

1972

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 1972

OCTOBER 1971

S	M	T	W	T	F	S
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MAY 1972

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SEPTEMBER 1972

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Prepared in cooperation with
Minnesota Department of Natural Resources
Through the Division of Waters, Soils
and Minerals
Pelican River Watershed District
Nine Mile Creek Watershed District
City of Austin
City of Rochester
Erie Mining Company
Eveleth Taconite Company
Hanna Mining Company
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1033 Post Office Building
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WATER RESOURCES DATA FOR MINNESOTA, 1972

Part 1. Surface-Water Records

Part 2. Water-Quality Records

INTRODUCTION

Water resources data for the 1972 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. These data are part of the National Water Data System.

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. Water-quality records beginning with the 1964 water year have been similarly released either in separate reports or in conjunction with streamflow records. These reports are for limited distribution and are designed primarily for rapid release of data shortly after the end of the water year.

Records of discharge and stage of streams, and contents and stage of lakes and reservoirs are published in a series of U.S. Geological Survey water-supply papers entitled, "Surface Water Supply of the United States." Through September 30, 1960, these water-supply papers were in an annual series and since then are in a 5-year series. Records of chemical quality, water temperatures, and suspended sediment have been published since 1941 in an annual series of water-supply papers entitled, "Quality of Surface Waters of the United States." More information is given under the headings "Publications" on pages 17 and 21.

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 Natural Resources, Division of Waters, Soils and Minerals, Eugene R. Gere, director.

Minnesota Department of Highways, 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 37 gaging stations and 3 water-quality 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

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 synthetic detergent compounds.

Micrograms per liter ($\mu\text{g}/\text{l}$, 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.

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

<u>Ion</u>	<u>Multi- ply by</u>	<u>Ion</u>	<u>Multi- ply by</u>
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 concen- tration in 1000 mg/l	Di- vide by	Range of concen- tration in 1000 mg/l	Di- vide by	Range of concen- tration in 1000 mg/l	Di- vide by	Range of concen- tration in 1000 mg/l	Di- vide 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.

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 recommendations 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 is 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).

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,

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.

Pesticide program is a network of regularly sampled water-quality stations where additional monthly samples are collected to determine the concentration and distribution of pesticides in streams whose waters are used for irrigation or in streams in areas where potential contamination could result from the application of the commonly used insecticides and herbicides.

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 indentation, each indentation 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 number consists of 15 digits. The first 6 digits denote the degrees, minutes, and seconds of latitude, the next 7 digits denote the degrees, minutes, and seconds of longitude, and the last 2 digits 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 non-recording 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. Lakewise 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 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 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 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 at pre-determined 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 concentrations 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 reporting data for chemical constituents and concentrations of suspended sediment in milligrams per liter (mg/l) and water temperatures 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. Temperatures reported in degrees Celsius may be converted to degrees Fahrenheit by using the 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

$$^{\circ}\text{C} = 5/9 (^{\circ}\text{F} - 32) \text{ or } ^{\circ}\text{F} = 9/5 (^{\circ}\text{C}) + 32.$$

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 5-6	Water year	Parts 1-4	Parts 3-4	Parts 4-5	Parts 5-6	Part 6
1941	942	---	---	1955	1400	---	---	1401	---
1942	950	---	---	1956	1450	---	---	1451	---
1943	970	---	---	1957	1520	---	---	1521	---
1944	1022	---	---	1958	1571	---	---	1572	---
1945	1030	---	---	1959	---	1642	---	1643	---
1946	1050	---	---	1960	---	1742	---	1743	---
1947	1102	---	---	1961	---	1882	---	1883	---
1948	---	1132	1132	1962	---	1942	---	1943	---
1949	---	1162	1162	1963	---	1948	---	1949	---
1950	---	1186	1187	1964	---	1955	---	1956	---
1951	---	1197	1198	1965	---	1962	---	1963	---
1952	---	1250	1251	1966	---	1992	---	1993	---
1953	---	1290	1291	1967	---	2012	---	2013	---
1954	---	1350	1351	1968	---		2094		2095

HYDROLOGIC CONDITIONS

Annual runoff during the 1972 water year was generally near normal. Streamflow was greater than normal throughout the State in November and December. The October precipitation amounts set new records across the State for this month. During the winter period and continuing through the spring and summer, streamflow returned to normal.

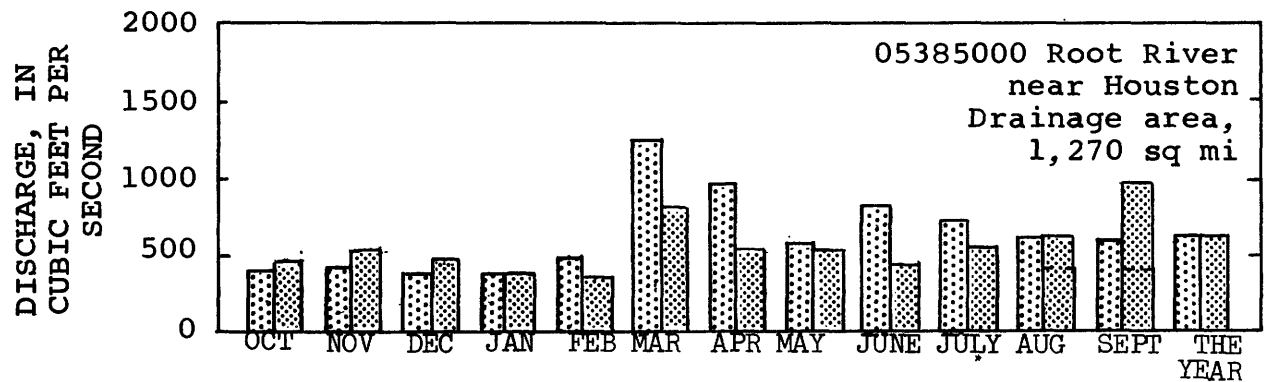
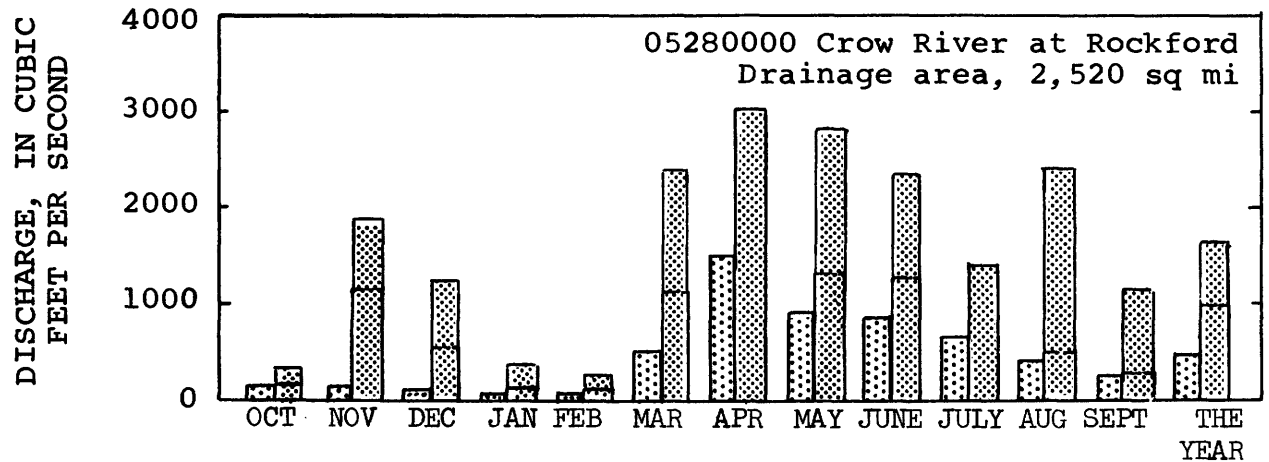
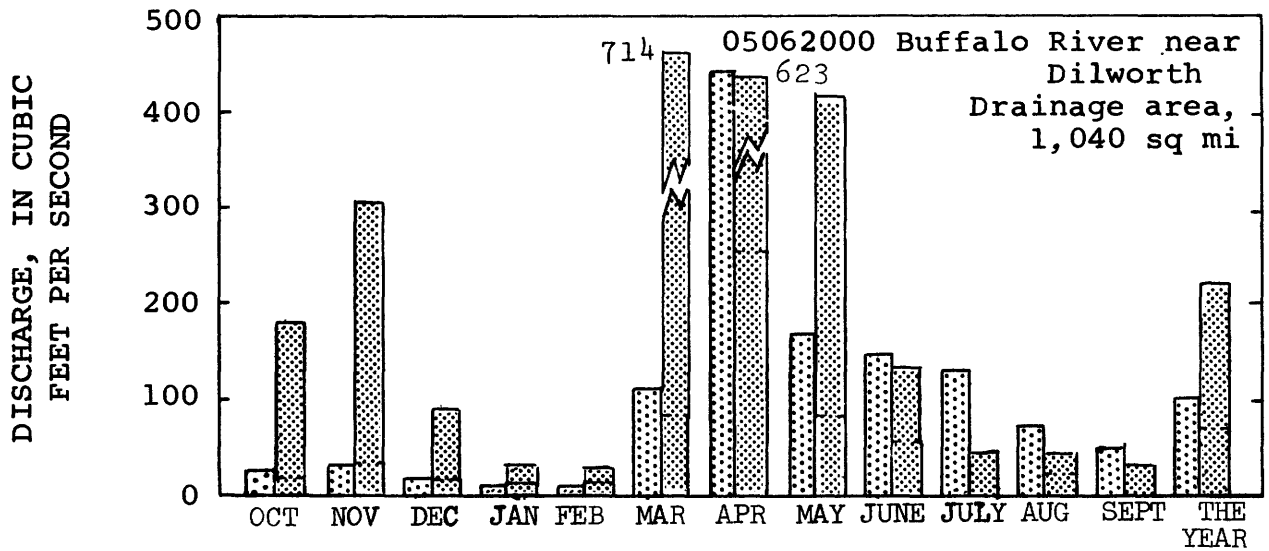
Heavy rainstorms on July 11, 12, 19, 21, 22, 27 and 31 put July's precipitation much above normal. The storm of July 21, 22 yielded the greatest official 24-hour rainfall amount ever recorded in Minnesota and the greatest monetary losses ever experienced in the State for a flash flood. The 24-hour rainfall at Fort Ripley was 10.84 inches, exceeding the previous record 24-hour rainfall for Minnesota of 10.75 inches on July 20, 1909 at Beaulieu.

