--	--	--	--	--
5	--	--	--	46	16	2.0	--	--	--
6	--	--	--	--	--	--	--	--	--
7	--	--	--	--	--	--	--	--	--
8	210	254	153	--	--	--	--	--	--
9	195	200	105	--	--	--	--	--	--
10	179	143	69	--	--	--	--	--	--
11	--	--	--	--	--	--	--	--	--
12	--	--	--	--	--	--	--	--	--
13	--	--	--	--	--	--	27	41	3.0
14	--	--	--	--	--	--	--	--	--
15	--	--	--	--	--	--	--	--	--
16	--	--	--	--	--	--	--	--	--
17	--	--	--	--	--	--	--	--	--
18	--	--	--	--	--	--	--	--	--
19	--	--	--	--	--	--	--	--	--
20	--	--	--	--	--	--	--	--	--
21	--	--	--	--	--	--	--	--	--
22	--	--	--	--	--	--	--	--	--
23	--	--	--	--	--	--	--	--	--
24	--	--	--	--	--	--	--	--	--
25	--	--	--	--	--	--	--	--	--
26	--	--	--	--	--	--	--	--	--
27	--	--	--	--	--	--	--	--	--
28	--	--	--	--	--	--	--	--	--
29	--	--	--	--	--	--	--	--	--
30	--	--	--	--	--	--	--	--	--
31	--	--	--	--	--	--	--	--	--

05374000 ZUMBRO RIVER AT ZUMBRO FALLS, MINN.

PERIODIC DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

	JANUARY			FEBRUARY			MARCH		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1							--	--	--
2							--	--	--
3							--	--	--
4							--	--	--
5							--	--	--
6							--	--	--
7							--	--	--
8							--	--	--
9							--	--	--
10							517	54	75
11							--	--	--
12							--	--	--
13							--	--	--
14							--	--	--
15							2230	683	4110
16							3320	680	6100
17							--	--	--
18							--	--	--
19							--	--	--
20							--	--	--
21							--	--	--
22							--	--	--
23							--	--	--
24							--	--	--
25							--	--	--
26							--	--	--
27							--	--	--
28							--	--	--
29							--	--	--
30							4810	299	3880
31							7840	512	10800

	APRIL			MAY			JUNE		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	10400	726	20400	--	--	--	--	--	--
2	6080	650	10700	--	--	--	--	--	--
3	3280	510	4520	--	--	--	271	12	8.8
4	2840	339	2600	720	61	119	--	--	--
5	2540	290	1990	1010	68	185	--	--	--
6	2740	285	2110	965	57	149	--	--	--
7	2790	286	2150	--	--	--	744	68	137
8	2900	272	2130	--	--	--	1030	75	209
9	2870	270	2090	--	--	--	1030	52	145
10	2610	241	1700	--	--	--	1020	129	355
11	2320	207	1300	--	--	--	1010	208	567
12	2090	164	925	--	--	--	3870	436	4610
13	1910	117	603	--	--	--	2780	542	4070
14	1720	73	339	--	--	--	1830	307	1520
15	1560	75	316	--	--	--	1290	111	387
16	1430	83	320	--	--	--	1120	100	302
17	1330	88	316	--	--	--	1010	75	205
18	1150	100	311	--	--	--	957	85	220
19	1160	118	370	--	--	--	790	95	203
20	1100	70	208	--	--	--	981	90	238
21	1060	53	152	--	--	--	838	60	136
22	943	43	110	619	28	47	531	51	73
23	1020	53	146	503	27	37	836	136	307
24	969	54	141	1120	31	94	738	124	247
25	942	50	127	1190	28	90	973	86	226
26	932	50	126	1100	39	116	1460	480	1890
27	895	30	72	--	--	--	1060	161	461
28	982	41	109	--	--	--	870	45	106
29	881	39	93	--	--	--	--	--	--
30	856	34	79	--	--	--	--	--	--
31	--	--	--	--	--	--	--	--	--

05374000 ZUMBRO RIVER AT ZUMBRO FALLS, MINN.--Continued

PERIODIC DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

	JULY			AUGUST			SEPTEMBER		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1				--	--	--	--	--	--
2				384	36	37	--	--	--
3				--	--	--	--	--	--
4				--	--	--	--	--	--
5				--	--	--	--	--	--
6				--	--	--	--	--	--
7				--	--	--	--	--	--
8				--	--	--	--	--	--
9				--	--	--	--	--	--
10				--	--	--	--	--	--
11				--	--	--	--	--	--
12				--	--	--	--	--	--
13				--	--	--	--	--	--
14				--	--	--	361	12	12
15				--	--	--	--	--	--
16				--	--	--	--	--	--
17				--	--	--	--	--	--
18				--	--	--	--	--	--
19				--	--	--	--	--	--
20				--	--	--	--	--	--
21				--	--	--	--	--	--
22				--	--	--	--	--	--
23				--	--	--	--	--	--
24				--	--	--	--	--	--
25				--	--	--	--	--	--
26				--	--	--	--	--	--
27				--	--	--	--	--	--
28				--	--	--	--	--	--
29				--	--	--	--	--	--
30				--	--	--	--	--	--
31				--	--	--	--	--	--

05384000 ROOT RIVER NEAR LANESBORO, MINN.

PERIODIC DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

	OCTOBER			NOVEMBER			DECEMBER		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	--	--	--				--	--	--
2	--	--	--				381	60	62
3	--	--	--				--	--	--
4	--	--	--				--	--	--
5	--	--	--				--	--	--
6	--	--	--				--	--	--
7	--	--	--				--	--	--
8	--	--	--				--	--	--
9	--	--	--				--	--	--
10	1730	750	3500				--	--	--
11	1150	352	1090				--	--	--
12	636	243	450				--	--	--
13	--	--	--				--	--	--
14	--	--	--				--	--	--
15	--	--	--				--	--	--
16	--	--	--				--	--	--
17	--	--	--				--	--	--
18	--	--	--				--	--	--
19	--	--	--				--	--	--
20	--	--	--				--	--	--
21	--	--	--				--	--	--
22	--	--	--				--	--	--
23	--	--	--				--	--	--
24	--	--	--				--	--	--
25	--	--	--				--	--	--
26	278	52	39				--	--	--
27	--	--	--				--	--	--
28	--	--	--				--	--	--
29	--	--	--				--	--	--
30	--	--	--				--	--	--
31	--	--	--				--	--	--

	JANUARY			FEBRUARY			MARCH		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	--	--	--	--	--	--	--	--	--
2	--	--	--	--	--	--	--	--	--
3	--	--	--	--	--	--	--	--	--
4	--	--	--	--	--	--	--	--	--
5	--	--	--	--	--	--	--	--	--
6	--	--	--	--	--	--	--	--	--
7	--	--	--	--	--	--	--	--	--
8	--	--	--	155	17	7.1	--	--	--
9	--	--	--	--	--	--	--	--	--
10	--	--	--	--	--	--	--	--	--
11	--	--	--	--	--	--	--	--	--
12	--	--	--	--	--	--	--	--	--
13	--	--	--	--	--	--	--	--	--
14	--	--	--	--	--	--	--	--	--
15	--	--	--	--	--	--	2300	1790	11100
16	--	--	--	--	--	--	3000	750	6080
17	--	--	--	--	--	--	1800	395	1920
18	--	--	--	--	--	--	--	--	--
19	--	--	--	--	--	--	--	--	--
20	162	62	27	--	--	--	--	--	--
21	--	--	--	--	--	--	--	--	--
22	--	--	--	--	--	--	--	--	--
23	--	--	--	--	--	--	--	--	--
24	--	--	--	--	--	--	--	--	--
25	--	--	--	--	--	--	--	--	--
26	--	--	--	--	--	--	--	--	--
27	--	--	--	--	--	--	--	--	--
28	--	--	--	--	--	--	--	--	--
29	--	--	--	--	--	--	--	--	--
30	--	--	--	--	--	--	2210	720	4300
31	--	--	--	--	--	--	5040	2140	29800

05384000 ROOT RIVER NEAR LANESBORO, MINN.--Continued

PERIODIC DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

	APRIL			MAY			JUNE		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	6890	1670	31100				--	--	--
2	3040	800	6570				--	--	--
3	--	--	--				--	--	--
4	--	--	--				--	--	--
5	--	--	--				--	--	--
6	--	--	--				--	--	--
7	--	--	--				--	--	--
8	--	--	--				--	--	--
9	--	--	--				--	--	--
10	--	--	--				--	--	--
11	--	--	--				--	--	--
12	--	--	--				--	--	--
13	--	--	--				--	--	--
14	--	--	--				--	--	--
15	--	--	--				--	--	--
16	--	--	--				--	--	--
17	--	--	--				--	--	--
18	--	--	--				--	--	--
19	--	--	--				--	--	--
20	--	--	--				--	--	--
21	506	66	90				--	--	--
22	--	--	--				--	--	--
23	--	--	--				--	--	--
24	--	--	--				--	--	--
25	--	--	--				--	--	--
26	--	--	--				--	--	--
27	--	--	--				--	--	--
28	--	--	--				--	--	--
29	--	--	--				247	196	131
30	--	--	--				--	--	--
31	--	--	--				--	--	--

	JULY			AUGUST			SEPTEMBER		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	--	--	--	--	--	--	--	--	--
2	--	--	--	--	--	--	--	--	--
3	--	--	--	173	30	14	--	--	--
4	--	--	--	--	--	--	--	--	--
5	--	--	--	--	--	--	--	--	--
6	--	--	--	--	--	--	--	--	--
7	--	--	--	--	--	--	--	--	--
8	--	--	--	--	--	--	140	82	31
9	--	--	--	--	--	--	--	--	--
10	--	--	--	--	--	--	--	--	--
11	--	--	--	--	--	--	--	--	--
12	--	--	--	--	--	--	--	--	--
13	775	2490	5950	--	--	--	--	--	--
14	--	--	--	--	--	--	--	--	--
15	--	--	--	--	--	--	--	--	--
16	--	--	--	--	--	--	--	--	--
17	--	--	--	--	--	--	--	--	--
18	--	--	--	--	--	--	--	--	--
19	--	--	--	--	--	--	--	--	--
20	--	--	--	--	--	--	--	--	--
21	--	--	--	--	--	--	--	--	--
22	--	--	--	--	--	--	--	--	--
23	--	--	--	--	--	--	--	--	--
24	--	--	--	--	--	--	--	--	--
25	--	--	--	--	--	--	--	--	--
26	--	--	--	--	--	--	--	--	--
27	--	--	--	--	--	--	--	--	--
28	--	--	--	--	--	--	--	--	--
29	--	--	--	--	--	--	--	--	--
30	--	--	--	--	--	--	--	--	--
31	--	--	--	--	--	--	--	--	--

05384000 ROOT RIVER NEAR LANESBORO, MINN.--Continued

INSTANTANEOUS SUSPENDED SEDIMENT AND PARTICLE SIZE, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DATE	TIME	DIS-CHARGE (CFS) 00060	SUS-PENDED SEDI-MENT (MG/L) 80154	SUS-PENDED SEDI-MENT DIS-CHARGE (T/DAY) 80155	SUS. SED. FALL DIAM. % FINER THAN .002 MM 70337	SUS. SED. FALL DIAM. % FINER THAN .004 MM 70338	SUS. SED. FALL DIAM. % FINER THAN .008 MM 70339	SUS. SED. FALL DIAM. % FINER THAN .016 MM 70340	SUS. SED. FALL DIAM. % FINER THAN .031 MM 70341	SUS. SED. FALL DIAM. % FINER THAN .062 MM 70342
JULY										
13...	[illegible]	740	3260	6510	45	61	76	92	96	99

05385000 ROOT RIVER NEAR HOUSTON, MINN.

PERIODIC DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

	OCTOBER			NOVEMBER			DECEMBER		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	--	--	--	--	--	--	622	84	141
2	--	--	--	--	--	--	--	--	--
3	--	--	--	--	--	--	--	--	--
4	--	--	--	778	126	265	--	--	--
5	--	--	--	1020	210	578	--	--	--
6	--	--	--	1080	280	816	--	--	--
7	--	--	--	926	200	500	--	--	--
8	--	--	--	823	150	332	--	--	--
9	--	--	--	793	140	300	--	--	--
10	1460	655	2580	808	169	369	--	--	--
11	1590	615	2640	--	--	--	--	--	--
12	1200	459	1490	1080	295	860	--	--	--
13	937	290	734	926	282	705	--	--	--
14	--	--	--	844	131	299	--	--	--
15	--	--	--	--	--	--	--	--	--
16	--	--	--	--	--	--	--	--	--
17	--	--	--	--	--	--	--	--	--
18	--	--	--	--	--	--	--	--	--
19	--	--	--	--	--	--	--	--	--
20	--	--	--	--	--	--	--	--	--
21	--	--	--	--	--	--	--	--	--
22	--	--	--	--	--	--	--	--	--
23	--	--	--	--	--	--	--	--	--
24	--	--	--	--	--	--	--	--	--
25	--	--	--	--	--	--	--	--	--
26	--	--	--	--	--	--	--	--	--
27	565	169	258	--	--	--	--	--	--
28	818	350	773	--	--	--	--	--	--
29	1360	585	2150	--	--	--	--	--	--
30	1040	370	1040	--	--	--	--	--	--
31	869	200	469	--	--	--	--	--	--