The city of Duluth experienced extensive flash flood damage twice in August and once in September from heavy rainstorms.

SELECTED REFERENCES

- American Public Health Association, and others, 1971, Standard methods for the examination of water and wastewater, 13th ed.: Am. Public Health Assoc., New York, 874 p.
- Brown, Eugene, Skougstad, M. W., and Fishman, M. J., 1970, Methods for collection and analysis of water samples for dissolved minerals and gases: U.S. Geol. Survey Techniques of Water-Resources Inv., book 5, chap. A1, 160 p.
- Carter, R. W., and Davidian, Jacob, 1968, General procedures for gaging streams: U.S. Geol. Survey Techniques of Water-Resources Inv., book 3, chap. A6, 13 p.
- Colby, B. R., 1963, Fluvial sediments--a summary of source, transportation, deposition, and measurement of sediment discharge: U.S. Geol. Survey Bull. 1181-A, 47 p.
- Colby, B. R., and Hembree, C. H., 1955, Computations of total sediment discharge, Niobrara River near Cody, Nebraska: U.S. Geol. Survey Water-Supply Paper 1357, 187 p.
- Colby, B. R., and Hubbell, D. W., 1961, Simplified methods for computing total sediment discharge with the modified Einstein procedure: U.S. Geol. Survey Water-Supply Paper 1593, 17 p.
- Corbett, D. M., and others, 1943, reprinted 1957, Stream-gaging procedures, a manual describing methods and practices of the Geological Survey: U.S. Geol. Survey Water-Supply Paper 888, 245 p.
- Guy, H. P., 1970, Fluvial sediment concepts: U.S. Geol. Survey Techniques of Water-Resources Inv., book 3, chap. C1, 55 p.
- _____, 1969, Laboratory theory and methods for sediment analysis: U.S. Geol. Survey Techniques of Water-Resources Inv., book 5, chap. C1, 58 p.
- Guy, H. P., and Norman, V. W., 1970, Field methods for measurement of fluvial sediment: U.S. Geol. Survey Techniques of Water-Resources Inv., book 3, chap. C2, 59 p.

- Hem, J. D., 1970, Study and interpretation of the chemical characteristics of natural water - Revised edition: U.S. Geol. Survey Water-Supply Paper 1473, 269 p.
- Langbein, W. B., and Iseri, K. T., 1960, General introduction and hydrologic definitions: U.S. Geol. Survey Water-Supply Paper 1541-A, 29 p.
- Porterfield, George, 1972, Computations of fluvial sediment discharges: U.S. Geol. Survey Techniques of Water Resources Inv., book 3, chap. C3, 66 p.
- Ritter, J. R., and Helley, E. J., 1969, Optical method for determining particle sizes of coarse sediment: U.S. Geol. Survey Techniques of Water-Resources Inv., book 5, chap. C3, 33 p.
- U.S. Inter-Agency Committee on Water Resources, Subcommittee on Sedimentation, A study of methods used in measurement and analysis of sediment loads in streams. Published by the St. Anthony Falls Hydraulic Laboratory, Minneapolis, Minn.
- _____, 1941, Methods of analyzing sediment samples: Rept. 4.
- _____, 1953, Accuracy of sediment size analyses made by the bottom-withdrawal-tube method: Rept. 10.
- _____, 1957, The development and calibration of visual-accumulation tube: Rept. 11.
- _____, 1957; Some fundamentals of particle size analysis: Rept. 12.
- _____, 1959, Federal inter-agency sedimentation instruments and reports: Rept. AA.
- _____, 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 1972 water year.

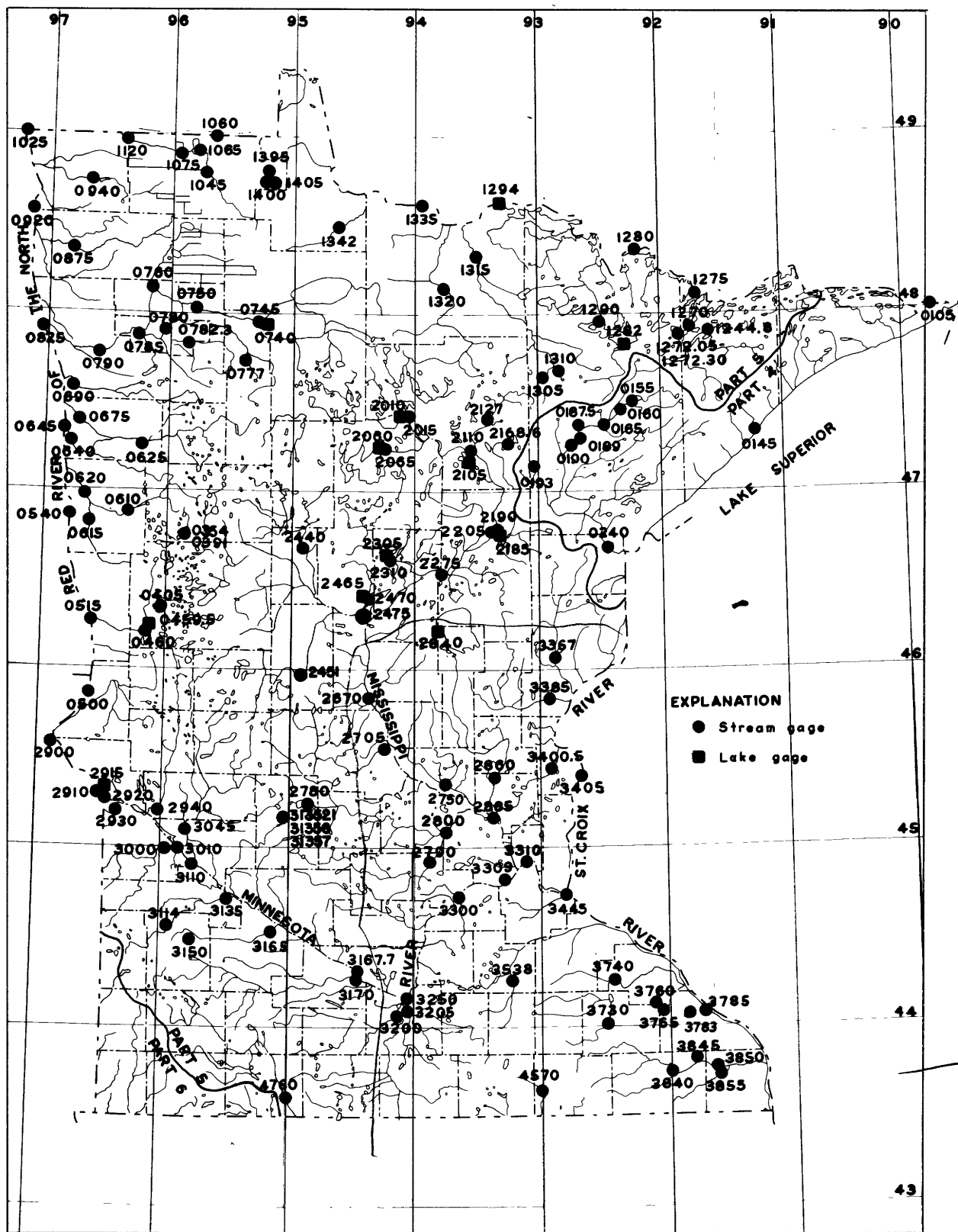


Figure 2.-- Map showing location of lake and stream gaging stations.

PART 1. SURFACE WATER RECORDS

STREAMS TRIBUTARY TO LAKE SUPERIOR

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

(International gaging station)

LOCATION.--Lat 48°00'44", long 89°36'58", in NE 1/4 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; 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.--49 years (1923-72), 502 cfs (11.36 inches per year).

EXTREMES.--Current year: Maximum discharge, 4,830 cfs May 2 (gage height, 7.77 ft); minimum, 107 cfs Sept. 20 (gage height, 0.72 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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	427	2,430	750	500	218	180	200	4,050	1,320	706	399	157
2	556	1,980	780	485	212	180	205	4,680	1,190	670	359	154
3	624	1,730	790	475	205	178	210	4,470	1,100	617	327	147
4	519	1,550	780	465	200	178	210	4,280	1,030	565	306	132
5	459	1,390	765	455	195	178	210	3,930	959	529	284	122
6	453	1,250	753	440	190	175	212	3,980	897	499	267	129
7	393	1,070	724	430	188	175	215	3,930	849	472	252	157
8	375	916	682	420	185	175	225	3,670	801	448	235	155
9	363	910	650	405	185	175	235	3,410	748	435	224	150
10	340	807	646	395	185	175	242	3,200	691	420	216	139
11	312	739	628	380	185	175	255	3,160	692	422	216	131
12	288	704	634	375	183	175	265	3,090	1,180	458	211	123
13	271	666	660	365	183	177	280	2,980	1,470	561	210	129
14	250	737	700	355	180	177	290	2,860	2,310	555	205	134
15	233	1,280	750	345	180	178	305	2,740	2,230	508	198	132
16	222	1,250	793	335	178	178	340	2,580	1,750	466	233	129
17	555	1,170	782	325	178	180	430	2,400	1,430	425	292	128
18	961	1,760	772	315	175	180	510	2,230	1,240	439	288	119
19	1,420	1,780	750	300	175	182	600	2,080	1,290	442	260	113
20	1,450	1,500	730	290	178	182	650	1,940	1,750	426	236	398
21	1,060	1,260	710	280	180	184	700	1,800	1,520	420	228	677
22	1,040	984	690	270	182	184	725	1,660	1,280	667	222	579
23	886	870	670	260	184	186	740	1,550	1,120	919	216	437
24	743	800	648	255	185	188	770	1,460	997	783	208	343
25	651	760	640	250	185	190	810	1,360	920	631	205	295
26	586	740	618	245	183	190	925	1,270	859	537	200	271
27	1,120	720	600	240	183	192	1,300	1,190	801	465	192	256
28	2,060	715	580	235	181	194	1,850	1,110	756	429	182	242
29	1,660	720	560	230	180	195	2,750	1,380	758	387	175	234
30	1,490	730	540	225	-----	195	3,300	1,690	747	367	169	231
31	2,890	-----	510	220	-----	198	-----	1,530	-----	402	162	-----
TOTAL	24,657	33,918	21,285	10,565	5,401	5,649	19,959	81,660	34,685	16,070	7,377	6,543
MEAN	795	1,131	687	341	186	182	665	2,634	1,156	518	238	218
MAX	2,890	2,430	793	500	218	198	3,300	4,680	2,310	919	399	677
MIN	222	666	510	220	175	175	200	1,110	691	367	162	113
CFSM	1.33	1.89	1.15	.57	.31	.30	1.11	4.39	1.93	.86	.40	.36
IN.	1.53	2.10	1.32	.66	.33	.35	1.24	5.06	2.15	1.00	.46	.41

CAL YR 1971 TOTAL 285,862 MEAN 783 MAX 4,850 MIN 81 CFSM 1.31 IN 17.72
WTR YR 1972 TOTAL 267,769 MEAN 732 MAX 4,680 MIN 113 CFSM 1.22 IN 16.60

PEAK DISCHARGE (BASE, 3,000 CFS).--May 2 (1100) 4,830 cfs (7.77 ft).

04014500 Baptism River near Beaver Bay, Minn.

LOCATION.--Lat 47°20'15", long 91°12'00", in SE 1/4 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.--45 years, 167 cfs (16.20 inches per year).

EXTREMES.--Current year: Maximum discharge, 8,320 cfs May 2 (gage height, 6.74 ft, from rating curve extended above 3,600 cfs); minimum, 19 cfs July 8, 9, 10; minimum gage height, 0.98 ft July 10.

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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	101	1,800	110	54	33	36	43	2,510	365	35	210	115
2	108	898	105	54	33	36	43	6,860	272	31	137	99
3	125	610	100	53	32	34	42	3,930	192	29	108	89
4	113	440	98	52	32	35	42	2,990	133	29	87	83
5	102	351	98	51	32	34	42	2,570	105	25	80	85
6	93	292	98	50	32	34	41	2,510	87	24	507	140
7	87	236	96	50	32	35	40	2,270	69	21	608	169
8	84	217	96	51	32	34	38	1,910	55	19	561	144
9	78	210	94	52	32	33	38	1,730	45	19	464	110
10	69	201	93	52	33	32	46	1,560	38	19	358	97
11	60	194	91	52	32	33	51	1,340	36	38	285	93
12	50	191	89	51	32	33	58	1,120	43	161	201	83
13	45	191	87	50	33	32	64	965	44	232	140	216
14	41	210	84	49	34	33	70	717	105	147	115	279
15	37	285	82	47	35	34	85	632	133	103	105	205
16	36	328	80	45	35	36	130	516	110	82	2,410	157
17	81	644	79	44	35	39	260	440	89	210	2,550	130
18	149	936	78	44	37	41	330	408	71	358	1,640	108
19	233	741	76	43	38	43	429	386	82	266	900	91
20	221	555	75	43	38	45	566	344	330	238	598	1,080
21	210	354	73	42	37	46	630	304	238	317	1,080	2,610
22	224	232	72	42	36	47	407	255	133	1,660	2,550	1,640
23	207	205	70	41	37	47	321	216	93	1,640	1,870	703
24	191	180	68	40	37	46	340	178	74	920	950	472
25	172	165	67	39	37	46	365	144	55	498	552	372
26	157	150	65	38	36	45	475	120	43	344	408	330
27	775	138	63	37	36	45	680	101	36	238	337	304
28	2,160	128	60	37	36	44	1,140	89	43	561	279	292
29	1,330	120	58	36	37	44	2,210	456	48	448	210	304
30	1,040	114	56	35	-----	44	2,410	703	43	324	169	330
31	2,390	-----	55	34	-----	44	-----	489	-----	337	140	-----
TOTAL	10,769	11,316	2,516	1,408	1,001	1,210	11,436	38,783	3,210	9,373	20,609	10,930
MFAN	347	377	81.2	45.4	34.5	39.0	381	1,251	107	302	665	364
MAX	2,390	1,800	110	54	38	47	2,410	6,860	365	1,660	2,550	2,610
MIN	36	114	55	34	32	32	38	89	36	19	80	83
CFSM	2.48	2.69	.58	.32	.25	.28	2.72	8.94	.76	2.16	4.75	2.60
IN.	2.86	3.01	.67	.37	.27	.32	3.04	10.31	.85	2.49	5.48	2.90

CAL YR 1971 TOTAL 86,597 MEAN 237 MAX 2,610 MIN 19 CFSM 1.69 IN 23.01
WTR YR 1972 TOTAL 122,561 MEAN 335 MAX 6,860 MIN 19 CFSM 2.39 IN 32.57

PEAK DISCHARGE (BASE, 1,300 CFS)

DATE	TIME	G. H.	DISCHARGE	DATE	TIME	G. H.	DISCHARGE
10-31	0400	4.18	2,610	8-16	1230	4.43	3,130
5-02	0630	6.74	8,320	8-21	1700	4.40	3,070
7-22	2300	3.81	1,890	9-20	1400	4.56	3,410

STREAMS TRIBUTARY TO LAKE SUPERIOR

04015500 Second Creek near Aurora, Minn.

LOCATION---Lat 47°31'25", long 92°11'35", in SW $\frac{1}{4}$ sec.12, T.58 N., R.15 W., 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---17 years, 22.5 cfs (11.62 inches per year).

EXTREMES---Current year: Maximum discharge, 160 cfs Oct. 27 (gage height, 5.09 ft); minimum, 9.3 cfs Aug. 2, 3 (gage height, 3.50 ft).

Period of record: Maximum discharge, 254 cfs 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.

REMARKS---Records good except those for period of no gage-height record and those for winter periods, which are fair.

REVISIONS (WATER YEARS)---WRD Minn. 1971: 1957, 1961.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	73	103	28	17	15	15	20	53	20	16	12	24
2	82	94	27	17	15	16	20	51	18	14	10	23
3	77	88	26	17	15	16	19	47	19	15	10	21
4	71	79	25	17	14	17	19	43	20	20	12	17
5	65	73	25	17	14	18	20	43	19	15	12	17
6	62	64	25	17	14	18	20	56	16	15	15	23
7	54	57	24	17	14	19	20	51	16	13	16	28
8	50	54	24	17	14	20	21	45	17	14	27	26
9	46	52	24	17	14	19	24	42	16	14	22	24
10	42	50	23	17	14	18	33	39	15	13	20	22
11	39	47	22	16	14	18	42	34	16	17	20	22
12	37	46	22	16	15	17	46	33	15	20	16	18
13	39	46	21	16	16	16	47	34	18	23	13	40
14	45	53	21	16	16	16	49	33	21	22	12	36
15	42	57	21	16	17	16	65	33	18	18	14	32
16	36	59	21	16	17	17	110	33	18	15	67	29
17	74	62	21	16	17	19	102	29	17	18	53	24
18	80	79	20	16	16	23	95	33	14	21	57	21
19	98	76	20	16	16	26	90	31	16	21	59	20
20	86	68	19	16	16	28	84	28	19	19	58	24
21	80	63	19	16	15	30	75	27	16	20	62	28
22	72	57	18	15	15	31	68	25	15	31	70	27
23	66	48	18	15	15	31	64	26	15	40	55	24
24	63	44	18	15	15	29	64	26	14	38	51	21
25	61	40	18	15	15	26	67	22	12	34	48	21
26	56	37	17	15	15	23	67	19	13	28	41	24
27	94	34	17	15	15	22	66	19	13	24	31	31
28	134	32	17	15	15	22	64	21	16	22	27	34
29	116	31	17	15	15	22	63	23	20	19	30	34
30	114	29	17	15	-----	21	58	24	18	19	25	36
31	120	-----	17	15	-----	20	-----	20	-----	15	24	-----
TOTAL	2,174	1,722	652	496	438	649	1,602	1,043	500	633	989	771
MEAN	70.1	57.4	21.0	16.0	15.1	20.9	53.4	33.6	16.7	20.4	31.9	25.7
MAX	134	103	28	17	17	31	110	56	21	40	70	40
MIN	36	29	17	15	14	15	19	19	12	13	10	17
CFSM	2.67	2.18	.80	.61	.57	.79	2.03	1.28	.64	.78	1.21	.98
IN.	3.08	2.44	.92	.70	.62	.92	2.27	1.48	.71	.90	1.40	1.09

CAL YR 1971 TOTAL 13,388.7 MEAN 36.7 MAX 196 MIN 8.0 CFSM 1.40 IN 18.94
WTR YR 1972 TOTAL 11,669.0 MEAN 31.9 MAX 134 MIN 10 CFSM 1.21 IN 16.51

PEAK DISCHARGE (BASE, 60 CFS)

NOTE---No gage-height record Mar. 12 to Apr. 11.

DATE	TIME	G.H.	DISCHARGE	DATE	TIME	G.H.	DISCHARGE
10-2	1430	4.61	91	11-18	1900	4.51	82
10-19	0730	4.70	104	4-16	1130	4.97	123
10-27	2200	5.09	160	8-16	0730	4.61	91

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).--30 years, 128 cfs (11.14 inches per year).

EXTREMES.--Current year: Maximum discharge, 1,240 cfs May 2 (gage height, 5.52 ft); minimum, 27 cfs July 10 (gage height, 1.99 ft).