	JANUARY			FEBRUARY			MARCH		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1				--	--	--	--	--	--
2				--	--	--	--	--	--
3				--	--	--	--	--	--
4				--	--	--	--	--	--
5				--	--	--	--	--	--
6				--	--	--	--	--	--
7				--	--	--	--	--	--
8				--	--	--	--	--	--
9				310	36	30	--	--	--
10				--	--	--	--	--	--
11				--	--	--	--	--	--
12				--	--	--	--	--	--
13				--	--	--	--	--	--
14				--	--	--	--	--	--
15				--	--	--	3580	2820	28600
16				--	--	--	3900	1860	19600
17				--	--	--	2990	1020	8230
18				--	--	--	2440	660	4350
19				--	--	--	2400	600	3890
20				--	--	--	1860	550	2760
21				--	--	--	1600	460	1990
22				--	--	--	1430	340	1310
23				--	--	--	--	--	--
24				--	--	--	--	--	--
25				--	--	--	--	--	--
26				--	--	--	--	--	--
27				--	--	--	--	--	--
28				--	--	--	1040	185	519
29				--	--	--	1630	545	2400
30				--	--	--	2630	800	5680
31				--	--	--	4780	1460	18800

053S5000 ROOT RIVER NEAR HOUSTON, MINN.--Continued

PERIODIC DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

	APRIL			MAY			JUNE		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	7910	2280	48700	--	--	--	--	--	--
2	6580	1730	30700	--	--	--	--	--	--
3	2900	865	6770	--	--	--	--	--	--
4	2190	525	3100	849	196	449	--	--	--
5	1850	382	1910	--	--	--	--	--	--
6	1790	340	1640	--	--	--	--	--	--
7	1860	337	1690	--	--	--	818	360	795
8	1980	367	1960	--	--	--	823	290	644
9	2120	405	2320	--	--	--	937	302	764
10	2000	342	1850	--	--	--	906	215	526
11	1780	272	1310	--	--	--	--	--	--
12	1610	225	978	--	--	--	--	--	--
13	1490	203	817	--	--	--	--	--	--
14	1370	195	721	--	--	--	--	--	--
15	1280	178	615	--	--	--	--	--	--
16	1210	166	542	--	--	--	--	--	--
17	--	--	--	--	--	--	--	--	--
18	--	--	--	--	--	--	--	--	--
19	--	--	--	--	--	--	--	--	--
20	1020	132	364	--	--	--	--	--	--
21	1030	143	398	--	--	--	--	--	--
22	1020	156	430	--	--	--	--	--	--
23	1030	234	651	--	--	--	--	--	--
24	980	235	628	953	480	1250	--	--	--
25	926	200	500	1080	421	1230	--	--	--
26	890	156	375	978	248	655	--	--	--
27	885	110	263	968	162	423	--	--	--
28	--	--	--	900	130	316	--	--	--
29	--	--	--	--	--	--	--	--	--
30	869	63	148	--	--	--	589	294	468
31	--	--	--	--	--	--	--	--	--

	JULY			AUGUST			SEPTEMBER		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	--	--	--	--	--	--	--	--	--
2	--	--	--	--	--	--	--	--	--
3	--	--	--	--	--	--	--	--	--
4	--	--	--	418	67	76	--	--	--
5	--	--	--	--	--	--	--	--	--
6	--	--	--	--	--	--	--	--	--
7	--	--	--	--	--	--	--	--	--
8	--	--	--	--	--	--	--	--	--
9	--	--	--	--	--	--	379	138	141
10	--	--	--	--	--	--	--	--	--
11	--	--	--	--	--	--	--	--	--
12	--	--	--	--	--	--	--	--	--
13	1130	2120	6470	--	--	--	--	--	--
14	803	1370	2970	--	--	--	--	--	--
15	699	740	1400	--	--	--	--	--	--
16	--	--	--	--	--	--	--	--	--
17	--	--	--	--	--	--	--	--	--
18	--	--	--	--	--	--	--	--	--
19	--	--	--	--	--	--	--	--	--
20	--	--	--	--	--	--	--	--	--
21	--	--	--	--	--	--	--	--	--
22	--	--	--	--	--	--	--	--	--
23	--	--	--	--	--	--	--	--	--
24	--	--	--	--	--	--	--	--	--
25	--	--	--	--	--	--	--	--	--
26	--	--	--	--	--	--	--	--	--
27	--	--	--	--	--	--	--	--	--
28	--	--	--	--	--	--	--	--	--
29	--	--	--	--	--	--	--	--	--
30	--	--	--	--	--	--	--	--	--
31	--	--	--	--	--	--	--	--	--

05385000 ROOT RIVER NEAR HOUSTON, MINN.--Continued

INSTANTANEOUS SUSPENDED SEDIMENT AND PARTICLE SIZE, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DATE	TIME	DIS-CHARGE (CFS) 00060	TEMP-ERATURE (DEG C) 00010	SUS-PENDED SEDI-MENT (MG/L) 80154	SUS-PENDED SEDI-MENT DIS-CHARGE (T/DAY) 80155	SUS. SED. FALL DIAM. % FINER THAN .002 MM 70337	SUS. SED. FALL DIAM. % FINER THAN .004 MM 70338	SUS. SED. FALL DIAM. % FINER THAN .008 MM 70339	SUS. SED. FALL DIAM. % FINER THAN .016 MM 70340	SUS. SED. FALL DIAM. % FINER THAN .031 MM 70341	SUS. SED. FALL DIAM. % FINER THAN .062 MM 70342
JULY											
13...	1710	1470	21.0	2440	9680	36	50	64	78	94	97

05457000 CEDAR RIVER NEAR AUSTIN, MINN.

PERIODIC DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

	JANUARY			FEBRUARY			MARCH		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1							--	--	--
2							--	--	--
3							--	--	--
4							--	--	--
5							--	--	--
6							--	--	--
7							--	--	--
8							--	--	--
9							--	--	--
10							--	--	--
11							--	--	--
12							--	--	--
13							--	--	--
14							915	178	604
15							2680	188	1360
16							2120	110	630
17							1610	78	339
18							1530	75	391
19							1490	58	233
20							940	48	122
21							810	67	147
22							710	46	88
23							600	43	70
24							530	31	44
25							490	32	42
26							466	18	23
27							546	24	45
28							2080	146	838
29							2120	89	509
30							2310	62	387
31							3380	128	1170

	APRIL			MAY			JUNE		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	3390	147	1350	--	--	--	--	--	--
2	1350	97	354	--	--	--	--	--	--
3	666	66	119	--	--	--	--	--	--
4	626	38	64	--	--	--	--	--	--
5	641	28	48	--	--	--	--	--	--
6	651	28	49	--	--	--	--	--	--
7	661	29	52	--	--	--	--	--	--
8	693	31	58	--	--	--	--	--	--
9	655	33	58	--	--	--	--	--	--
10	528	45	64	--	--	--	--	--	--
11	435	40	47	--	--	--	--	--	--
12	--	--	--	--	--	--	--	--	--
13	--	--	--	--	--	--	--	--	--
14	--	--	--	--	--	--	--	--	--
15	--	--	--	--	--	--	--	--	--
16	--	--	--	--	--	--	--	--	--
17	--	--	--	--	--	--	--	--	--
18	--	--	--	--	--	--	--	--	--
19	--	--	--	--	--	--	--	--	--
20	--	--	--	--	--	--	--	--	--
21	216	70	41	--	--	--	--	--	--
22	--	--	--	--	--	--	--	--	--
23	--	--	--	--	--	--	--	--	--
24	--	--	--	--	--	--	--	--	--
25	--	--	--	240	48	31	--	--	--
26	--	--	--	--	--	--	--	--	--
27	--	--	--	--	--	--	--	--	--
28	--	--	--	--	--	--	--	--	--
29	--	--	--	--	--	--	129	35	12
30	--	--	--	--	--	--	--	--	--
31	--	--	--	--	--	--	--	--	--

05457000 CEDAR RIVER NEAR AUSTIN, MINN.--Continued

PERIODIC DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

	JULY			AUGUST			SEPTEMBER		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1				--	--	--	--	--	--
2				--	--	--	--	--	--
3				--	--	--	--	--	--
4				--	--	--	--	--	--
5				61	17	2.8	--	--	--
6				--	--	--	--	--	--
7				--	--	--	--	--	--
8				--	--	--	--	--	--
9				--	--	--	--	--	--
10				--	--	--	--	--	--
11				--	--	--	--	--	--
12				--	--	--	--	--	--
13				--	--	--	52	10	1.4
14				--	--	--	--	--	--
15				--	--	--	--	--	--
16				--	--	--	--	--	--
17				--	--	--	--	--	--
18				--	--	--	--	--	--
19				--	--	--	--	--	--
20				--	--	--	--	--	--
21				--	--	--	--	--	--
22				--	--	--	--	--	--
23				--	--	--	--	--	--
24				--	--	--	--	--	--
25				--	--	--	--	--	--
26				--	--	--	--	--	--
27				--	--	--	--	--	--
28				--	--	--	--	--	--
29				--	--	--	--	--	--
30				--	--	--	--	--	--
31				--	--	--	--	--	--

05476000 DES MOINES RIVER AT JACKSON, MINN.

PERIODIC DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

	OCTOBER			NOVEMBER			DECEMBER		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1				--	--	--	270	63	46
2				--	--	--	280	72	54
3				175	25	12	270	54	39
4				--	--	--	260	86	60
5				--	--	--	250	80	54
6				--	--	--	230	93	58
7				--	--	--	240	38	25
8				--	--	--	280	98	74
9				450	48	58	310	75	63
10				633	52	89	266	58	42
11				682	57	105	250	59	40
12				682	53	98	240	33	21
13				676	54	99	230	45	28
14				659	78	139	260	38	27
15				603	56	91	290	20	16
16				574	47	73	290	31	24
17				550	50	74	285	51	39
18				512	56	77	275	48	36
19				493	42	56	265	43	31
20				487	45	59	245	38	25
21				570	60	92	230	36	22
22				447	50	60	245	54	36
23				--	--	--	265	49	35
24				--	--	--	250	58	39
25				--	--	--	240	57	37
26				--	--	--	230	100	62
27				--	--	--	--	--	--
28				--	--	--	--	--	--
29				--	--	--	--	--	--
30				260	96	67	--	--	--
31				--	--	--	--	--	--

	JANUARY			FEBRUARY			MARCH		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	--	--	--	--	--	--	--	--	--
2	--	--	--	--	--	--	--	--	--
3	--	--	--	--	--	--	--	--	--
4	--	--	--	--	--	--	--	--	--
5	--	--	--	--	--	--	--	--	--
6	--	--	--	--	--	--	--	--	--
7	--	--	--	--	--	--	--	--	--
8	--	--	--	--	--	--	--	--	--
9	--	--	--	--	--	--	--	--	--
10	--	--	--	--	--	--	--	--	--
11	--	--	--	--	--	--	--	--	--
12	79	87	19	--	--	--	--	--	--
13	--	--	--	--	--	--	--	--	--
14	--	--	--	--	--	--	--	--	--
15	--	--	--	--	--	--	--	--	--
16	--	--	--	--	--	--	--	--	--
17	--	--	--	16	52	2.2	--	--	--
18	--	--	--	--	--	--	--	--	--
19	--	--	--	--	--	--	--	--	--
20	--	--	--	--	--	--	--	--	--
21	--	--	--	--	--	--	--	--	--
22	--	--	--	--	--	--	1000	41	111
23	--	--	--	--	--	--	960	28	73
24	--	--	--	--	--	--	930	23	58
25	--	--	--	--	--	--	920	22	55
26	--	--	--	--	--	--	920	18	45
27	--	--	--	--	--	--	940	21	53
28	--	--	--	--	--	--	1100	48	143
29	--	--	--	--	--	--	1700	94	431
30	--	--	--	--	--	--	2820	197	1500
31	--	--	--	--	--	--	3250	335	2940