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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	102	840	145	66	48	42	61	1,200	68	31	50	153
2	115	848	137	68	49	44	60	1,240	70	30	49	138
3	122	830	132	68	51	47	59	1,190	71	31	47	122
4	112	779	126	67	50	48	58	1,080	68	34	47	104
5	107	660	123	70	46	48	60	972	60	31	45	92
6	104	547	120	69	45	46	59	888	55	30	51	95
7	97	464	115	65	45	44	59	800	53	28	49	97
8	95	374	112	65	46	41	58	722	50	29	66	96
9	87	294	111	63	46	38	58	655	47	29	58	98
10	83	262	111	61	48	36	63	590	46	28	58	98
11	79	229	109	60	50	34	78	515	47	33	54	93
12	78	211	100	60	51	33	86	440	47	35	50	86
13	73	197	94	59	51	35	83	372	47	37	49	122
14	78	199	92	58	51	33	82	337	49	38	47	122
15	81	203	92	57	51	34	97	313	43	33	50	128
16	77	222	91	56	51	38	137	288	43	31	145	129
17	132	261	86	55	49	43	170	264	42	38	123	119
18	140	317	85	54	49	47	177	245	41	39	146	107
19	169	352	85	52	47	52	194	222	44	39	172	99
20	160	376	84	52	46	62	215	196	44	37	231	104
21	162	371	76	51	43	77	222	179	41	39	295	118
22	146	327	71	51	43	86	220	158	39	59	448	146
23	123	319	70	50	43	90	261	143	37	77	513	158
24	125	303	69	50	45	85	328	127	35	89	494	162
25	136	269	70	50	47	79	515	111	33	80	419	173
26	142	235	67	49	45	73	660	95	32	71	366	178
27	250	211	66	49	45	68	740	83	31	69	313	186
28	400	191	64	48	45	64	836	75	34	62	250	174
29	580	172	69	48	44	62	958	74	38	59	214	160
30	700	155	68	47	-----	66	1,080	69	34	59	189	151
31	800	-----	68	48	-----	66	-----	64	-----	53	171	-----
TOTAL	5,655	11,018	2,908	1,766	1,370	1,661	7,734	13,707	1,389	1,378	5,259	3,808
MEAN	182	367	93.8	57.0	47.2	53.6	258	442	46.3	44.5	170	127
(/)	+93.1	+33.6	+14.1	-0.65	-0.93	+1.70	+91.1	+30.3	+1.02	+20.0	+58.2	+35.8
MEAN #	275	401	108	56.4	46.3	55.3	349	472	47.3	64.5	228	163
MAX	800	848	145	70	51	90	1,080	1,240	71	89	513	186
MIN	73	155	64	47	43	33	58	64	31	28	45	86
CFSM #	1.76	2.57	0.69	0.36	0.30	0.35	2.24	3.03	0.30	0.41	1.46	1.04
IN. #	2.04	2.87	0.80	0.42	0.32	0.41	2.50	3.49	0.34	0.48	1.68	1.16

CAL YR 1971	MEAN	158	MEAN #	184	MAX	1,390	MIN	21	CFSM #	1.18	IN. #	16.00
WTR YR 1972	MEAN	158	MEAN #	189	MAX	1,240	MIN	28	CFSM #	1.21	IN. #	16.49

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.

STREAMS TRIBUTARY TO LAKE SUPERIOR

04016500 St. Louis River near Aurora, Minn.

LOCATION.--Lat 47°29'30", long 92°14'20", in SW $\frac{1}{4}$ sec.22, T.58 N., R.15 W., 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).--30 years, 248 cfs (10.79 inches per year).

EXTREMES.--Current year: Maximum discharge, 2,000 cfs May 6 (gage height, 5.00 ft); minimum daily, 48 cfs Mar. 12-15; minimum gage height, 1.09 ft July 10.

Period of record: Maximum discharge, 5,380 cfs May 14, 1950 (gage height, 8.37 ft); minimum, 4.0 cfs Oct. 2, 1948 (gage height, 0.30 ft).

REMARKS.--Records good except those for winter period, 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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	145	1,350	320	97	62	59	104	1,770	249	77	143	474
2	160	1,360	292	95	62	60	102	1,890	240	72	140	425
3	165	1,340	278	93	61	61	100	1,970	233	74	138	382
4	151	1,280	256	92	60	61	98	1,970	216	76	135	344
5	145	1,170	238	91	60	60	97	1,950	198	71	131	308
6	145	1,020	228	90	60	58	95	1,970	182	69	146	299
7	138	906	215	89	60	56	94	1,890	171	66	140	297
8	135	805	204	89	61	53	95	1,760	159	65	174	274
9	128	713	192	89	62	52	96	1,620	147	66	166	255
10	124	674	180	88	63	51	97	1,470	137	64	170	243
11	120	611	170	87	65	49	105	1,330	135	74	170	232
12	119	561	162	84	65	48	120	1,180	133	74	160	215
13	112	521	152	81	65	48	125	1,060	130	78	155	280
14	116	505	147	79	65	48	132	971	137	83	147	275
15	121	501	140	77	64	48	155	889	126	89	142	272
16	120	508	137	74	63	58	234	812	124	80	335	259
17	215	556	130	72	62	66	325	737	119	71	402	237
18	236	654	127	71	61	73	400	679	115	75	526	219
19	333	711	124	69	60	80	515	620	120	75	560	203
20	330	732	121	69	59	90	672	555	114	75	692	230
21	336	687	118	69	59	107	830	503	110	78	784	288
22	342	626	115	68	58	118	777	450	106	115	921	392
23	330	617	113	68	57	120	684	409	98	154	1,050	399
24	341	606	111	68	56	118	716	370	90	174	1,200	383
25	359	538	110	67	56	114	886	331	85	189	1,310	381
26	375	489	108	67	56	113	1,080	292	80	177	1,190	382
27	580	465	106	66	56	111	1,210	259	79	171	980	383
28	805	433	105	65	57	110	1,340	235	87	164	820	373
29	879	394	103	64	58	111	1,480	235	92	160	690	357
30	1,080	352	102	64	-----	110	1,620	240	81	161	570	339
31	1,290	-----	99	63	-----	107	-----	251	-----	153	527	-----
TOTAL	9,975	21,685	5,003	2,405	1,753	2,418	14,384	30,668	4,093	3,170	14,814	9,400
MEAN	322	723	161	77.6	60.4	78.0	479	989	136	102	478	313
MAX	1,290	1,360	320	97	65	120	1,620	1,970	249	189	1,310	474
MIN	112	352	99	63	56	48	94	235	79	64	131	203
(%)	+93.1	+33.6	+14.1	-0.65	-0.93	+1.70	+91.1	+30.3	+1.02	+20.0	+58.2	+35.8
MEAN \neq	415	757	175	77.0	59.5	79.7	570	1,019	137	122	536	349
CFSM \neq	1.33	2.43	0.56	0.25	0.19	0.26	1.83	3.27	0.44	0.39	1.72	1.12
IN. \neq	1.53	2.70	0.65	0.28	0.21	0.29	2.04	3.77	0.49	0.45	1.98	1.25
CAL YR 1971	MEAN	330	MEAN \neq	356	MAX	2,330	MIN	41	CFSM \neq	1.14	IN. \neq	15.23
WTR YR 1972	MEAN	327	MEAN \neq	359	MAX	1,970	MIN	48	CFSM \neq	1.15	IN. \neq	15.65

\neq Change in contents in Partridge Reservoir and diversion to iron-ore processing plant, equivalent in cubic feet per second; furnished by Erie Mining Co.

\neq Adjusted for change in contents and diversion.

04018750 St. Louis River at Forbes, Minn.

LOCATION.--Lat 47°21'48", long 92°35'56", in NE 1/4 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.--8 years, 596 cfs.

EXTREMES.--Current year: Maximum discharge, 3,680 cfs May 6 (gage height, 13.83 ft); minimum, 35 cfs June 23 (gage height, 5.35 ft, result of regulation).
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.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	518	2,840	800	245	180	152	165	3,380	344	129	347	814
2	557	2,910	760	240	178	151	162	3,550	456	190	243	716
3	680	2,940	740	235	177	151	160	3,600	360	117	307	642
4	683	2,910	720	230	174	150	160	3,620	407	198	210	579
5	676	2,800	705	222	173	150	157	3,610	394	155	269	524
6	651	2,620	690	215	171	149	155	3,660	278	167	269	481
7	669	2,350	675	212	169	148	152	3,600	357	143	193	487
8	657	2,070	660	210	169	147	152	3,480	207	190	321	417
9	644	1,850	640	208	168	146	155	3,280	298	175	304	421
10	587	1,700	600	205	168	142	160	3,040	301	91	363	423
11	596	1,560	570	203	168	140	175	2,800	272	161	285	507
12	557	1,420	550	203	167	140	205	2,540	155	135	347	376
13	519	1,300	530	201	166	137	240	2,290	291	129	321	476
14	482	1,200	515	200	165	137	280	2,060	204	213	196	577
15	449	1,020	480	200	164	140	370	1,860	216	198	288	556
16	424	1,190	460	200	163	145	560	1,610	247	175	216	535
17	503	1,220	445	199	162	150	1,020	1,550	238	101	501	494
18	798	1,490	425	198	160	155	1,300	1,380	147	152	625	414
19	1,040	1,630	420	197	159	160	1,750	1,280	225	210	698	405
20	1,250	1,650	400	195	158	172	2,200	1,160	219	115	750	459
21	1,100	1,600	380	194	158	180	2,700	1,060	240	207	957	580
22	1,060	1,400	360	193	157	185	2,840	945	213	269	1,340	634
23	1,010	1,300	340	192	156	188	2,840	776	73	337	1,470	719
24	942	1,250	325	191	155	190	2,770	765	240	307	1,550	734
25	955	1,210	310	190	154	190	2,770	702	231	357	1,560	707
26	943	1,170	295	189	154	185	2,890	628	149	370	1,500	694
27	1,250	1,120	280	188	153	180	3,040	529	133	298	1,400	676
28	2,080	1,020	270	187	152	177	3,170	501	216	390	1,280	671
29	2,290	930	265	185	152	173	3,270	487	193	404	1,140	654
30	2,360	850	260	184	-----	170	3,340	456	234	384	1,110	621
31	2,690	-----	250	182	-----	168	-----	463	-----	272	888	-----
TOTAL	29,620	50,520	15,120	6,293	4,750	4,948	39,308	60,662	7,538	6,739	21,248	16,993
MEAN	955	1,684	488	203	164	160	1,310	1,957	251	217	685	566
MAX	2,690	2,940	800	245	180	190	3,340	3,660	456	404	1,560	814
MIN	424	850	250	182	152	137	152	456	73	91	193	376
CAL YR 1971	TOTAL 285,457	MEAN 782	MAX 4,910	MIN 44								
WTR YR 1972	TOTAL 263,739	MEAN 721	MAX 3,660	MIN 73								

STREAMS TRIBUTARY TO LAKE SUPERIOR

04018900 East Two River near Iron Junction, Minn.

LOCATION.--Lat 47°24'04", long 92°39'52", in NW 1/4 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.--6 years, 34.9 cfs (11.85 inches per year).