05476000 DES MOINES RIVER AT JACKSON, MINN.--Continued

PERIODIC DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

	APRIL			MAY			JUNE		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	2780	268	2010	--	--	--	--	--	--
2	2280	172	1060	--	--	--	--	--	--
3	1950	182	958	345	65	61	--	--	--
4	1910	107	552	342	73	67	--	--	--
5	1850	88	440	334	80	72	--	--	--
6	1760	86	409	305	63	52	--	--	--
7	1630	83	365	284	50	38	442	137	163
8	1530	83	343	279	70	53	536	137	198
9	1430	91	351	264	72	51	660	152	271
10	1320	79	282	254	68	47	753	155	315
11	1240	100	335	244	71	47	841	158	359
12	1160	82	257	--	--	--	915	172	425
13	1040	103	289	--	--	--	939	163	413
14	947	89	228	--	--	--	911	183	450
15	884	122	291	--	--	--	859	174	404
16	838	96	217	--	--	--	804	160	347
17	795	92	197	--	--	--	735	143	284
18	729	77	152	--	--	--	737	140	279
19	699	61	115	--	--	--	786	223	473
20	682	55	101	--	--	--	888	220	527
21	650	54	95	--	--	--	873	157	370
22	617	54	90	--	--	--	824	121	269
23	590	56	89	--	--	--	770	105	218
24	554	58	87	--	--	--	740	75	150
25	505	68	93	--	--	--	690	74	138
26	471	55	70	--	--	--	647	94	164
27	459	47	58	--	--	--	599	86	139
28	450	45	55	--	--	--	547	76	112
29	444	37	44	--	--	--	525	70	99
30	--	--	--	--	--	--	805	194	446
31	--	--	--	--	--	--	--	--	--

	JULY			AUGUST			SEPTEMBER		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	1070	246	711						
2	1030	138	384						
3	988	128	341						
4	1030	165	459						
5	958	110	285						
6	975	99	261						
7	934	92	232						
8	893	80	193						
9	813	80	176						
10	759	85	174						
11	750	82	166						
12	780	77	162						
13	800	86	186						
14	795	85	182						
15	752	80	162						
16	699	69	130						
17	635	86	147						
18	573	75	116						
19	531	75	108						
20	486	82	108						
21	443	72	86						
22	408	75	83						
23	374	100	101						
24	338	92	84						
25	308	84	70						
26	286	99	76						
27	259	78	55						
28	237	72	46						
29	220	70	42						
30	204	75	41						
31	193	75	39						
TOTAL	19521	--	5406						

WATER QUALITY DATA AT STREAMFLOW STATIONS

Periodic field determinations of water temperature and specific conductance are made at many stream-gaging stations other than regular water-quality stations. These data are usually collected at monthly intervals during routine visits to the station. Additional data for each station are published in Part 1 of this report.

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

04010500 PIGEON RIVER ABOVE MIDDLE FALLS, NEAR GRAND PORTAGE, MINN.

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
SEPT. 23, 1970	473	14	--
OCT. 27	1140	7	--
OCT. 28	4500	5.5	--
JAN. 05, 1971	355	0	70
FEB. 09	390	0	<50
MAR. 16	201	.5	100
APR. 20	4840	2	<50
APR. 22	4720	4	--
MAY 13	1710	8	--
MAY 18	1400	11.5	65
JUNE 22	839	18.5	--
JULY 28	243	20	--
AUG. 17	106	22	--
AUG. 31	103	18	185
OCT. 05	464	12	115

04014500 BAPTISM RIVER NEAR BEAVER BAY, MINN.

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
SEPT. 21, 1970	39	18.5	--
OCT. 26	209	9	--
OCT. 28	1740	7	--
OCT. 29	1650	5.5	--
JAN. 04, 1971	100	0	75
FEB. 09	25	0	70
MAR. 16	52	0	90
APR. 20	1990	2	50
MAY 17	194	12	70
JUNE 21	640	19	--
JULY 27	24	17.5	--
AUG. 30	31	19	180
OCT. 05	99	12.5	--

04015500 SECOND CREEK NEAR AURORA, MINN.

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
SEPT. 16, 1970	15	9	520
OCT. 21	16	6.5	650
NOV. 18	25	1	--
DEC. 29	20	0	--
FEB. 04, 1971	9.0	0	560
MAR. 11	18	0	--
APR. 08	32	1	--
APR. 12	193	4	--
APR. 13	173	.5	--
APR. 14	144	.5	--
APR. 15	126	3	--
APR. 28	40	5.5	500
JUNE 03	27	18	600
AUG. 11	19	17.5	502
SEPT. 15	26	13	650
OCT. 13	38	6	640

04016000 PARTRIDGE RIVER NEAR AURORA, MINN.

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
SEPT. 16, 1970	26	9.5	--
OCT. 21	31	7	490
NOV. 18	207	1	--
DEC. 29	50	1	--
FEB. 04, 1971	22	0	--
MAR. 11	39	.5	--
APR. 08	81	1	--
APR. 12	355	5	--
APR. 14	368	1	--
APR. 21	1390	5.5	--
APR. 28	579	5.5	--
JUNE 03	231	18	140
JULY 12	70	21	--
AUG. 11	33	19	400
SEPT. 15	44	15.5	520
OCT. 13	74	6	460

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
04016500 ST. LOUIS RIVER NEAR AURORA, MINN.							
SEPT. 16, 1970...	35	10	--	APR. 12.....	800	5	--
OCT. 06.....	26	11.5	--	APR. 14.....	969	1	--
OCT. 21.....	127	9	190	APR. 28.....	1500	6	--
NOV. 18.....	465	1	--	JUNE 03.....	488	18	60
DEC. 29.....	97	0	--	AUG. 11.....	58	20.5	318
FEB. 04, 1971...	41	0	205	SEPT. 15.....	72	15.5	460
MAR. 11.....	59	0	--	OCT. 13.....	107	6.5	180
APR. 08.....	129	1	--				
04018750 ST. LOUIS RIVER AT FORBES, MINN.							
SEPT. 15, 1970...	72	13	240	APR. 17.....	4450	3	100
OCT. 20.....	477	7.5	170	APR. 21.....	4910	6	--
NOV. 19.....	897	1	--	APR. 29.....	2810	6	--
DEC. 28.....	341	1	--	JUNE 07.....	932	18	100
FEB. 03, 1971...	109	1	--	AUG. 11.....	198	21	206
MAR. 12.....	155	0	--	SEPT. 16.....	102	17.5	280
APR. 16.....	4230	1	100	OCT. 14.....	500	5.5	160
04018900 EAST TWO RIVER NEAR IRON JUNCTION, MINN.							
OCT. 06, 1970...	8.8	12	--	MAY 18.....	19	13	--
OCT. 13.....	129	7	--	JUNE 01.....	41	13	--
NOV. 03.....	76	5	--	JUNE 15.....	26	20	--
DEC. 02.....	24	0	--	JULY 06.....	26	24	--
FEB. 02, 1971	8.5	.5	--	JULY 23.....	16	21	--
FEB. 15.....	7.7	0	--	AUG. 06.....	10	23	--
MAR. 08.....	14	0	--	SEPT. 27.....	12	10	--
APR. 16.....	358	5	--	OCT. 06.....	78	10	--
04019000 WEST TWO RIVER NEAR IRON JUNCTION, MINN.							
OCT. 06, 1970...	9.9	12	--	MAY 18.....	29	13	--
OCT. 12.....	52	7	--	JUNE 01.....	79	14	--
NOV. 13.....	103	1	--	JUNE 15.....	36	19	--
DEC. 04.....	46	0	--	JULY 06.....	44	23	--
JAN. 22, 1971...	18	0	--	JULY 23.....	24	21	--
FEB. 16.....	16	0	--	AUG. 06.....	17	21	--
MAR. 12.....	17	0	--	AUG. 27.....	13	21	--
APR. 05.....	30	0	--	SEPT. 03.....	11	24	--
APR. 14.....	636	1	--	SEPT. 27.....	11	13	--
APR. 15.....	729	4	--	OCT. 06.....	122	12	--

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
04019300 WEST SWAN RIVER NEAR SILICA, MINN.							
OCT. 20, 1970...	1.0	4.5	280	JUNE 02.....	4.7	16	100
NOV. 17.....	4.3	1	--	JULY 06.....	1.6	23	--
DEC. 30.....	1.4	1	--	AUG. 12.....	.3	17	240
APR. 12, 1971...	360	1.5	--	SEPT. 16.....	.6	11.5	190
APR. 16.....	188	5.5	--	OCT. 14.....	3.5	5	140
APR. 29.....	7.5	6.5	--				
04019500 EAST SWAN RIVER NEAR TOIVOLA, MINN.							
SEPT. 17, 1970...	36	9.5	--	APR. 14.....	1690	.5	--
OCT. 19.....	48	7	500	APR. 21.....	800	9	--
NOV. 19.....	69	1	--	APR. 29.....	245	6.5	--
DEC. 30.....	26	0	--	AUG. 12.....	31	18	510
MAR. 12, 1971...	17	0	--	SEPT. 16.....	28	12	560
APR. 09.....	150	2.5	--	OCT. 14.....	88	5	300
APR. 13.....	1660	2.5	--				
04024000 ST. LOUIS RIVER AT SCANLON, MINN.							
SEPT. 15, 1970...	876	17	--	APR. 27.....	9190	6	--
NOV. 17.....	3700	1	--	JUNE 08.....	3840	18	140
DEC. 29.....	1520	0	--	AUG. 10.....	1140	23.5	170
FEB. 11, 1971...	1380	.5	--	SEPT. 14.....	1460	19	270
MAR. 10.....	1480	.5	--	OCT. 19.....	2860	11	180
APR. 17.....	25500	3	--				
05030000 OTTER TAIL RIVER NEAR DETROIT LAKES, MINN.							
AUG. 31, 1970...	1.2	20	--	APR. 06.....	49	4.5	410
OCT. 05.....	1.1	15	460	APR. 07.....	68	7	--
NOV. 16.....	14	3	--	MAY 10.....	44	17.5	300
DEC. 15.....	19	0	--	JUNE 15.....	34	26	300
JAN. 18, 1971...	26	0	400	JULY 12.....	50	23.5	280
FEB. 22.....	33	0	400	SEPT. 28.....	31	13.5	295
MAR. 22.....	41	0	--	OCT. 27.....	73	10.5	285
05033900 PELICAN RIVER AT DETROIT LAKES, MINN.							
SEPT. 23, 1970...	3.4	12.5	--	MAR. 22.....	5.3	0	590
OCT. 06.....	2.4	13	--	APR. 06.....	36	.5	420
OCT. 26.....	2.7	8.5	--	APR. 08.....	61	.5	360
NOV. 17.....	2.7	2.5	660	APR. 12.....	47	5.5	--
NOV. 30.....	2.2	0	700	MAY 10.....	17	17	540
DEC. 15.....	1.4	0	--	JUNE 16.....	3.8	18	525
JAN. 18, 1971...	1.3	0	625	JULY 12.....	17	21.5	420
FEB. 22.....	1.6	0	640	SEPT. 28.....	30	13.5	475

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

05034100 PELICAN RIVER AT DETROIT LAKE OUTLET NEAR DETROIT LAKES, MINN.

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
NOV. 17, 1970	.7	3	330	MAR. 22	22	2.5	470
NOV. 30	1.4	1	400	APR. 06	16	7.5	420
DEC. 15	6.0	1.5	400	MAY 10	27	19	370
JAN. 19, 1971	9.2	1.5	420	JUNE 16	7.1	23.5	380
FEB. 22	38	1.5	450	JULY 13	29	20.5	360

05035100 LONG LAKE OUTLET NEAR DETROIT LAKES, MINN.

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
SEPT. 23, 1970	.1	18.5	--	MAR. 23	4.4	1	430
NOV. 17	.4	3.5	380	APR. 06	4.4	3	390
NOV. 30	.5	0	390	MAY 10	3.3	16	410
DEC. 15	.8	.5	--	JUNE 18	1.6	22	400
JAN. 19, 1971	.5	.5	460	JULY 13	2.9	23.5	370
FEB. 23	.5	0	450				

05035200 WEST BRANCH COUNTY DITCH 14 NEAR DETROIT LAKES, MINN.

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
SEPT. 23, 1970	.5	17	--	DEC. 15	.1	0	--
OCT. 06	.1	14	850	APR. 12, 1971	3.1	4	--
OCT. 26	.6	10.5	--	MAY 11	.9	7	710
NOV. 17	.2	0	900	JUNE 16	.2	9.5	720
NOV. 30	.1	1	--	JULY 13	1.4	18.5	650

05035300 EAST BRANCH COUNTY DITCH 14 NEAR DETROIT LAKES, MINN.

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
SEPT. 23, 1970	1.8	13	--	FEB. 23	.5	0	900
OCT. 06	1.2	12	825	MAR. 23	1.0	.5	920
OCT. 26	2.0	8.5	--	APR. 07	2.4	1	530
NOV. 17	.8	2	875	MAY 11	1.1	8	880
NOV. 30	.7	1.5	925	JUNE 16	.8	19	750
DEC. 15	.6	0	--	JULY 13	4.1	17.5	340
JAN. 19, 1971	.6	0	880	OCT. 27	5.3	10	430

05035500 ST. CLAIR LAKE OUTLET NEAR DETROIT LAKES, MINN.

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
SEPT. 23, 1970	5.3	15	--	MAR. 23	7.9	.5	900
OCT. 06	2.2	13.5	750	APR. 07	13	2.5	600
OCT. 26	3.9	10	--	MAY 11	7.3	12	750
NOV. 17	3.9	3	830	JUNE 16	4.3	24.5	690
NOV. 30	3.5	2	940	JULY 13	9.2	20	510
DEC. 15	2.4	1	--	SEPT. 29	6.0	12.5	675
JAN. 19, 1971	1.2	0	1460	OCT. 28	8.8	5.5	620
FEB. 23	3.4	0	1350				