EXTREMES.--Current year: Maximum discharge, 316 cfs Apr. 16 (gage height, 9.13 ft, backwater from ice); minimum daily discharge, 7.9 cfs Jan. 31 to Feb. 6; minimum gage height, 2.85 ft June 11, 12.
Period of record: Maximum discharge, 625 cfs Apr. 14, 1971 (gage height, 9.61 ft); maximum gage height, 10.16 ft Apr. 12, 1971, backwater from ice; 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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	69	209	31	17	7.9	12	15	108	18	13	17	18
2	99	181	31	17	7.9	12	15	118	17	13	15	19
3	127	172	30	16	7.9	12	15	107	16	13	14	19
4	124	137	29	16	7.9	12	16	92	15	13	13	19
5	103	105	28	16	7.9	12	16	82	14	13	12	20
6	80	83	28	16	7.9	12	16	104	13	13	18	20
7	62	71	27	15	8.0	12	17	103	12	12	23	22
8	51	70	26	15	8.2	12	17	91	11	13	32	24
9	47	61	26	15	8.4	12	18	79	11	13	35	22
10	42	53	25	14	8.6	12	19	68	11	12	31	21
11	36	47	25	14	8.8	12	22	57	10	14	29	20
12	32	42	24	14	9.2	12	45	48	13	16	27	19
13	29	38	23	14	9.6	12	70	43	16	15	23	31
14	26	41	23	13	9.9	12	125	44	16	14	21	34
15	24	52	22	13	10	12	210	42	16	13	19	31
16	23	54	22	13	10	12	275	39	14	13	20	27
17	40	62	21	12	11	13	300	36	13	14	21	24
18	71	109	21	12	11	13	274	34	13	16	20	22
19	100	115	21	12	11	14	244	31	17	15	20	21
20	112	99	20	11	11	15	225	28	21	15	21	38
21	100	86	20	11	11	16	199	27	20	16	26	78
22	83	72	20	11	11	17	179	25	21	19	38	84
23	66	60	19	10	11	17	170	24	20	28	54	78
24	51	52	19	10	11	18	165	23	18	33	57	63
25	42	47	19	9.6	12	18	149	21	16	30	53	49
26	38	45	19	9.3	12	18	132	20	13	29	44	42
27	85	42	18	9.0	12	17	124	18	12	27	36	38
28	224	37	18	8.6	12	16	123	17	12	26	29	34
29	222	34	18	8.4	12	16	122	17	14	24	25	31
30	213	32	17	8.0	-----	15	116	18	14	21	22	28
31	233	-----	17	7.9	-----	15	-----	17	-----	19	20	-----
TOTAL	2,654	2,308	707	387.8	286.1	430	3,433	1,581	447	545	835	996
MEAN	85.6	76.9	22.8	12.5	9.87	13.9	114	51.0	14.9	17.6	26.9	33.2
MAX	233	209	31	17	12	18	300	118	21	33	57	84
MIN	23	32	17	7.9	7.9	12	15	17	10	12	12	18
CFSM	2.14	1.92	.57	.31	.25	.35	2.85	1.28	.37	.44	.67	.83
IN.	2.47	2.15	.66	.36	.27	.40	3.19	1.47	.42	.51	.78	.93

CAL YR 1971 TOTAL 16,773.8 MEAN 46.0 MAX 540 MIN 7.7 CFSM 1.15 IN 15.60
WTR YR 1972 TOTAL 14,609.9 MEAN 39.9 MAX 300 MIN 7.9 CFSM 1.00 IN 13.59

04019000 West Two River near Iron Junction, Minn.

LOCATION.--Lat 47°24'05", long 92°42'10", in S.W. 1/4 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.--16 years, 47.5 cfs (9.43 inches per year).

EXTREMES.--Current year: Maximum discharge, 511 cfs Apr. 19 (gage height, 8.06 ft); minimum, 5.7 cfs June 11 (gage height, 2.35 ft).

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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	61	409	49	16	8.5	13	23	216	18	8.0	9.6	12
2	91	339	45	16	8.4	13	22	224	12	8.0	9.2	10
3	139	289	40	15	8.4	13	22	207	6.7	8.8	8.8	9.6
4	152	230	37	15	8.5	13	21	184	6.3	8.8	8.4	8.4
5	146	182	35	15	8.6	13	21	164	6.3	8.4	8.4	8.0
6	128	145	34	15	8.6	13	21	178	6.3	8.0	12	8.4
7	106	110	33	14	8.8	13	21	172	6.3	8.0	16	14
8	89	96	32	14	9.0	13	22	161	5.9	7.5	21	10
9	76	83	31	14	9.3	14	24	141	6.3	7.5	21	9.2
10	66	73	30	14	9.6	14	28	117	6.7	8.0	21	8.8
11	58	66	29	13	9.9	14	33	95	5.9	8.8	22	9.2
12	51	61	28	13	10	14	43	82	8.4	8.8	15	9.2
13	44	57	28	13	11	14	60	73	10	8.0	23	27
14	40	57	27	13	11	14	90	79	9.2	8.4	23	27
15	36	63	26	13	11	14	140	76	9.6	7.5	20	24
16	35	64	25	13	11	14	200	68	9.2	7.5	21	22
17	54	82	24	12	11	15	274	61	8.8	8.8	24	20
18	79	113	23	12	11	15	388	55	8.4	8.0	23	18
19	112	125	22	12	12	16	500	49	16	6.7	22	16
20	121	129	22	12	12	17	500	43	16	8.4	21	40
21	118	122	21	12	12	18	485	37	12	9.2	21	62
22	109	112	20	12	12	18	451	33	9.6	14	28	43
23	92	100	20	11	12	19	410	34	8.8	18	25	37
24	82	85	19	11	12	21	366	32	8.4	14	26	55
25	77	76	19	11	12	22	324	29	8.0	14	24	51
26	64	67	18	11	12	23	300	26	8.0	14	22	41
27	152	61	18	10	13	24	283	23	7.5	14	19	35
28	300	57	17	9.7	13	24	270	18	8.8	14	16	32
29	385	55	17	9.3	13	24	254	21	8.8	12	15	29
30	470	52	17	8.9	-----	23	236	20	8.0	11	14	25
31	480	-----	16	8.5	-----	23	-----	18	-----	11	12	-----
TOTAL	4,013	3,560	822	388.4	308.6	518	5,832	2,736	270.2	307.1	575.4	720.8
MEAN	129	119	26.5	12.5	10.6	16.7	194	88.3	9.01	9.91	18.6	24.0
MAX	480	409	49	16	13	24	500	224	18	18	28	62
MIN	35	52	16	8.5	8.4	13	21	18	5.9	6.7	8.4	8.0
CFSM	1.89	1.74	.39	.18	.16	.24	2.84	1.29	.13	.14	.27	.35
IN.	2.18	1.94	.45	.21	.17	.28	3.17	1.49	.15	.17	.31	.39

CAL YR 1971 TOTAL 26,955.6 MEAN 73.9 MAX 864 MIN 9.6 CFSM 1.08 IN 14.66
WTR YR 1972 TOTAL 20,051.5 MEAN 54.8 MAX 500 MIN 5.9 CFSM .80 IN 10.91

STREAMS TRIBUTARY TO LAKE SUPERIOR

04019300 West Swan River near Silica, Minn.

LOCATION.---Lat 47°17'36", long 93°02'30", in SW 1/4 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.---9 years, 10.9 cfs.

EXTREMES.---Current year: Maximum discharge, 352 cfs Apr. 17 (gage height, 4.64 ft); no flow July 8, 9, 10.
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 for several days in 1969, 1970, 1972.

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

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	43	89	3.2	1.1	1.2	.60	6.4	19	2.6	.20	.80	.80
2	46	53	3.0	1.1	1.1	.60	6.3	26	1.8	.20	.60	.50
3	54	35	2.8	1.1	1.1	.60	6.1	29	1.4	.20	.40	.50
4	28	23	2.6	1.0	1.1	.60	5.9	24	.90	.20	.20	.40
5	16	17	2.5	1.0	1.0	.60	5.8	19	.70	.40	.10	.40
6	12	13	2.5	1.0	1.0	.60	5.8	36	.60	.50	.30	.40
7	9.2	10	2.4	1.0	.90	.60	5.7	38	.50	.10	2.3	1.4
8	8.2	8.5	2.3	1.0	.90	.60	5.6	26	.40	0	6.0	1.3
9	7.3	7.5	2.2	1.0	.80	.60	5.6	18	.20	0	6.7	1.0
10	5.7	6.9	2.2	1.0	.80	.70	6.0	13	.20	0	5.1	.90
11	4.8	6.7	2.1	1.0	.80	.70	8.0	11	.10	.20	4.1	.50
12	4.1	6.7	2.0	1.1	.80	.80	10	8.8	.20	.50	3.1	.60
13	3.7	6.6	1.8	1.1	.70	.90	13	7.7	.10	.50	2.6	2.1
14	3.4	7.3	1.7	1.1	.70	1.0	25	13	.20	.50	1.6	4.6
15	3.0	12	1.6	1.0	.70	1.1	40	14	.10	.50	1.2	4.8
16	2.8	13	1.6	1.0	.70	1.2	151	12	.20	.20	1.9	3.6
17	7.8	15	1.5	1.0	.70	1.2	302	9.1	.20	.40	9.5	2.5
18	17	30	1.5	1.0	.70	1.3	204	7.3	.20	.40	8.0	1.8
19	18	36	1.4	1.1	.70	1.4	191	5.7	.90	.40	4.2	1.4
20	15	28	1.4	1.1	.70	1.7	172	4.5	1.2	1.0	4.2	1.7
21	12	18	1.3	1.1	.70	2.4	136	3.5	1.9	1.3	7.5	5.2
22	9.5	12	1.3	1.1	.70	3.2	81	3.4	1.7	2.4	16	6.9
23	7.8	9.0	1.3	1.0	.60	5.5	64	6.6	1.2	4.8	17	5.1
24	6.7	7.2	1.2	1.1	.60	8.0	68	5.9	.90	3.5	8.8	3.8
25	6.2	6.4	1.2	1.2	.60	15	75	3.9	.50	2.6	5.5	2.9
26	5.5	5.8	1.2	1.2	.60	11	66	2.9	.10	2.1	3.8	2.6
27	70	5.1	1.2	1.2	.60	8.2	53	2.2	.10	2.5	2.9	2.7
28	223	4.5	1.1	1.2	.60	7.3	39	2.1	.20	3.6	2.1	2.8
29	114	4.1	1.1	1.2	.60	6.8	29	3.0	.30	2.9	1.7	2.7
30	60	3.6	1.1	1.2	-----	6.6	22	4.6	.10	2.3	1.4	2.4
31	108	-----	1.1	1.2	-----	6.5	-----	3.8	-----	1.6	.80	-----
TOTAL	931.7	499.9	55.4	33.5	22.70	97.90	1,808.2	382.9	19.70	36.00	130.40	68.30
MEAN	30.1	16.7	1.79	1.08	.78	3.16	60.3	12.4	.66	1.16	4.21	2.28
MAX	223	89	3.2	1.2	1.2	15	302	38	2.6	4.8	17	6.9
MIN	2.8	3.6	1.1	1.0	.60	.60	5.6	2.1	.10	0	.10	.40

CAL YR 1971 TOTAL 5,020.00 MEAN 13.8 MAX 367 MIN .10
WTR YR 1972 TOTAL 4,086.60 MEAN 11.2 MAX 302 MIN 0

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).--64 years, 2,268 cfs (8.98 inches per year).