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
05035600 PELICAN RIVER AT MUSKRAT LAKE OUTLET NEAR DETROIT LAKES, MINN.							
SEPT. 23, 1970...	4.4	17	--	MAR. 23.....	23	1	590
OCT. 06.....	1.9	14	500	APR. 07.....	31	4.5	500
OCT. 26.....	3.4	10	--	MAY 11.....	34	15.5	470
NOV. 17.....	4.2	4	600	JUNE 17.....	14	24	490
NOV. 30.....	4.1	3	675	JULY 14.....	30	22	360
DEC. 15.....	7.6	.5	--	SEPT. 29.....	28	13	430
FEB. 23, 1971...	34	.5	570	OCT. 28.....	54	9	420
05037100 PELICAN RIVER AT SALLIE LAKE OUTLET NEAR DETROIT LAKES, MINN.							
SEPT. 24, 1970...	.5	16	--	FEB. 23.....	31	1	460
OCT. 06.....	.2	16	370	APR. 07.....	30	5	410
OCT. 27.....	1.9	6.5	--	MAY 12.....	41	14.5	450
NOV. 17.....	7.9	2.5	370	JUNE 18.....	18	23	395
NOV. 30.....	7.8	0	380	JULY 14.....	36	22	370
DEC. 16.....	9.1	0	--	SEPT. 29.....	31	14	350
JAN. 20, 1971...	15	1	400	OCT. 28.....	63	8	340
05039100 PELICAN RIVER AT LAKE MELISSA OUTLET NEAR DETROIT LAKES, MINN.							
NOV. 17, 1970...	6.8	2.5	370	APR. 07.....	36	4.5	470
NOV. 30.....	7.8	0	--	MAY 12.....	55	13.5	410
DEC. 16.....	11	.5	--	JUNE 17.....	17	25	380
JAN. 19, 1971...	16	0	--	JULY 13.....	34	23	370
FEB. 23.....	22	.5	450	SEPT. 29.....	31	14.5	380
MAR. 23.....	35	1	--	OCT. 28.....	65	7.5	360
05046000 OTTER TAIL RIVER BELOW ORWELL DAM NEAR FERGUS FALLS, MINN.							
SEPT. 01, 1970...	46	19	--	APR. 08.....	658	4.5	--
OCT. 05.....	141	13	420	MAY 12.....	373	15	380
OCT. 07.....	71	12.5	--	JUNE 15.....	282	24	410
NOV. 18.....	214	2.5	400	JULY 14.....	471	23	390
DEC. 14.....	194	1	--	AUG. 24.....	96	22.5	360
FEB. 24, 1971...	243	1	--	SEPT. 29.....	209	15	--
MAR. 24.....	276	1	--	OCT. 28.....	321	10.5	--
05050000 BOIS DE SIOUX RIVER NEAR WHITE ROCK, S. DAK.							
SEPT. 13, 1971...	10	20	1600	OCT. 21.....	.2	12	1810
05061000 BUFFALO RIVER NEAR HAWLEY, MINN.							
SEPT. 01, 1970...	9.7	18.5	--	JUNE 09.....	27	17	--
OCT. 06.....	10	14	--	JULY 12.....	35	24	--
NOV. 02.....	39	4.5	--	AUG. 16.....	15	21	--
DEC. 14.....	13	0	880	SEPT. 24.....	45	10	800
JAN. 19, 1971...	14	0	--	OCT. 27.....	130	10	810
MAR. 30.....	110	.5	580				

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DATE	DISCHARGE (CFS)	TEMPERA TURE (°C)	SPECIFIC CONDUC- TANCE (MICRO- MHOS)	DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUC- TANCE (MICRO- MHOS)
05061500 SOUTH BRANCH BUFFALO RIVER AT SABIN, MINN.							
SEPT. 01, 1970...	.9	17	--	APR. 27.....	34	8	--
OCT. 06.....	1.4	12	--	JULY 13.....	139	20.5	--
NOV. 03.....	14	4	--	AUG. 17.....	1.6	22	--
DEC. 15.....	3.6	0	990	SEPT. 23.....	7.6	11	950
APR. 10, 1971...	114	5	650	OCT. 27.....	38	10	1000
05062000 BUFFALO RIVER NEAR DILWORTH, MINN.							
SEPT. 01, 1970...	8.6	18.5	--	APR. 15.....	221	7	640
OCT. 06.....	7.4	12	--	APR. 28.....	120	5.5	--
NOV. 03.....	48	4	--	JUNE 10.....	51	19	--
DEC. 15.....	19	0	850	JULY 13.....	215	23	--
JAN. 19, 1971...	12	0	--	AUG. 17.....	14	21.5	--
MAR. 30.....	125	2	540	SEPT. 23.....	66	10.5	800
APR. 09.....	445	1.5	500	OCT. 27.....	230	10	800
05062500 WILD RICE RIVER AT TWIN VALLEY, MINN.							
SEPT. 01, 1970...	17	21	--	APR. 28.....	438	5	--
OCT. 07.....	14	13	--	JUNE 16.....	105	23	--
NOV. 04.....	93	3.5	--	JULY 13.....	39	25.5	--
DEC. 16.....	39	0	670	AUG. 18.....	38	23	--
JAN. 20, 1971...	34	0	--	SEPT. 22.....	32	11	520
MAR. 31.....	622	1.5	--	OCT. 28.....	352	7	530
APR. 06.....	510	1	--				
05064000 WILD RICE RIVER AT HENDRUM, MINN.							
SEPT. 02, 1970...	27	20.5	--	APR. 28.....	489	5.5	--
OCT. 07.....	19	13	--	JUNE 17.....	132	25	--
NOV. 04.....	104	3.5	--	JULY 14.....	72	22	--
DEC. 15.....	44	0	610	AUG. 18.....	34	24	--
JAN. 19, 1971...	31	0	--	SEPT. 23.....	46	9	610
APR. 09.....	1420	1	350	OCT. 29.....	551	5	570
APR. 14.....	827	5	400				
05067500 MARSH RIVER NEAR SHELLY, MINN.							
NOV. 04, 1970...	1.0	4	--	JULY 14.....	.05	22	--
APR. 07, 1971...	227	1	--	OCT. 29.....	30	5	560
APR. 28.....	7.8	8	--				
05069000 SANDHILL RIVER AT CLIMAX, MINN.							
OCT. 07, 1970...	13	12	--	APR. 28.....	83	5.4	--
NOV. 05.....	39	3.5	--	JULY 14.....	19	19.5	--
DEC. 16.....	11	0	605	AUG. 18.....	10	23	--
JAN. 20, 1971...	13	0	--	SEPT. 22.....	20	10	675
APR. 09.....	1210	1.8	--	OCT. 29.....	202	5	620

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
05074500 RED LAKE RIVER NEAR RED LAKE, MINN.							
AUG. 27, 1970...	702	21	--	MAY 28.....	873	14.5	--
OCT. 05.....	866	12.5	--	JULY 02.....	760	21.5	--
NOV. 10.....	616	4	--	AUG. 06.....	589	20	--
DEC. 11.....	691	0	--	AUG. 24.....	460	23	--
FEB. 17, 1971...	815	1	305	SEPT. 10.....	302	19	--
MAR. 29.....	890	1	340	OCT. 18.....	176	10	280
APR. 23.....	666	6	300				
05075000 RED LAKE RIVER AT HIGH LANDING, NEAR GOODRIDGE, MINN.							
OCT. 02, 1970...	935	12	300	APR. 23.....	829	9	280
NOV. 10.....	789	4	--	MAY 28.....	1080	15	--
DEC. 11.....	635	0	--	JULY 01.....	801	20.5	--
JAN. 18, 1971...	628	0	720	AUG. 13.....	636	19.5	--
FEB. 17.....	829	.5	310	SEPT. 10.....	484	19	--
MAR. 30.....	910	0	290				
05076000 THIEF RIVER NEAR THIEF RIVER FALLS, MINN.							
AUG. 26, 1970...	1.6	20	--	APR. 12.....	554	7	310
OCT. 02.....	1.7	10.5	670	APR. 23.....	290	10	400
NOV. 10.....	12	4	--	MAY 26.....	427	11.5	--
DEC. 10.....	1.2	.5	--	JULY 01.....	19	21.5	--
JAN. 19, 1971...	1.2	0	410	AUG. 06.....	2.2	18	--
FEB. 18.....	1.0	.5	1000	SEPT. 14.....	3.8	16	--
MAR. 25.....	5.6	0	950	OCT. 19.....	894	10	480
APR. 08.....	1350	0	--				
05077700 RUFFY BROOK NEAR GONVICK, MINN.							
SEPT. 02, 1970...	1.2	22.5	--	APR. 14.....	65	3	340
OCT. 09.....	2.3	11	--	APR. 30.....	24	8	--
NOV. 06.....	6.8	2.5	--	JUNE 24.....	5.4	19	--
DEC. 18.....	4.2	0	480	JULY 15.....	2.7	23	--
JAN. 22, 1971...	1.2	0	--	AUG. 19.....	1.8	22	--
APR. 05.....	26	.5	--	SEPT. 20.....	1.7	11.5	660
APR. 07.....	144	1	--	NOV. 03.....	69	2.5	430
APR. 10.....	143	4	--				
05078000 CLEARWATER RIVER AT PLUMMER, MINN.							
OCT. 08, 1970...	45	11	--	APR. 29.....	252	8.5	--
NOV. 05.....	208	3.5	--	JULY 15.....	65	20.5	--
DEC. 17.....	105	0	--	AUG. 19.....	101	23	--
JAN. 21, 1971...	59	0	--	SEPT. 21.....	49	10	530
APR. 09.....	1170	1	--	NOV. 02.....	1220	3	530
APR. 12.....	951	6.5	400				

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
05078230 LOST RIVER AT OKLEE, MINN.							
SEPT. 02, 1970	3.2	24	--	APR. 30	124	8.5	--
OCT. 08	3.9	11	--	JUNE 24	27	22	--
NOV. 06	59	2.5	--	JULY 15	13	21	--
DEC. 18	12	0	800	AUG. 19	35	23	--
JAN. 22, 1971	6.9	0	--	SEPT. 21	18	9	650
APR. 09	1080	1	--	NOV. 02	765	3	590
APR. 14	210	3	490				
05078500 CLEARWATER RIVER AT RED LAKE FALLS, MINN.							
OCT. 08, 1970	49	11	--	APR. 29	504	8	--
NOV. 05	391	4	--	JUNE 23	177	22.5	--
DEC. 17	115	0	570	JULY 15	87	19.5	--
JAN. 21, 1971	83	0	--	AUG. 19	178	22	--
MAR. 30	152	1	500	SEPT. 21	80	10.5	660
APR. 10	3340	2.5	--	NOV. 02	3810	3	500
APR. 13	1540	5.5	400				
05079000 RED LAKE RIVER AT CROOKSTON, MINN.							
SEPT. 02, 1970	854	21.5	--	APR. 29	1530	8	--
OCT. 07	967	12	--	JUNE 22	1290	22.5	--
NOV. 05	1480	4.0	--	JULY 14	780	22.5	--
DEC. 16	786	.5	370	AUG. 18	755	23	--
JAN. 20, 1971	744	0	--	SEPT. 22	392	12	400
APR. 02	2820	1.5	480	NOV. 01	6260	3	430
APR. 12	4830	5.5	310				
05087500 MIDDLE RIVER AT ARGYLE, MINN.							
OCT. 01, 1970	.29	13	--	APR. 22	82	10.5	500
NOV. 10	8.6	5	--	MAY 27	47	15	--
DEC. 10	2.5	0	--	JUNE 30	4.0	23.5	--
JAN. 15, 1971	1.5	0	800	AUG. 05	.45	22.5	--
FEB. 25	1.4	1	750	AUG. 18	.08	22.5	--
MAR. 25	9.2	0	390	SEPT. 15	.02	15	--
APR. 08	272	1	--	OCT. 14	.16	8	620
APR. 13	309	5	300				

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

05094000 SOUTH BRANCH TWO RIVERS AT LAKE BRONSON, MINN.

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
AUG. 26, 1970...	3.0	19	--
OCT. 01.....	7.0	13	440
NOV. 04.....	87	5	--
JAN. 15, 1971...	3.8	1.5	600
FEB. 25.....	3.0	4	610
MAR. 26.....	8.8	1	--
APR. 07.....	361	3	300
APR. 09.....	1340	5	--
APR. 14.....	968	1.5	--
APR. 21.....	905	10	460
MAY 27.....	9.3	13.5	--
JUNE 30.....	6.3	23	--
AUG. 05.....	3.8	22	--
SEPT. 09.....	1.9	18	--
OCT. 14.....	1.7	10.5	500

05104500 ROSEAU RIVER BELOW SOUTH FORK, NEAR MALUNG, MINN.

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
SEPT. 30, 1970...	14	11.5	280
NOV. 04.....	244	5	--
DEC. 09.....	16	0	--
JAN. 14, 1971...	13	0	--
FEB. 24.....	7.1	0	510
MAR. 24.....	16	0	500
APR. 09.....	1330	4	--
MAY 26.....	324	10	--
AUG. 04.....	10	17.5	--
SEPT. 08.....	1.9	19	--
OCT. 20.....	127	8	750

05106000 SPRAGUE CREEK NEAR SPRAGUE, MANITOBA

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
SEPT. 30, 1970...	6.4	10	280
NOV. 04.....	58	5	--
DEC. 09.....	6.7	0	--
JAN. 14, 1971...	2.8	0	580
FEB. 24.....	1.4	.5	540
MAR. 25.....	2.6	0	--
APR. 08.....	259	4	--
APR. 14.....	91	1.5	--
APR. 20.....	300	7	240
MAY 26.....	142	10.5	--
JUNE 29.....	22	20.5	--
AUG. 04.....	26	18	--
SEPT. 08.....	9.8	18	--
OCT. 19.....	42	8.5	280

05107500 ROSEAU RIVER AT ROSS, MINN.

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
SEPT. 30, 1970...	43	12	400
NOV. 05.....	402	5	--
DEC. 09.....	42	0	--
JAN. 15, 1971	20	0	610
FEB. 23.....	9.3	.5	610
MAR. 23.....	183	.5	600
APR. 13.....	1560	1.0	--
APR. 22.....	1490	8.5	360
MAY 26.....	606	11	--
AUG. 05.....	48	20	--
SEPT. 09.....	17	18	--
OCT. 19.....	140	8.5	265

05112000 ROSEAU RIVER BELOW STATE DITCH 51, NEAR CARIBOU, MINN.

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
AUG. 26, 1970...	20.6	20	--
OCT. 01.....	58.3	13	420
NOV. 05.....	421	5	--
APR. 13, 1971...	1390	2	--
MAY 27.....	624	14	--
AUG. 05.....	67.7	21.5	--
SEPT. 09.....	27.5	18	--
OCT. 14.....	109	8	385

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
05124480 KAWISHIWI RIVER NEAR ELY, MINN.							
SEPT. 24, 1970...	57	16.5	--	APR. 28.....	1450	4	--
OCT. 21.....	124	8	--	MAY 26.....	602	10.5	60
JAN. 14, 1971...	143	0	--	AUG. 04.....	119	19.5	<50
FEB. 11.....	108	0	<50	SEPT. 02.....	52	21.5	--
MAR. 18.....	73	0	<50	OCT. 13.....	43	10.5	<50
05127205 BURNTSIDE RIVER NEAR ELY, MINN.							
SEPT. 24, 1970...	49	15	--	APR. 20.....	256	5.5	--
OCT. 29.....	134	7	--	APR. 26.....	222	9	--
JAN. 06, 1971...	51	0	<50	MAY 19.....	121	6	50
FEB. 10.....	35	0	<50	JUNE 18.....	156	19.5	--
MAR. 19.....	36	1	<50	JUNE 23.....	109	16	--
APR. 09.....	37	1	--	AUG. 05.....	27	19.5	--
APR. 13.....	62	3	<50	SEPT. 01.....	17	18.5	180
APR. 16.....	99	2.5	--	OCT. 06.....	12	10.5	105
05127210 ARMSTRONG CREEK NEAR ELY, MINN.							
SEPT. 24, 1970...	5.2	13	--	APR. 17.....	60	3	--
OCT. 28.....	18	6	--	APR. 19.....	53	4.5	--
JAN. 06, 1971...	1.9	0	140	MAY 19.....	4.0	6	100
FEB. 10.....	.6	0	145	JUNE 18.....	18	16	--
MAR. 23.....	.8	0	110	JUNE 23.....	4.2	15.5	--
APR. 09.....	.7	0	--	AUG. 06.....	.6	16	--
APR. 13.....	47	1	<50	SEPT. 01.....	1.0	17	--
APR. 15.....	37	1	--	OCT. 06.....	5.0	9.5	135
05127215 LONGSTORFF CREEK NEAR ELY, MINN.							
SEPT. 24, 1970...	3.8	13	--	APR. 19.....	89	5	--
OCT. 28.....	31	6	--	MAY 19.....	5.5	6	75
JAN. 06, 1971...	2.9	0	90	JUNE 18.....	16	17.5	--
FEB. 10.....	2.2	0	<50	JUNE 23.....	5.6	15.5	--
MAR. 18.....	3.4	0	90	AUG. 03.....	.5	13.5	--
APR. 09.....	7.3	1	--	SEPT. 01.....	1.6	18.5	--
APR. 13.....	62	3	<50	OCT. 06.....	4.8	9.5	120
APR. 17.....	97	3	--				
05127219 SHAGAWA LAKE TRIBUTARY AT ELY, MINN.							
APR. 09, 1971...	9.9	.5	--	JUNE 09.....	.1	10.5	--
APR. 13.....	4.1	4	--	JUNE 18.....	.9	14.5	--
APR. 15.....	1.7	3	--	JUNE 22.....	.1	22	--
APR. 20.....	1.1	3.5	--	JUNE 30.....	.9	15.5	--
APR. 27.....	.4	4	--	SEPT. 01.....	.1	21	--
MAY 19.....	2.3	3.5	160	OCT. 06.....	.3	11.5	460

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

05127220 BURGO CREEK NEAR ELY, MINN.

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
SEPT. 24, 1970...	7.9	13.5	--
OCT. 28.....	17	5	--
JAN. 06, 1971...	.7	0	--
FEB. 10.....	.3	0	--
MAR. 19.....	.2	0	--
APR. 13.....	49	3	<50
APR. 14.....	38	.5	--
APR. 15.....	30	1	--
APR. 17.....	62	2	--
MAY 19.....	.7	7.5	75
JUNE 18.....	30	17.5	--
JUNE 23.....	3.0	18	--
AUG. 05.....	.1	14.5	--
SEPT. 01.....	.2	14.5	180
OCT. 06.....	3.8	10	85

05127230 SHAGAWA RIVER AT ELY, MINN.

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
SEPT. 23, 1970...	61	17.5	--
OCT. 28.....	183	6	--
JAN. 06, 1971...	77	.5	70
FEB. 10.....	55	0	65
MAR. 22.....	52	1	75
APR. 09.....	64	1	--
APR. 13.....	118	3	<50
APR. 20.....	353	3.5	--
MAY 20	177	10	70
JUNE 23.....	191	21	--
JULY 21.....	71	22.5	--
SEPT. 01.....	26	21	--
OCT. 06.....	36	13	83

05127500 BASSWOOD RIVER NEAR WINTON, MINN.

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
AUG. 26, 1970...	407	22.5	80
MAR. 17, 1971...	795	0	55
MAY 04.....	7160	4.5	--
JULY 20.....	1900	23	--
SEPT. 02.....	477	20.5	180
OCT. 12.....	768	14.5	60

05129000 VERMILION RIVER BELOW VERMILION LAKE NEAR TOWER, MINN.

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
SEPT. 25, 1970...	89	15	--
OCT. 30.....	435	7	--
JAN. 08, 1971...	316	.5	90
FEB. 12.....	218	0	65
MAR. 23.....	151	1	80
APR. 10.....	216	1.5	--
APR. 16.....	420	4	--
APR. 27.....	1290	4.5	--
MAY 20.....	862	10	70
JUNE 24.....	893	19	--
AUG. 12.....	173	23	--
SEPT. 03.....	153	22.5	120
OCT. 08.....	209	12	--

05130500 STURGEON RIVER NEAR CHISHOLM, MINN.

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
SEPT. 28, 1970...	20	14.5	--
OCT. 30.....	189	5	--
DEC. 11.....	64	0	100
JAN. 11, 1971...	30	0	--
MAR. 24.....	34	0	160
APR. 16.....	1190	3	--
APR. 21.....	1470	4	--
MAY 21.....	293	8	100
JUNE 25.....	415	17.5	--
AUG. 10.....	35	23	--
SEPT. 03.....	27	24.5	--
OCT. 14.....	56	7.5	115

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
05131500 LITTLE FORK RIVER AT LITTLEFORK, MINN.							
SEPT. 28, 1970...	252	14.5	200	APR. 19.....	14400	5	72
NOV. 03.....	3560	6	--	APR. 21.....	14300	6.5	--
DEC. 07.....	914	0	--	MAY 24.....	5720	12	--
JAN. 12, 1971...	222	0	210	JUNE 28.....	1970	19	--
FEB. 18.....	132	0	240	JULY 27.....	260	19.5	--
MAR. 22.....	157	0	220	SEPT. 07.....	238	20	--
APR. 15.....	6980	4	--	OCT. 12.....	984	9	110
05132000 BIG FORK RIVER AT BIG FALLS, MINN.							
SEPT. 28, 1970...	314	8.5	<50	APR. 19.....	6250	5	80
NOV. 02.....	1820	7	--	APR. 22.....	5030	6.5	--
DEC. 15.....	449	0	--	MAY 24.....	2940	11	--
JAN. 11, 1971...	244	0	180	JULY 26.....	272	17.5	--
FEB. 19.....	172	0	300	SEPT. 07.....	262	18	--
MAR. 22.....	145	0	--	OCT. 12.....	540	7.5	170
APR. 15.....	4630	4	--				
05133500 RAINY RIVER AT MANITOU RAPIDS, MINN.							
NOV. 03, 1970...	31900	7	--	JULY 29.....	12200	17.5	--
FEB. 18, 1971...	11800	0	--	OCT. 13.....	11800	8.5	85
MAY 25.....	27300	8.5	--				
05134200 RAPID RIVER NEAR BAUDETTE, MINN.							
SEPT. 29, 1970...	17	12	290	APR. 15.....	1000	2	--
DEC. 08.....	57	0	--	APR. 19.....	1520	7.5	170
JAN. 13, 1971...	15	0	240	MAY 25.....	1190	9.0	--
FEB. 22.....	9.5	0	410	JULY 29.....	160	17.5	--
MAR. 23.....	14	0	420	SEPT. 08.....	74	16	--
APR. 13.....	1420	.5	120	OCT. 13.....	582	6.5	110
05139500 WARROAD RIVER NEAR WARROAD, MINN.							
SEPT. 29, 1970...	5.0	12	330	APR. 14.....	368	2	--
NOV. 05.....	104	4	--	MAY 25.....	114	11	--
DEC. 08.....	8.4	0	--	JUNE 29.....	26	19.5	--
JAN. 13, 1971...	5.2	0	520	AUG. 03.....	7.5	16.5	--
FEB. 23.....	1.4	1	460	SEPT. 08.....	.3	16	--
MAR. 24.....	3.3	0	450	OCT. 15.....	11	6.5	180
APR. 08.....	266	3	--				
05140000 BULLDOG RUN NEAR WARROAD, MINN.							
APR. 08, 1971...	128	4	--	APR. 20.....	6.8	8	540
APR. 10.....	38	6	--	MAY 25.....	3.6	11	--
APR. 14.....	7.9	2	--	JUNE 29.....	2.8	17.5	--

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DATE	DISCHARGE (CFS)	TEMPERA-TURE (°C)	SPECIFIC CONDUC-TANCE (MICRO-MHOS)	DATE	DISCHARGE (CFS)	TEMPERA-TURE (°C)	SPECIFIC CONDUC-TANCE (MICRO-MHOS)
05140500 EAST BRANCH WARROAD RIVER NEAR WARROAD, MINN.							
SEPT. 29, 1970...	.8	12	500	APR. 14.....	151	2.5	--
NOV. 05.....	53	4	--	APR. 20.....	134	8	215
DEC. 08.....	5.6	0	--	MAY 25.....	89	10.5	--
JAN. 13, 1971...	3.0	0	390	JUNE 29.....	14	19.5	--
FEB. 22.....	2.1	0	450	AUG. 02.....	7.1	16.5	--
MAR. 24.....	3.8	0	--	SEPT. 08.....	.5	17	--
APR. 08.....	72	3	--	OCT. 15.....	8.9	6.5	350
05211000 MISSISSIPPI RIVER AT GRAND RAPIDS, MINN.							
SEPT. 18, 1970...	257	13	--	APR. 19.....	3420	4.5	--
OCT. 26.....	294	11	295	MAY 04.....	923	12	--
NOV. 23.....	1380	1	--	MAY 28.....	1060	17	--
DEC. 31.....	1490	1	--	JUNE 11.....	289	20.5	--
FEB. 12, 1971...	1790	1.5	265	JULY 06.....	689	18.5	--
MAR. 16.....	1850	1	--	AUG. 16.....	189	24	316
APR. 13.....	3230	2.5	--	SEPT. 20.....	238	17	310
APR. 16.....	2980	4.5	220	OCT. 15.....	1310	11	300
05212700 PRAIRIE RIVER NEAR TACONITE, MINN.							
SEPT. 17, 1970...	23	11	--	APR. 22.....	2420	7	--
OCT. 16.....	87	5.5	160	APR. 30.....	1020	6.5	--
DEC. 03.....	124	1	--	JULY 06.....	360	22	--
DEC. 31.....	87	0	--	JULY 09.....	259	21.5	--
FEB. 09, 1971...	71	.5	170	AUG. 12.....	53	24.5	172
MAR. 16.....	86	0	--	SEPT. 17.....	53	13	180
APR. 07.....	105	1	180	OCT. 15.....	99	4.5	160
APR. 19.....	2200	4.5	--				
05216860 SWAN RIVER NEAR CALUMET, MINN.							
SEPT. 17, 1970...	2.2	10	--	APR. 23.....	470	4.5	--
OCT. 19.....	52	9	230	APR. 30.....	199	6	--
NOV. 19.....	73	1	--	JUNE 04.....	104	17.5	205
DEC. 30.....	38	1	--	JULY 06.....	98	22	--
FEB. 05, 1971...	31	1	--	AUG. 12.....	18	22.5	238
MAR. 15.....	37	1	--	SEPT. 17.....	25	13.5	230
APR. 05.....	40	.5	--	OCT. 15.....	57	5	220
APR. 14.....	377	2.5	--				