EXTREMES.--Current year: Maximum discharge, 25,900 cfs Apr. 21 (gage height, 11.99 ft); minimum, 625 cfs May 24 (gage height, 2.63 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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1,610	16,200	4,520	2,280	1,620	1,690	1,840	12,700	2,460	1,240	3,260	4,000
2	2,340	15,200	4,060	2,100	1,730	1,670	1,800	13,900	1,920	1,250	2,700	3,450
3	2,970	15,000	4,240	1,980	1,670	1,730	1,770	14,700	1,710	1,500	2,120	3,080
4	3,600	14,300	4,160	1,550	1,740	1,720	1,700	13,800	1,920	1,510	1,750	2,920
5	3,370	13,200	4,180	1,400	1,700	1,700	1,700	12,500	1,890	1,420	1,580	2,550
6	3,030	11,900	4,380	1,400	1,710	1,680	1,780	12,400	1,790	1,030	2,620	2,330
7	2,840	10,300	4,140	2,050	1,700	1,660	1,710	12,500	1,720	1,150	3,150	2,360
8	2,550	8,080	4,160	2,000	1,780	1,650	1,680	11,600	1,260	1,040	3,390	2,790
9	2,420	6,720	3,920	1,970	1,680	1,700	1,750	10,400	1,240	1,050	3,480	2,630
10	2,280	5,700	3,520	1,950	1,700	1,680	1,720	9,490	1,190	1,110	3,390	2,330
11	2,130	5,440	3,130	1,620	1,690	1,710	1,810	8,350	1,030	1,260	3,150	2,110
12	1,900	5,240	2,650	1,350	1,700	1,780	1,880	7,810	1,250	1,310	3,310	1,980
13	1,940	4,940	2,500	1,400	1,710	1,770	2,340	7,990	1,450	1,310	3,410	2,260
14	1,710	4,640	2,750	1,370	1,710	1,810	2,190	7,900	1,450	1,430	3,220	3,410
15	1,680	4,560	2,900	1,770	1,730	1,800	2,430	8,290	1,380	1,220	2,970	4,080
16	1,720	4,820	2,800	1,660	1,730	1,910	4,860	7,660	1,450	1,210	3,210	3,540
17	1,980	6,910	2,450	1,720	1,750	1,900	10,600	6,420	1,200	1,410	9,130	2,720
18	2,090	10,600	2,030	1,800	1,780	1,870	13,900	5,640	1,180	1,430	8,470	2,390
19	3,280	12,000	2,750	1,750	1,700	2,030	16,300	5,020	1,400	1,370	7,480	2,400
20	4,400	11,800	2,560	1,660	1,730	2,200	20,400	4,420	1,620	1,450	9,790	4,540
21	4,800	10,300	2,300	1,620	1,700	2,300	23,700	4,000	1,250	1,660	10,600	10,100
22	4,580	8,350	2,100	1,630	1,760	2,130	20,000	3,620	1,470	2,990	14,300	10,500
23	4,260	6,770	2,400	1,600	1,810	2,050	17,500	3,390	1,240	6,080	16,600	9,640
24	3,920	6,970	2,700	1,630	1,750	2,000	16,400	2,670	1,190	5,920	14,800	8,770
25	3,520	6,750	2,110	1,620	1,710	1,820	16,200	2,360	1,160	4,780	12,300	8,080
26	3,190	5,940	2,420	1,570	1,700	1,770	15,800	2,230	983	3,780	10,400	7,300
27	5,180	5,970	2,060	1,500	1,700	1,760	15,400	2,040	1,180	3,220	8,770	6,540
28	13,000	6,240	2,200	1,610	1,730	1,740	14,700	2,020	1,200	2,970	7,750	5,900
29	13,600	5,660	1,770	1,570	1,740	1,730	14,100	2,020	1,280	3,800	6,340	4,940
30	12,900	5,040	2,530	1,640	-----	1,710	13,400	2,720	1,280	3,860	5,400	4,320
31	15,500	-----	2,400	1,610	-----	1,690	-----	3,130	-----	3,720	4,600	-----
TOTAL	134,290	255,540	92,790	52,380	49,860	56,360	261,360	223,690	42,743	68,480	193,440	133,960
MEAN	4,332	8,518	2,993	1,690	1,719	1,818	8,712	7,216	1,425	2,209	6,240	4,465
MAX	15,500	16,200	4,520	2,280	1,810	2,300	23,700	14,700	2,460	6,080	16,600	10,500
MIN	1,610	4,560	1,770	1,350	1,620	1,650	1,680	2,020	983	1,030	1,580	1,980
(A)	+079	+4	-1,258	-880	-974	-1,034	+1,651	+2,479	-525	+648	+174	+30
MEAN #	5,311	8,522	1,735	810	745	784	10,363	9,695	900	2,857	6,414	4,495
CFSM #	1.55	2.48	0.51	0.24	0.22	0.23	3.02	2.83	0.26	0.83	1.87	1.31
IN. #	1.79	2.77	0.58	0.27	0.23	0.26	3.37	3.26	0.29	0.96	2.16	1.46
CAL YR 1971	MEAN	3,915	MAX	26,000	MIN	784	MEAN #	3,972	CFSM #	1.16	IN. #	15.72
WTR YR 1972	MEAN	4,276	MAX	23,700	MIN	983	MEAN #	4,388	CFSM #	1.28	IN. #	17.41

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.

RED RIVER OF THE NORTH BASIN

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, 20 cfs Apr. 23, 24; maximum gage height, 2.58 ft Apr. 24; minimum daily discharge, 2.1 cfs, Aug. 5.

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.

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

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.9	12	8.4	5.2	4.8	5.8	13	16	15	5.7	3.4	7.0
2	8.4	12	8.1	5.1	4.9	5.8	12	16	15	5.4	3.2	6.9
3	9.1	12	8.0	5.0	5.0	5.9	12	16	14	5.2	2.7	6.8
4	9.5	12	7.8	5.0	5.0	6.0	12	15	14	4.9	2.5	6.7
5	9.2	12	7.8	4.9	5.0	6.0	12	14	13	4.8	2.1	6.6
6	9.1	12	7.7	4.8	5.0	6.0	12	16	12	4.5	3.8	6.5
7	9.0	11	7.5	4.8	5.1	6.0	12	16	12	4.3	4.5	6.4
8	8.4	11	7.4	4.7	5.1	6.1	12	16	12	4.3	5.8	6.0
9	8.3	10	7.3	4.7	5.2	6.2	12	16	11	4.1	6.3	5.5
10	8.2	9.8	7.3	4.7	5.2	6.2	12	15	10	3.8	7.2	5.4
11	7.8	9.6	7.2	4.6	5.2	6.2	13	15	9.9	3.6	7.5	5.3
12	7.6	9.5	7.0	4.6	5.2	6.2	14	14	9.6	3.7	7.5	5.3
13	7.5	9.6	6.8	4.6	5.3	6.3	16	14	8.8	3.6	7.6	5.7
14	7.0	10	6.8	4.6	5.3	6.4	17	16	8.4	3.6	7.5	6.4
15	6.9	11	6.7	4.6	5.4	7.2	18	17	8.2	3.5	7.5	6.4
16	6.8	11	6.6	4.6	5.4	8.5	18	17	7.8	3.5	7.2	6.2
17	8.1	11	6.5	4.6	5.4	11	19	17	7.5	3.4	6.9	5.9
18	9.5	12	6.4	4.6	5.4	13	19	16	7.6	3.2	6.9	5.6
19	9.9	12	6.4	4.6	5.5	13	19	16	8.1	2.9	6.8	5.5
20	9.8	12	6.3	4.6	5.5	15	19	15	8.6	2.8	6.7	5.5
21	9.8	12	6.2	4.6	5.6	18	18	15	8.6	2.6	6.7	5.1
22	9.5	11	5.9	4.6	5.5	19	19	15	8.2	3.4	7.4	4.8
23	9.4	10	5.8	4.6	5.6	18	20	14	7.8	3.8	7.7	4.6
24	9.2	9.9	5.8	4.7	5.6	18	20	15	7.6	3.6	7.7	4.4
25	9.1	9.8	5.6	4.6	5.7	17	19	15	7.3	3.5	7.7	4.1
26	9.1	9.5	5.5	4.6	5.7	16	19	16	7.0	3.5	7.7	3.9
27	9.1	9.2	5.4	4.7	5.8	16	18	15	6.7	3.6	7.6	3.6
28	8.8	9.1	5.4	4.7	5.8	15	18	16	6.6	3.7	7.5	3.4
29	8.3	9.0	5.3	4.7	5.8	14	17	16	6.5	3.7	7.3	3.2
30	10	9.6	5.2	4.8	-----	14	16	15	6.2	3.7	6.9	3.1
31	12	-----	5.2	4.8	-----	13	-----	15	-----	3.6	7.3	-----
TOTAL	271.4	319.7	205.3	146.3	155.1	330.8	477	480	285.0	119.5	195.1	161.8
MEAN	8.75	10.7	6.62	4.72	5.35	10.7	15.9	15.5	9.50	3.85	6.29	5.39
MAX	12	12	8.4	5.2	5.8	19	20	17	15	5.7	7.7	7.0
MIN	6.8	8.6	5.2	4.6	4.8	5.8	12	14	6.2	2.6	2.1	3.1
AC-FT	538	634	407	290	308	656	946	952	565	237	387	321

CAL YR 1971 TOTAL 2,342.4 MEAN 6.42 MAX 17 MIN 1.0 AC-FT 4,650
 WTR YR 1972 TOTAL 3,147.0 MEAN 8.60 MAX 20 MIN 2.1 AC-FT 6,240

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.