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
05220500 MISSISSIPPI RIVER NEAR LIBBY, MINN.							
SEPT. 18, 1970...	426	12	--	APR. 12.....	4500	1.5	--
OCT. 14.....	632	7	290	APR. 21.....	7710	5	--
NOV. 20.....	2200	1	--	JUNE 02.....	2930	17	--
DEC. 30.....	1990	1	--	AUG. 09.....	590	23.5	276
FEB. 01, 1971...	1880	0	--	SEPT. 13.....	484	19	325
APR. 05.....	2760	0	300	OCT. 20.....	1870	10	--
05227500 MISSISSIPPI RIVER AT AITKIN, MINN.							
SEPT. 14, 1970...	412	14.5	285	APR. 13.....	5120	2.5	--
OCT. 14.....	745	7.5	320	APR. 16.....	6050	5	--
NOV. 16.....	2670	2	--	APR. 20.....	6280	4	--
DEC. 28.....	2200	0	--	JUNE 01.....	3600	17	--
FEB. 02, 1971...	1900	0	--	AUG. 09.....	815	24.5	264
MAR. 09.....	1620	0	--	SEPT. 13.....	649	20	360
APR. 06.....	1960	0	320	OCT. 18.....	1890	5.5	290
05244000 CROW WING RIVER AT NIMROD, MINN.							
AUG. 31, 1970...	254	21	--	APR. 12.....	1130	7	--
OCT. 05.....	308	12	--	APR. 26.....	805	8.5	--
NOV. 02.....	508	5	--	JUNE 07.....	474	19.5	--
DEC. 14.....	355	0	340	JULY 12.....	397	22	--
JAN. 18, 1971...	220	0	--	AUG. 16.....	408	21	--
MAR. 29.....	430	0	350	OCT. 26.....	616	10	320
05270500 SAUK RIVER NEAR ST. CLOUD, MINN.							
SEPT. 30, 1970...	49	15	460	MAY 13.....	351	17.5	420
NOV. 03.....	153	4	485	JUNE 14.....	316	25	610
DEC. 09.....	156	0	613	JULY 30.....	241	18	420
JAN. 11, 1971...	66	0	760	AUG. 26.....	96	22.5	370
FEB. 16.....	78	0	655	SEPT. 29.....	133	15.5	400
MAR. 23.....	225	0	790	OCT. 27.....	430	13	420
APR. 06.....	1780	2	340				
05275000 ELK RIVER NEAR BIG LAKE, MINN.							
AUG. 24, 1970...	60	29	290	MAY 13.....	335	14	305
OCT. 01.....	79	16	285	JUNE 14.....	292	24	380
NOV. 02.....	220	5.5	350	JULY 30.....	160	19	--
DEC. 09.....	177	0	466	AUG. 27.....	78	22	300
FEB. 16, 1971...	114	0	466	SEPT. 30.....	123	14	325
MAR. 22.....	176	0	365	OCT. 28.....	376	9	290
APR. 06.....	1100	2	230				

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
05278000 MIDDLE FORK CROW RIVER NEAR SPICER, MINN.							
SEPT. 09, 1970...	3.5	19	--	MAY 04.....	127	11	400
OCT. 13.....	2.8	9	--	JUNE 08.....	127	19	400
NOV. 17.....	17	8	--	JULY 13.....	183	20	360
DEC. 15.....	13	.5	390	AUG. 05.....	84	20	380
JAN. 18, 1971...	12	1	220	SEPT. 02.....	36	12	--
FEB. 17.....	16	6.5	520	OCT. 19.....	39	11	380
MAR. 25.....	85	3	--				
05279000 SOUTH FORK CROW RIVER NEAR MAYER, MINN.							
SEPT. 14, 1970...	10	12	--	FEB. 17.....	28	8	1200
OCT. 14.....	140	8	--	JULY 22.....	810	22	--
NOV. 13.....	1080	3	--	AUG. 06.....	173	20	725
NOV. 18.....	1220	9	--	SEPT. 22.....	49	17	--
DEC. 16.....	150	2.5	--	OCT. 19.....	73	12.5	875
JAN. 19, 1971...	39	1	700				
05280000 CROW RIVER AT ROCKFORD, MINN.							
SEPT. 28, 1970...	89	17.5	--	MAR. 02.....	120	0	710
OCT. 28.....	220	10	770	MAR. 30.....	3510	.5	--
NOV. 13.....	1630	3.5	575	APR. 01.....	4070	2.5	310
DEC. 15.....	562	2	530	APR. 28.....	1990	9	450
DEC. 30.....	219	0	760	JUNE 28.....	1230	23.5	732
JAN. 19, 1971...	133	1	400	JULY 28.....	1390	20	500
JAN. 27.....	130	.5	--	AUG. 30.....	227	20.5	480
FEB. 16.....	126	0	660	SEPT. 28.....	218	15	--
FEB. 25.....	146	1	650	OCT. 28.....	672	11	--
05286000 RUM RIVER NEAR ST. FRANCIS, MINN.							
SEPT. 01, 1970...	182	19	295	APR. 06.....	2150	1	193
OCT. 02.....	181	13	335	JUNE 14.....	636	22	310
NOV. 02.....	397	5.5	320	AUG. 02.....	352	20	--
DEC. 09.....	355	0	434	AUG. 27.....	211	23	275
JAN. 11, 1971...	183	0	340	SEPT. 30.....	265	15.5	280
FEB. 15.....	191	0	466	OCT. 28.....	809	11	230
MAR. 22.....	498	0	392				
05288500 MISSISSIPPI RIVER NEAR ANOKA, MINN.							
SEPT. 27, 1970...	1800	13	--	JUNE 09.....	9710	17	460
OCT. 28.....	4650	10	404	JULY 08.....	10000	24	--
MAR 29, 1971...	10500	0	300	OCT. 13.....	4920	11.5	330
APR. 15.....	35700	9.5	260				

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
05290000 LITTLE MINNESOTA RIVER NEAR PEEVER, S. DAK.							
SEPT. 14, 1970...	.1	11	1340	APR. 26.....	11	9.5	1630
OCT. 19.....	.3	9	1445	JUNE 02.....	184	13	--
NOV. 16.....	2.1	2	1455	JULY 06.....	114	26	1040
DEC. 22.....	.2	0	--	AUG. 10.....	2.5	25.5	1200
MAR. 29, 1971...	133	.5	580	SEPT. 13.....	.8	21	1585
APR. 06.....	63	.5	340	OCT. 21.....	3.2	9	1710
APR. 12.....	40	9	940				
05291000 WHETSTONE RIVER NEAR BIG STONE CITY, S. DAK.							
SEPT. 14, 1970...	3.6	11	1050	APR. 12.....	31	9	880
OCT. 19.....	3.3	8	905	APR. 26.....	16	11	1210
NOV. 16.....	11	1	1030	JULY 06.....	97	24	1140
DEC. 21.....	4.0	0	1510	AUG. 10.....	6.3	24	980
JAN. 20, 1971...	4.0	0	1285	SEPT. 13.....	4.5	21	1250
FEB. 25.....	10	0	940	OCT. 18.....	17	12	1450
MAR. 24.....	76	.5	530				
05292000 MINNESOTA RIVER AT ORTONVILLE, MINN.							
OCT. 20, 1970...	8.8	9	995	APR. 27.....	53	10	1160
NOV. 17.....	16	2	1175	JUNE 02.....	86	13	--
DEC. 22.....	13	.5	1285	JULY 06.....	241	24	985
JAN. 20, 1971...	11	.5	1305	AUG. 10.....	66	23	780
FEB. 22.....	14	0	1040	SEPT. 14.....	74	19	1200
MAR. 29.....	178	2.5	890	OCT. 18.....	10	14	1400
05293000 YELLOW BANK RIVER NEAR ODESSA, MINN.							
SEPT. 14, 1970...	1.4	10.5	960	APR. 06.....	72	2	600
OCT. 19.....	4.5	7	950	APR. 26.....	40	10.5	980
NOV. 16.....	55	0	950	JULY 06.....	141	22	905
DEC. 21.....	7.6	0	1280	AUG. 10.....	5.6	23	--
JAN. 18, 1971...	5.1	0	1285	SEPT. 14.....	2.7	16.5	1090
FEB. 23.....	23	0	530	OCT. 18.....	36	11	1045
05294000 POMME DE TERRE RIVER AT APPLETON, MINN.							
SEPT. 15, 1970...	23	11	940	APR. 26.....	131	10	900
OCT. 20.....	28	10	815	JUNE 01.....	88	13.5	--
NOV. 11.....	89	1.5	725	JULY 07.....	127	23	985
DEC. 21.....	27	0	1170	AUG. 10.....	32	25	900
JAN. 18, 1971...	18	0	1335	SEPT. 14.....	45	18	1050
FEB. 22.....	19	0	1130	OCT. 19.....	90	13	1035
MAR. 29.....	374	.5	380				

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
05300000 LAC QUI PARLE RIVER NEAR LAC QUI PARLE, MINN.							
SEPT. 21, 1970...	23	18	785	FEB. 24.....	46	0	--
OCT. 22.....	55	10	1350	APR. 29.....	252	11	1580
NOV. 19.....	365	1.5	1350	JUNE 04.....	113	19	--
DEC. 16.....	85	0	1600	AUG. 11.....	17	21	1120
JAN. 22, 1971...	19	--	1880	OCT. 20.....	16	9.5	1605
05301000 MINNESOTA RIVER NEAR LAC QUI PARLE, MINN.							
SEPT. 21, 1970...	39	18	1045	APR. 29.....	633	11	990
OCT. 22.....	50	10	1265	JUNE 04.....	335	16	--
NOV. 19.....	1080	2	1085	JULY 07.....	1280	23.5	1070
DEC. 17.....	210	.5	--	AUG. 11.....	58	23.5	860
JAN. 20, 1971...	197	1	1190	SEPT. 16.....	117	17	950
FEB. 24.....	184	.5	840	OCT. 20.....	166	12	985
MAR. 26.....	2400	1.5	550				
05304500 CHIPPEWA RIVER NEAR MILAN, MINN.							
SEPT. 16, 1970...	37	10	840	APR. 28.....	447	7	740
OCT. 21.....	70	9	770	JUNE 03.....	747	15	--
NOV. 18.....	417	2	815	JULY 09.....	920	21	715
DEC. 17.....	83	0	1100	AUG. 11.....	106	23.5	700
JAN. 22, 1971...	34	0	--	SEPT. 15.....	70	16	850
FEB. 24.....	41	0	690	OCT. 19.....	250	13	765
05311000 MINNESOTA RIVER AT MONTEVIDEO, MINN.							
SEPT. 21, 1970...	63	21	765	MAR. 25.....	3160	1	--
OCT. 21.....	115	10	1085	JUNE 04.....	952	18	--
DEC. 16.....	394	0	1190	AUG. 12.....	163	22	820
JAN. 21, 1971...	229	0	1190	SEPT. 15.....	166	18	985
FEB. 23.....	208	0	840	OCT. 20.....	190	12	1270
MAR. 22.....	3120	.5	590				
05311400 SOUTH BRANCH YELLOW MEDICINE RIVER NEAR MINNEOTA, MINN.							
SEPT. 30, 1970...	.2	19	1355	MAY 19.....	4.7	10	1280
NOV. 05.....	7.1	7	1450	JUNE 23.....	9.0	25	1245
DEC. 15.....	4.9	0	1480	JUNE 29.....	182	19	1035
JAN. 13, 1971...	1.2	0	1630	JULY 28.....	4.0	19	1300
FEB. 18.....	84	1	355	OCT. 06.....	.2	14	1505
FEB. 20.....	30	.5	800				