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

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

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	40	94	78	48	38	32	71	104	91	27	8.1	19
2	51	94	73	48	38	32	71	105	90	25	7.9	18
3	48	94	68	46	36	32	71	106	87	23	6.3	17
4	47	104	68	46	38	34	72	103	83	20	5.3	15
5	47	99	63	48	36	32	77	107	81	19	6.5	14
6	45	98	63	48	36	34	80	108	78	18	13	15
7	43	96	58	46	36	32	78	108	77	17	14	14
8	42	95	58	46	34	30	78	106	76	16	18	13
9	42	96	55	43	34	30	78	105	77	15	17	12
10	41	94	55	43	34	30	77	104	73	14	18	12
11	39	89	52	43	34	28	76	103	69	14	19	12
12	37	89	52	46	34	28	79	101	67	15	19	12
13	38	89	52	46	34	30	83	107	67	13	19	17
14	37	89	52	43	34	30	83	112	66	13	20	15
15	37	89	52	43	30	32	84	110	50	12	19	16
16	39	94	49	43	30	32	87	107	32	12	19	15
17	59	94	49	43	34	34	87	105	30	11	19	15
18	59	109	49	41	34	34	88	103	32	9.3	20	15
19	58	104	49	41	32	36	90	102	34	8.3	20	16
20	58	109	49	41	32	41	89	97	32	8.3	19	18
21	55	118	48	38	30	51	94	102	26	9.4	26	16
22	55	109	48	38	30	55	96	98	25	11	33	14
23	55	104	48	43	30	58	100	104	24	10	27	14
24	56	99	48	41	28	59	99	101	24	9.9	26	14
25	57	99	48	38	28	60	101	104	22	9.0	25	14
26	57	94	48	38	28	64	102	102	25	10	24	14
27	73	89	48	38	28	67	101	102	28	9.9	23	14
28	65	89	48	38	32	68	102	103	29	10	22	14
29	63	84	48	41	32	70	101	101	28	10	21	14
30	78	78	48	38	-----	70	102	95	27	9.8	19	13
31	97	-----	48	38	-----	70	-----	94	-----	9.5	22	-----
TOTAL	1,618	2,882	1,672	1,321	954	1,335	2,597	3,209	1,550	418.4	575.1	441
MEAN	52.2	96.1	53.9	42.6	32.9	43.1	86.6	104	51.7	13.5	18.6	14.7
MAX	97	118	78	48	38	70	102	112	91	27	33	19
MIN	37	78	48	38	28	28	71	94	22	8.3	5.3	12
AC-FT	3,210	5,720	3,320	2,620	1,890	2,650	5,150	6,370	3,070	830	1,140	875
CAL YR 1971	TOTAL	14,098.2	MEAN	38.6	MAX	120	MIN	4.3	AC-FT	27,960		
WTR YR 1972	TOTAL	18,572.5	MEAN	50.7	MAX	118	MIN	5.3	AC-FT	36,840		

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, 132 cfs May 23 (gage height, 2.38 ft); minimum daily, 10 cfs Aug. 4. Period of record: Maximum discharge, 132 cfs May 23, 1972 (gage height, 2.38 ft); no flow Sept. 10-20, 1969.

REMARKS.--Records good except those for periods of no gage-height record and those for winter period, which are fair. 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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	31	102	91	58	42	37	65	112	119	36	12	23
2	32	100	91	57	42	37	59	112	114	35	12	21
3	32	97	90	56	42	36	71	115	108	33	11	20
4	34	95	89	56	42	36	74	116	105	32	10	18
5	37	92	88	55	42	36	77	119	100	31	12	17
6	38	90	87	54	41	36	80	122	95	30	14	16
7	38	88	86	54	41	36	85	123	91	29	18	15
8	38	87	85	53	41	36	87	123	88	28	18	14
9	38	86	84	52	41	36	89	122	84	27	21	13
10	38	85	84	51	40	35	90	123	81	26	21	13
11	38	84	83	51	40	35	94	123	76	25	21	13
12	39	82	82	50	40	35	95	123	76	24	21	16
13	41	82	80	49	40	35	96	123	74	23	21	19
14	43	81	78	48	40	35	97	125	72	21	21	18
15	45	80	75	48	39	35	98	125	70	20	21	17
16	45	82	73	47	39	35	100	126	66	19	21	16
17	47	84	71	47	39	35	100	126	63	18	21	16
18	50	86	70	46	39	35	100	125	61	17	21	17
19	52	88	68	46	39	35	102	125	58	17	21	18
20	54	88	67	46	38	35	102	125	55	16	21	18
21	55	90	66	45	38	35	103	126	52	16	30	18
22	56	90	66	45	38	35	106	126	52	15	37	16
23	58	92	65	44	38	35	106	129	50	14	31	15
24	58	92	64	44	38	35	108	123	47	14	27	15
25	61	92	64	44	38	35	108	123	47	14	26	15
26	63	92	63	43	37	38	108	129	45	13	25	15
27	66	92	62	43	37	44	108	129	45	13	24	15
28	65	92	61	43	37	48	110	129	45	12	24	15
29	75	92	60	43	37	54	110	129	42	12	23	15
30	90	91	60	42	-----	59	111	126	40	12	22	15
31	101	-----	59	42	-----	63	-----	123	-----	12	24	-----
TOTAL	1,558	2,674	2,312	1,502	1,145	1,192	2,849	3,825	2,121	654	652	492
MEAN	50.3	89.1	74.6	48.5	39.5	38.5	95.0	123	70.7	21.1	21.0	16.4
MAX	101	102	91	58	42	63	111	129	119	36	37	23
MIN	31	80	59	42	37	35	65	112	40	12	10	13
AC-FT	3,090	5,300	4,590	2,980	2,270	2,360	5,650	7,590	4,210	1,300	1,290	976

CAL YR 1971 TOTAL 14,688.9 MEAN 40.2 MAX 102 MIN 6.2 AC-FT 29,140
 4TR YR 1972 TOTAL 20,976.0 MEAN 57.3 MAX 129 MIN 10 AC-FT 41,610

NOTE.--No gage-height record Oct. 1-9, Aug. 15 to Sept. 30.

RED RIVER OF THE NORTH BASIN

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.--33 years (1909-12, 1942-72), 78.6 cfs (56,950 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 420 cfs May 30 (gage height, 4.60 ft); maximum gage height, 6.04 ft Mar. 21 (backwater from ice); minimum discharge, 16 cfs Nov. 21 (gage height, 3.20 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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	40	113	142	119	112	114	230	267	305	131	109	110
2	43	109	140	119	112	114	220	262	297	128	105	108
3	45	102	140	119	112	115	210	211	286	126	103	107
4	47	93	138	118	112	115	195	216	276	120	101	104
5	47	91	136	118	112	116	180	251	268	119	102	104
6	47	92	134	117	112	116	170	271	263	116	117	106
7	47	92	133	117	112	116	163	271	254	114	143	108
8	47	93	131	117	112	116	152	280	241	111	160	102
9	47	94	130	117	112	117	151	270	230	108	164	97
10	47	97	129	117	111	117	165	263	222	105	173	100
11	47	97	129	116	111	118	177	259	214	104	169	97
12	45	101	128	116	111	119	174	257	210	269	163	96
13	47	99	127	115	111	120	200	273	207	232	157	97
14	49	98	127	115	111	121	212	280	113	185	149	92
15	50	102	126	114	111	134	213	280	173	158	140	90
16	50	111	125	114	111	150	215	275	222	143	134	92
17	51	119	124	114	111	170	205	278	197	130	124	87
18	79	125	124	114	111	190	185	274	183	123	153	86
19	86	123	123	114	111	220	203	263	189	117	143	84
20	78	121	122	113	111	260	188	265	185	112	140	85
21	75	88	121	112	111	270	192	308	180	119	135	82
22	71	100	121	112	111	270	207	304	173	133	143	79
23	69	110	121	112	111	275	216	307	169	129	155	73
24	68	135	121	111	112	275	237	298	169	122	153	77
25	67	155	121	111	112	275	225	297	162	125	146	73
26	67	155	120	111	112	275	205	313	154	131	140	72
27	76	153	120	111	113	275	242	367	148	129	134	70
28	79	152	120	111	113	270	205	380	151	129	128	70
29	76	151	120	112	113	270	225	350	146	129	123	71
30	88	148	119	112	-----	260	228	361	136	123	117	69
31	107	-----	119	112	-----	250	-----	341	-----	121	112	-----
TOTAL	1,882	3,419	3,931	3,550	3,237	5,723	5,990	8,892	6,113	4,141	4,235	2,688
MEAN	60.7	114	127	115	112	185	200	287	204	134	137	89.6
MAX	107	155	142	119	113	275	242	380	305	269	173	110
MIN	40	88	119	111	111	114	151	211	113	104	101	69
CFSM	.13	.24	.26	.24	.23	.38	.41	.60	.42	.28	.28	.19
IN ₄	.15	.26	.30	.27	.25	.44	.46	.69	.47	.32	.33	.21
AC-FT	3,730	6,780	7,900	7,040	6,420	11,350	11,880	17,640	12,130	8,210	8,400	5,330
CAL YR 1971	TOTAL 26,710		MEAN 73.2	MAX 215	MIN 16	CFSM .15	IN 2.06	AC-FT 52,980				
WTR YR 1972	TOTAL 53,801		MEAN 147	MAX 380	MIN 40	CFSM .31	IN 4.15	AC-FT 106,700				

05045950 Orwell Lake near Fergus Falls, Minn.

LOCATION.--Lat $46^{\circ}12'55''$, long $96^{\circ}10'40''$, in SW $\frac{1}{4}$ sec.26, T.132 N., R.44 W., Otter Tail County, at dam on Otter Tail River at outlet of Orwell, 7 miles southwest of Fergus Falls, Minn.