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
05313500 YELLOW MEDICINE RIVER NEAR GRANITE FALLS, MINN.							
SEPT. 28, 1970...	12	12	1355	APR. 14.....	100	8	1295
NOV. 02.....	94	4.5	2000	MAY 17.....	54	17	1600
DEC. 09.....	88	0	2000	JUNE 21.....	69	22	1810
JAN. 11, 1971...	17	0	1980	JULY 26.....	69	19	1505
FEB. 16.....	11	0	1435	OCT. 04.....	4.1	13	1380
05315000 REDWOOD RIVER AT MARSHALL, MINN.							
SEPT. 30, 1970...	3.7	15	1405	MAR. 18.....	128	.5	430
NOV. 04.....	12	3.5	1265	MAY 19.....	13	10	1280
DEC. 15.....	8.4	0	1670	JUNE 23.....	64	21	1280
JAN. 13, 1971...	3.1	0	1780	JULY 28.....	16	--	1085
FEB. 18.....	112	1	680	OCT. 06.....	2.7	13	1505
05316500 REDWOOD RIVER NEAR REDWOOD FALLS, MINN.							
NOV. 02, 1970...	76	4.5	1900	MAY 17.....	46	--	1480
DEC. 09.....	75	0	2000	JUNE 07.....	172	20	--
FEB. 16, 1971...	10	0	1380	JUNE 21.....	197	23	1505
APR. 14.....	111	9	1285	JULY 26.....	77	21.5	1200
05316770 MINNESOTA RIVER AT NEW ULM, MINN.							
SEPT. 24, 1970...	177	17	--	APR. 24.....	2510	14	--
OCT. 30.....	664	5	--	MAY 28.....	1260	13	950
NOV. 13.....	3930	9	--	JUNE 25.....	2110	22	900
JAN. 14, 1971...	573	1	--	SEPT. 09.....	252	20	--
FEB. 12.....	540	0	1450	OCT. 12.....	278	10	805
MAR. 22.....	8140	0	--				
05317000 COTTONWOOD RIVER NEAR NEW ULM, MINN.							
SEPT. 25, 1970...	68	14	--	MAY 27.....	385	17	975
OCT. 30.....	162	6	--	MAY 28.....	312	14	1000
JAN. 13, 1971...	83	2	--	JUNE 24.....	682	29	950
FEB. 11.....	60	0	1550	SEPT. 09.....	30	18	745
MAR. 19.....	2780	1	--	OCT. 12.....	25	8	715
APR. 23.....	465	15	--				
05320000 BLUE EARTH RIVER NEAR RAPIDAN, MINN.							
SEPT. 23, 1970...	111	18	--	FEB. 10.....	231	0	--
OCT. 28.....	636	9	850	AUG. 06.....	174	23	--
DEC. 04.....	1040	2	--	SEPT. 10.....	57	22.5	795
JAN. 11, 1971...	319	2	460	OCT. 01.....	54	13	945

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DATE	DISCHARGE (CFS)	TEMPERA-TURE (°C)	SPECIFIC CONDUC-TANCE (MICRO-MHOS)	DATE	DISCHARGE (CFS)	TEMPERA-TURE (°C)	SPECIFIC CONDUC-TANCE (MICRO-MHOS
05320500 LE SUEUR RIVER NEAR RAPIDAN, MINN.							
SEPT. 23, 1970...	108	15.5	--	AUG. 06.....	87	18	--
OCT. 28.....	535	9.5	800	SEPT. 10.....	31	22	645
JAN. 12, 1971...	85	1	380	OCT. 13.....	19	13	745
FEB. 10.....	42	0	800				
05325000 MINNESOTA RIVER AT MANKATO, MINN.							
SEPT. 24, 1970...	536	15	--	MAR. 19.....	20400	2	424
OCT. 29.....	2210	8	--	APR. 23.....	5350	14	--
NOV. 13.....	11000	4.5	--	MAY 27.....	4720	13.5	830
DEC. 03.....	4650	2	--	JUNE 24.....	4920	27	725
JAN. 13, 1971...	1020	2	975	SEPT. 10.....	448	19	855
FEB. 11.....	665	0	1400	OCT. 13.....	404	10	945
05330000 MINNESOTA RIVER NEAR JORDAN, MINN.							
SEPT. 26, 1970...	696	15	--	FEB. 02.....	1040	.5	--
OCT. 28.....	2520	11	--	MAR. 23.....	23900	.5	355
NOV. 13.....	11200	6	860	JUNE 08.....	7630	19.5	825
JAN. 02, 1971...	2300	.5	--	OCT. 20.....	580	14	800
05330900 NINE MILE CREEK AT BLOOMINGTON, MINN..							
SEPT. 15, 1970...	14	11.5	--	MAR. 24.....	80	5	--
OCT. 19.....	12	11	--	APR. 26.....	18	15	--
NOV. 09.....	90	5	--	JUNE 01.....	25	13.5	690
DEC. 18.....	10	4	--	JULY 07.....	52	22	250
JAN. 27, 1971...	6.8	1	420	AUG. 10.....	17	20	--
FEB. 18.....	10	1	--	SEPT. 17.....	6.7	19	--
MAR. 23.....	75	4	--	OCT. 15.....	13	10	650
05331000 MISSISSIPPI RIVER AT ST. PAUL, MINN.							
OCT. 30, 1970...	7230	11.5	378	JULY 07.....	21800	24	420
MAR. 30, 1971...	37200	2.5	539	JULY 23.....	12600	25	545
APR. 12.....	51800	6.5	--				
05336700 KETTLE RIVER BELOW SANDSTONE, MINN.							
SEPT. 28, 1970...	108	13	225	MAY 13.....	600	13	120
NOV. 05.....	732	4	160	JUNE 16.....	485	24	160
DEC. 10.....	424	0	130	JULY 28.....	195	18	170
FEB. 17, 1971...	156	1	266	AUG. 24.....	598	22.5	130
MAR. 25.....	245	0	305	SEPT. 27.....	140	14	175
APR. 07.....	950	2	182	OCT. 26.....	740	11	155
APR. 15.....	7410	6	90				

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
05338500 SNAKE RIVER NEAR PINE CITY, MINN.							
SEPT. 28, 1970...	75	18	260	MAY 13.....	547	17	160
DEC. 11.....	273	.5	266	JUNE 17.....	470	24	400
JAN. 13, 1971...	88	0	372	JULY 27.....	153	21	200
FEB. 18.....	120	1	340	AUG. 25.....	84	21.5	230
MAR. 26.....	282	1	340	SEPT. 28.....	84	13	225
APR. 07.....	1680	2	193	OCT. 27.....	833	12.5	275
05340050 SUNRISE RIVER NEAR LINDSTROM, MINN.							
SEPT. 28, 1970...	5.0	16	280	MAY 14.....	206	15.5	275
NOV. 05.....	128	7	340	JUNE 17.....	95	25	--
DEC. 11.....	106	1	372	JULY 27.....	35	19.5	340
JAN. 13, 1971...	49	0	466	AUG. 24.....	91	22	330
FEB. 18.....	40	0	466	SEPT. 27.....	9.3	13.5	370
APR. 07.....	290	5	288	OCT. 27.....	49	13.5	365
05353800 STRAIGHT RIVER NEAR FARIBAULT, MINN.							
SEPT. 21, 1970...	86	20.5	--	APR. 19.....	263	11	--
OCT. 26.....	199	15	680	APR. 20.....	328	15.5	--
DEC. 01.....	270	3	--	MAY 24.....	673	12.5	570
JAN. 05, 1971...	113	2	760	JUNE 28.....	210	24	700
FEB. 08.....	44	0	950	AUG. 05.....	46	22.5	650
MAR. 16.....	1870	2	--	SEPT. 13.....	28	19	785
APR. 01.....	2400	3	--	OCT. 15.....	26	9	845
APR. 07.....	853	5	--				
05355200 CANNON RIVER AT WELCH, MINN.							
SEPT. 16, 1970...	205	12.5	--	FEB. 23.....	447	8	600
OCT. 16.....	862	11	--	JULY 19.....	357	22	--
NOV. 23.....	1090	5	--	AUG. 10.....	242	19	--
DEC. 17.....	729	3.5	--	SEPT. 23.....	269	12.5	--
JAN. 25, 1971...	395	1	--	OCT. 22.....	223	12	580
05373000 SOUTH FORK ZUMBRO RIVER NEAR ROCHESTER, MINN.							
SEPT. 23, 1970...	67	19	740	APR. 23.....	281	12	640
OCT. 30.....	276	9	530	JUNE 03.....	181	23	615
DEC. 04.....	185	5.5	605	JULY 02.....	137	26	610
JAN. 11, 1971...	101	4	700	AUG. 06.....	100	23	670
FEB. 11.....	68	7	800	SEPT. 14.....	89	23.5	705
MAR. 31.....	2560	6	340	OCT. 15.....	71	17.5	780

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)	DATE	DISCHARGE (CFS)	TEMPERATURE (°C)	SPECIFIC CONDUCTANCE (MICROMHOS)
05374000 ZUMBRO RIVER AT ZUMBRO FALLS, MINN.							
SEPT. 23, 1970...	174	15	540	MAR. 31.....	7450	3.5	--
OCT. 30.....	1120	10	540	JUNE 03.....	246	19.5	536
DEC. 04.....	857	2.5	600	JUNE 28.....	937	23	--
JAN. 11, 1971...	160	.5	600	AUG. 02.....	198	15	500
FEB. 08.....	131	1	525	SEPT. 14.....	175	16	515
MAR. 10.....	255	2.5	565	OCT. 19.....	166	14.5	550
MAR. 30.....	4660	3.5	360				
05376500 SOUTH FORK WHITEWATER RIVER NEAR ALTURA, MINN.							
SEPT. 24, 1970...	18	13	500	APR. 01.....	256	2	300
OCT. 28.....	59	10	395	APR. 22.....	57	13	545
DEC. 02.....	43	3.5	485	MAY 27.....	61	11	500
JAN. 12, 1971...	19	0	465	JULY 01.....	34	21.5	470
FEB. 10.....	13	0	455	AUG. 05.....	22	12	500
MAR. 30.....	127	5.5	340	SEPT. 10.....	34	14	585
MAR. 31.....	927	1	155	OCT. 13.....	18	8.5	475
05378300 STRAIGHT VALLEY CREEK NEAR ROLLINGSTONE, MINN.							
AUG. 11, 1970...	1.1	17.7	535	MAY 26.....	1.9	12	--
OCT. 28.....	1.9	10.5	560	JULY 01.....	1.3	17.5	510
DEC. 03.....	1.5	5.5	575	AUG. 04.....	1.2	15.5	555
JAN. 12, 1971...	1.1	.5	520	AUG. 19.....	1.2	16	550
FEB. 10.....	1.3	4	490	OCT. 12.....	1.1	8.5	550
MAR. 15.....	3.1	4	--				
05378500 MISSISSIPPI RIVER AT WINONA, MINN.							
SEPT. 23, 1970...	11300	19	335	JUNE 02.....	56500	15.5	325
APR. 14, 1971...	113000	17.5	327	JULY 08.....	34900	24.5	420
05384000 ROOT RIVER NEAR LANESBORO, MINN.							
SEPT. 23, 1970...	155	17	465	APR. 21.....	512	12	550
OCT. 26.....	286	12	495	MAY 25.....	497	11	435
DEC. 02.....	376	3	520	JUNE 29.....	248	27.5	440
JAN. 20, 1971...	162	.5	553	AUG. 03.....	178	19.5	440
FEB. 08.....	153	0	445	SEPT. 08.....	145	21	565
MAR. 17.....	1680	--	319	OCT. 14.....	139	11.5	460
05384500 RUSH CREEK NEAR RUSHFORD, MINN.							
SEPT. 23, 1970...	40	13	505	MAY 25.....	70	10	415
DEC. 01.....	39	6	575	JULY 01.....	42	16.5	455
FEB. 09, 1971...	30	0	475	AUG. 04.....	40	13.5	440
APR. 01.....	128	2.5	280	NOV. 09.....	38	5.5	555
APR. 21.....	64	13.5	480				

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DATE	DISCHARGE (CFS)	TEMPERA-TURE (°C)	SPECIFIC CONDUC-TANCE (MICRO-MHOS)	DATE	DISCHARGE (CFS)	TEMPERA-TURE (°C)	SPECIFIC CONDUC-TANCE (MICRO-MHOS)
05385000 ROOT RIVER NEAR HOUSTON, MINN.							
SEPT. 24, 1970...	400	15	500	APR. 22.....	1020	12	550
OCT. 27.....	597	12	480	MAY 26.....	979	10.5	485
DEC. 01.....	624	5.5	505	JUNE 30.....	549	25	490
JAN. 13, 1971...	397	0	--	AUG. 04.....	419	18.5	475
FEB. 09.....	309	0	525	SEPT. 09.....	388	19	685
APR. 01.....	7820	4	288	OCT. 12.....	330	9.5	445
APR. 02.....	8160	1	250				
05385500 SOUTH FORK ROOT RIVER NEAR HOUSTON, MINN.							
SEPT. 24, 1970...	105	15	550	APR. 22.....	174	12	570
OCT. 27.....	102	12.5	460	MAY 25.....	257	10	340
DEC. 01.....	114	7	500	JUNE 30.....	128	21.5	502
JAN. 13, 1971...	81	0	--	AUG. 03.....	110	19	485
FEB. 09.....	77	0	495	SEPT. 09.....	98	17.5	585
MAR. 31.....	432	9	571	OCT. 12.....	97	9.5	490
05457000 CEDAR RIVER NEAR AUSTIN, MINN.							
SEPT. 22. 1970...	64	17.5	--	APR. 21.....	222	13	--
OCT. 27.....	319	8.5	675	MAY 25.....	233	12	--
DEC. 02.....	188	9	--	JUNE 29.....	106	25	750
JAN. 06, 1971...	64	2	850	AUG. 05.....	59	20	680
FEB. 09.....	69	1	900	SEPT. 13.....	54	25	945
MAR. 31.....	3380	4	--	OCT. 14.....	49	14	1045
05476000 DES MOINES RIVER AT JACKSON, MINN.							
SEPT. 29, 1970...	27.5	16	--	MAY 18.....	188	16	--
NOV. 03.....	178	5	815	JUNE 22.....	793	22	985
DEC. 10.....	266	.5	--	JULY 26.....	295	21.5	1045
JAN. 12, 1971	79	0	1480	AUG. 31.....	37	21	--
FEB. 17.....	16	--	1285	OCT. 05.....	14	16	--
APR. 15.....	906	9.5	--				

WELL NUMBER	DATE OF SAMPLE	SAMPLING DEPTH (FT.)	SILICA (SIO2) (MG/L)	DISSOLVED IRON (FE) (UG/L)	DISSOLVED MANGANESE (MN) (UG/L)	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	SODIUM (NA) (MG/L)	POTASSIUM (K) (MG/L)
BENTON COUNTY									
454031N0940147.1	06-08-71	44	28	7100	540	65	23	7.5	1.6
454031N0940147.2	06-08-71	24	19	140	280	48	15	8.6	1.0
454116N0940710.1	06-08-71	140	15	1400	120	31	11	20	1.8
454736N0940211.1	06-08-71	145	13	100	70	29	14	25	2.1
BLUE EARTH COUNTY									
440645N0935925.1	10-27-70	300	21	3900	10	95	34	53	3.8
441130N0935830.1	10-24-70	830	18	810	0	57	21	33	3.5
441304N0935711.1	10-29-70	155	25	1840	0	57	21	25	4.3
CARVER COUNTY									
444553N0933742.1	11-17-70	174	26	90	220	60	35	19	4.3
COTTONWOOD COUNTY									
440456N0945521.1	10-29-69	248	22	860	0	61	22	61	2.2
DAKOTA COUNTY									
444400N0931440.1	05-24-71	530	17	400	100	74	25	4.6	2.5
HENNEPIN COUNTY									
445512N0932340.1	05-14-71	496	17	820	90	74	31	6.9	1.8
445512N0932340.2	05-14-71	1081	7.2	820	10	43	27	29	6.3
LE SUEUR COUNTY									
442654N0933437.1	11-21-70	712	24	20	10	57	35	80	3.3
442950N0934529.1	11-21-70	348	16	8860	0	49	31	60	3.1
443037N0933957.1	10-27-70	176	25	5570	30	86	20	103	3.8
MORRISON COUNTY									
454557N0943833.1	06-09-71	153	29	4000	70	100	30	11	2.5
455139N0943024.1	06-08-71	28	24	70	0	110	32	30	1.7
455144N0942954.1	06-07-71	134	19	3000	20	37	18	120	4.5
NICOLLET COUNTY									
441817N0935850.2	10-29-70	640	7.9	720	0	82	38	78	9.0
442039N0935814.1	10-28-70	116	29	20	0	77	25	4.2	2.3
RAMSEY COUNTY									
445751N0930728.1	05-24-71	--	7.6	700	40	48	15	17	5.4
450449N0930815.1	05-25-71	--	16	30	210	52	21	6.0	1.9
RICE COUNTY									
443130N0932104.1	11-18-70	221	24	980	10	58	44	21	3.3
SCOTT COUNTY									
443645N0934606.1	10-27-70	180	24	1520	0	59	25	3.6	2.3
444058N0932233.1	11-17-70	170	32	790	500	85	36	6.6	3.7
444244N0932248.1	11-18-70	265	19	430	710	77	23	31	6.7
SIBLEY COUNTY									
443700N0935609.1	10-26-70	569	9.5	1380	8	63	38	32	8.4
444007N0934732.1	10-23-70	463	12	8190	0	75	37	71	5.5
STEARNS COUNTY									
452806N0942728.1	06-04-71	167	21	4400	130	67	24	9.7	1.8
453235N0943957.1	06-04-71	40	21	50	20	89	33	5.3	2.3
453245N0942416.1	06-05-71	77	21	220	150	61	51	11	3.2
453602N0942522.1	06-05-71	226	26	2800	100	74	21	7.0	2.2
454357N0942758.1	06-08-71	96	27	150	60	64	31	11	2.6
TODD COUNTY									
455155N0945359.1	06-05-71	54	13	480	260	83	24	2.0	1.9

WELL NUMBER	DATE OF SAMPLE	BICAR-BONATE (HCO3) (MG/L)	CAR-BONATE (CO3) (MG/L)	ALKA-LINITY AS CACO3 (MG/L)	SULFATE (SO4) (MG/L)	CHLO-RIDE (CL) (MG/L)	DIS-SOLVED FLUO-RIDE (F) (MG/L)	NITRATE (NO3) (MG/L)	DIS-SOLVED BORON (B) (UG/L)
BENTON COUNTY									
454031N0940147.1	06-08-71	333	0	273	9.3	4.5	.2	--	30
454031N0940147.2	06-08-71	116	0	95	17	26	.2	--	10
454116N0940710.1	06-08-71	191	0	157	4.8	1.8	.4	--	20
454736N0940211.1	06-08-71	220	0	180	4.3	.8	.4	--	40
BLUE EARTH COUNTY									
440645N0935925.1	10-27-70	481	0	395	102	1.6	.2	2.8	220
441130N0935830.1	10-24-70	339	0	278	25	1.2	.3	3.6	190
441304N0935711.1	10-29-70	316	0	259	18	1.2	.4	1.5	150
CARVER COUNTY									
444553N0933742.1	11-17-70	332	0	273	62	1.2	.0	4.1	120
COTTONWOOD COUNTY									
440456N0945521.1	10-29-69	361	0	296	29	16	.5	19	330
DAKOTA COUNTY									
444400N0931440.1	05-24-71	346	--	284	6.8	1.2	.2	--	20
HENNEPIN COUNTY									
445512N0932340.1	05-14-71	353	--	290	15	5.5	.1	--	50
445512N0932340.2	05-14-71	247	--	203	35	21	.2	--	190
LE SUEUR COUNTY									
442654N0933437.1	11-21-70	451	0	370	98	1.2	.3	.2	310
442950N0934529.1	11-21-70	325	0	267	116	1.2	.4	4.8	190
443037N0933957.1	10-27-70	560	0	459	51	1.0	.4	11	540
MORRISON COUNTY									
454557N0943833.1	06-09-71	473	0	388	.5	1.1	.3	--	80
455139N0943024.1	06-08-71	408	0	335	54	34	.1	--	280
455144N0942954.1	06-07-71	430	0	353	88	15	.5	--	1300
NICOLLET COUNTY									
441817N0935850.1	10-29-70	224	0	183	199	101	.3	1.2	230
442039N0935814.1	10-28-70	262	0	215	32	13	.1	51	40
RAMSEY COUNTY									
445751N0930728.1	05-24-71	231	--	189	5.5	23	.3	--	40
450449N0930815.1	05-25-71	299	--	245	1.8	.9	.3	--	10
RICE COUNTY									
443130N0932104.1	11-18-70	414	0	339	28	.8	.2	1.1	140
SCOTT COUNTY									
443645N0934606.1	10-27-70	209	0	172	60	14	.2	.1	20
444058N0932233.1	11-17-70	452	0	371	7.5	.9	.3	1.6	40
444244N0932248.1	11-18-70	342	0	280	20	46	.0	.0	110
SIBLEY COUNTY									
443700N0935609.1	10-26-70	295	0	242	133	1.2	.4	.2	280
444007N0934732.1	10-23-70	421	0	345	149	6.6	.3	2.5	310
STEARNS COUNTY									
452806N0942728.1	06-04-71	357	0	293	3.3	.9	.2	--	80
453235N0943957.1	06-04-71	408	0	335	46	2.1	.2	--	50
453245N0942416.1	06-05-71	485	0	398	--	5.7	.2	--	10
453602N0942522.1	06-05-71	352	0	289	3.5	1.5	.2	--	250
454357N0942758.1	06-08-71	392	0	322	28	6.3	.2	--	70
TODD COUNTY									
455155N0945359.1	06-05-71	349	0	286	8.2	3.9	.0	--	0

WELL NUMBER	DATE OF SAMPLE	DISSOLVED SOLIDS (RESIDUE AT 180 C)	HARDNESS (CA,MG) (MG/L)	NON-CARBONATE HARDNESS (MG/L)	SODIUM ADSORPTION RATIO	SPECIFIC CONDUCTANCE (MICROMHOS)	PH	TEMPERATURE (DEG C)	COLOR
BENTON COUNTY									
454031N0940147.1	06-08-71	322	260	0	.2	532	7.5	10.0	20
454031N0940147.2	06-08-71	316	180	86	.3	429	7.4	9.0	4
454116N0940710.1	06-08-71	186	120	0	.8	302	7.9	12.0	8
454736N0940211.1	06-08-71	206	130	0	1.0	337	8.0	11.0	5
BLUE EARTH COUNTY									
440645N0935925.1	10-27-70	560	378	0	1.2	843	7.9	10.0	1
441130N0935830.1	10-24-70	339	230	0	1.0	537	8.1	12.0	2
441304N0935711.1	10-29-70	313	228	0	.7	498	8.2	11.0	5
CARVER COUNTY									
444553N0933742.1	11-17-70	372	293	20	.5	600	8.1	11.0	1
COTTONWOOD COUNTY									
440456N0945521.1	10-29-69	430	243	0	1.7	658	7.8	--	10
DAKOTA COUNTY									
444400N0931440.1	05-24-71	258	290	4	.1	524	7.6	10.0	5
HENNEPIN COUNTY									
445512N0932340.1	05-14-71	306	310	23	.2	581	7.6	11.0	--
445512N0932340.2	05-14-71	288	220	16	.9	501	7.7	12.0	--
LE SUEUR COUNTY									
442654N0933437.1	11-21-70	533	285	0	2.1	809	8.0	9.0	1
442950N0934529.1	11-21-70	542	249	0	1.6	679	7.9	10.0	2
443037N0933957.1	10-27-70	578	297	0	2.6	865	8.0	13.0	5
MORRISON COUNTY									
454557N0943833.1	06-09-71	408	370	0	.2	704	7.6	13.0	7
455139N0943024.1	06-08-71	612	410	72	.6	944	7.4	12.0	5
455144N0942954.1	06-07-71	616	170	0	4.0	969	7.9	11.0	20
NICOLLET COUNTY									
441817N0935850.1	10-29-70	719	361	178	1.8	1040	8.0	10.0	2
442039N0935814.1	10-28-70	419	296	81	.1	588	8.0	11.0	1
RAMSEY COUNTY									
445751N0930728.1	05-24-71	236	180	0	.5	424	7.3	12.0	5
450449N0930815.1	05-25-71	236	220	0	.2	422	7.5	11.0	5
RICE COUNTY									
443130N0932104.1	11-18-70	383	324	0	.5	635	7.9	12.0	2
SCOTT COUNTY									
443645N0934606.1	10-27-70	428	251	80	.1	495	8.2	15.0	1
444058N0932233.1	11-17-70	398	361	0	.2	645	8.1	10.0	1
444244N0932248.1	11-18-70	392	286	5	.8	653	8.2	12.0	4
SIBLEY COUNTY									
443700N0935609.1	10-26-70	510	312	71	.8	772	7.4	11.0	5
444007N0934732.1	10-23-70	580	339	0	1.7	884	7.9	11.0	1
STEARNS COUNTY									
452806N0942728.1	06-04-71	282	270	0	.3	531	7.4	--	--
453235N0943957.1	06-04-71	262	360	23	.1	671	7.3	10.0	--
453245N0942416.1	06-05-71	374	360	0	.3	738	7.5	10.0	--
453602N0942522.1	06-05-71	314	270	0	.2	537	7.6	12.0	--
454357N0942756.1	06-06-71	398	290	0	.3	666	7.6	--	10
TODD COUNTY									
455155N0945359.1	06-05-71	312	310	20	.1	565	7.2	15.0	--

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