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

PERIOD OF RECORD.--March 1953 to current year. Prior to October 1971, published as Orwell Reservoir.

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, 16,100 acre-ft June (elevation, 1,071.71 ft); minimum, 1,480 acre-ft Mar. 11 (elevation, 1,050.10 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 1971 TO SEPTEMBER 1972

	Gage height (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30.....	1,069.97	14,070	-
Oct. 31.....	1,069.19	13,210	-860
Nov. 30.....	1,065.18	9,540	-3,670
Dec. 31.....	1,061.44	6,710	-2,830
CAL YR 1971.....	-	-	+2,000
Jan. 31.....	1,054.01	2,800	-3,910
Feb. 29.....	1,052.74	2,310	-490
Mar. 31.....	1,069.02	13,020	+10,710
Apr. 30.....	1,062.90	7,730	-5,290
May 31.....	1,071.67	16,050	+8,320
June 30.....	1,061.14	6,500	-9,550
July 31.....	1,058.06	4,630	-1,870
Aug. 31.....	1,064.98	9,380	+4,750
Sept. 30.....	1,068.92	12,920	+3,540
WTR YR 1972.....	-	-	-1,150

RED RIVER OF THE NORTH BASIN

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.--42 years, 293 cfs (212,300 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 1,360 cfs part or all of each day June 3-8 (gage height, 4.44 ft); minimum, 13 cfs Sept. 6 (gage height, 1.74 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 or periods of no gage-height record, 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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	201	351	542	599	485	540	831	895	1,340	911	479	525
2	201	412	542	599	481	535	834	892	1,350	897	485	524
3	201	412	542	599	495	524	838	897	1,360	873	490	530
4	201	412	542	593	481	518	837	899	1,360	854	412	536
5	201	411	546	593	476	505	837	903	1,360	787	362	536
6	201	412	565	593	476	500	855	910	1,360	738	373	441
7	201	407	617	582	476	500	867	917	1,360	698	378	451
8	203	405	635	578	476	511	867	924	1,360	659	384	451
9	201	401	631	574	485	526	862	933	1,350	659	479	457
10	201	401	624	568	482	512	857	940	1,330	618	547	457
11	201	401	620	560	489	490	858	946	1,310	578	547	412
12	201	400	616	564	487	507	868	933	1,300	693	553	367
13	201	401	616	564	470	530	865	901	1,280	785	559	367
14	203	401	556	564	451	610	861	898	1,270	797	559	373
15	205	401	524	564	451	651	861	903	1,250	801	519	373
16	205	443	564	564	444	720	861	907	1,230	793	496	373
17	205	563	593	564	447	611	858	911	1,210	784	496	384
18	210	680	593	597	451	303	855	887	1,190	767	502	384
19	235	680	593	588	451	134	861	842	1,100	684	502	384
20	293	674	593	582	451	121	869	862	1,010	593	507	395
21	322	674	587	572	451	131	867	880	1,020	570	507	395
22	322	668	608	562	451	109	867	891	1,010	574	507	401
23	322	662	616	550	447	76	864	892	997	582	507	401
24	318	656	622	544	451	219	880	953	988	588	507	401
25	317	645	622	544	456	543	899	1,070	979	593	513	401
26	317	501	616	537	507	758	897	1,060	974	599	507	406
27	320	384	616	537	505	814	897	1,070	966	604	513	406
28	315	390	610	522	505	831	897	1,190	954	610	513	406
29	317	455	610	517	545	831	897	1,290	937	610	512	406
30	317	524	604	515	-----	831	897	1,330	925	610	513	406
31	317	-----	604	490	-----	831	-----	1,340	-----	553	520	-----
TOTAL	7,675	14,627	18,369	17,479	13,723	15,822	25,964	30,066	35,430	21,462	15,248	12,749
MEAN	248	488	593	564	473	510	865	970	1,181	692	492	425
MAX	322	680	635	599	545	831	899	1,340	1,360	911	559	536
MIN	201	351	524	490	444	76	831	842	925	553	362	367
AC-FT	15,220	29,010	36,430	34,670	27,220	31,380	51,500	59,640	70,280	42,570	30,240	25,290

CAL YR 1971 TOTAL 111,882 MEAN 307 MAX 732 MIN 88 AC-FT 221,900
WTR YR 1972 TOTAL 228,614 MEAN 625 MAX 1,360 MIN 76 AC-FT 453,500

NOTE.--No gage-height record Jan. 7-10, Jan. 23 to Mar. 13.

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

LOCATION.--Lat 45°51'45", long 96°34'25", in SW $\frac{1}{4}$ SW $\frac{1}{4}$ 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.--31 years, 83.8 cfs (60,710 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 776 cfs, Apr. 10 (gage height, 9.39 ft); maximum gage height, 9.61 ft Mar. 29 (backwater from ice); 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 good except those for winter periods, which are fair. 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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.30	1.6	2.0	1.7	1.1	0	694	121	183	12	237	12
2	.30	1.9	1.9	1.7	1.1	0	684	142	414	.40	239	10
3	.20	1.9	1.9	1.7	1.0	0	700	144	496	.10	234	10
4	.20	8.2	1.8	1.7	.90	.10	715	147	542	.10	239	10
5	.20	1.2	1.8	1.7	.80	.20	728	151	550	.10	237	10
6	.20	1.2	1.8	1.7	.70	.30	719	147	546	0	236	10
7	.20	1.2	1.8	1.7	.60	.40	711	150	538	.10	230	9.8
8	.20	1.2	1.7	1.7	.50	.50	696	151	526	0	215	1.9
9	.20	1.2	1.7	1.7	.40	.60	675	152	509	0	209	1.5
10	.20	1.2	1.7	1.7	.30	.80	723	153	490	1.2	204	.90
11	.20	1.2	1.7	1.7	.20	1.0	755	150	479	0	155	.80
12	.10	1.2	1.7	1.7	.10	1.3	732	151	463	.10	75	.40
13	.20	1.2	1.7	1.7	0	1.5	728	156	448	.10	72	0
14	.30	1.2	1.7	1.7	0	2.1	728	180	432	.10	72	0
15	.20	1.3	1.7	1.7	0	3.0	704	276	411	.10	70	0
16	.20	1.6	1.7	1.7	0	10	675	381	350	.10	73	3.0
17	.20	2.2	1.7	1.7	0	82	700	369	279	.20	76	0
18	.20	3.6	1.7	1.7	0	95	732	360	273	.20	63	39
19	.20	4.0	1.7	1.7	0	96	732	351	268	.20	30	83
20	.20	5.1	1.7	1.6	0	93	711	338	249	.10	26	82
21	.20	4.7	1.7	1.6	0	90	700	348	228	.10	24	81
22	1.6	4.3	1.7	1.5	0	86	707	356	60	.20	22	74
23	.40	3.8	1.7	1.5	0	83	681	372	54	.40	21	54
24	.30	3.5	1.7	1.4	0	80	650	411	68	.90	39	45
25	.40	3.2	1.7	1.4	0	78	620	412	64	.80	46	.20
26	3.3	2.9	1.7	1.4	0	76	584	411	52	3.0	22	0
27	.60	2.6	1.7	1.3	0	79	324	417	40	29	21	0
28	.50	2.4	1.7	1.3	0	288	137	429	37	88	22	5.2
29	.60	2.2	1.7	1.2	0	460	139	321	36	196	24	.10
30	.70	2.0	1.7	1.2	-----	684	142	63	29	229	20	0
31	1.1	-----	1.7	1.2	-----	709	-----	59	-----	229	17	-----
TOTAL	13.90	75.0	53.8	48.9	7.70	3,100.80	18,926	7,769	9,114	791.60	3,270	543.70
MEAN	.45	2.50	1.74	1.58	.27	100	631	251	304	25.5	105	18.1
MAX	3.3	8.2	2.0	1.7	1.1	709	755	429	550	229	239	83
MIN	.10	1.2	1.7	1.2	0	0	137	59	29	0	17	0
AC-FT	28	149	107	97	15	6,150	37,540	15,410	18,080	1,570	6,490	1,080
CAL YR 1971	TOTAL	3,621.40	MEAN	9.9	MAX	187	MIN	0	AC-FT	7,180		
WTR YR 1972	TOTAL	43,714.40	MEAN	119	MAX	755	MIN	0	AC-FT	86,710		

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

LOCATION.--Lat 46°51'40", long 96°47'00", in NW¼ 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).--71 years, 541 cfs (392,000 acre-ft per year); median of yearly mean discharges, 440 cfs (319,000 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 7,250 cfs Mar. 24 (gage height, 25.36 ft); minimum, 181 cfs Oct. 5-9 (gage height, 13.90 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 water temperatures for current year are published in Part 2 of Water Resources Data for North Dakota.

REVISIONS (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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	190	517	449	600	510	455	2,200	1,430	4,140	1,030	1,010	560
2	246	568	386	590	495	470	2,250	1,340	3,670	1,000	1,000	552
3	222	582	356	585	460	460	2,320	1,320	2,700	968	941	560
4	218	560	386	580	440	490	2,440	1,300	2,270	941	852	552
5	190	560	436	575	460	490	2,490	1,320	2,150	896	812	531
6	181	545	462	575	440	490	2,490	1,310	2,100	869	748	510
7	181	392	552	575	440	500	2,500	1,300	2,000	852	780	510
8	181	332	598	575	420	500	2,440	1,330	1,900	812	692	517
9	181	299	552	575	430	500	2,400	1,370	1,850	756	668	475
10	190	374	456	575	435	510	2,420	1,370	1,800	700	684	436
11	186	598	380	570	435	520	2,440	1,370	1,800	644	676	423
12	186	708	404	570	425	520	2,320	1,380	1,760	636	700	402
13	186	668	552	565	430	530	2,900	1,500	1,750	732	764	442
14	186	660	700	560	420	540	3,500	2,250	1,740	887	764	410
15	186	628	724	560	385	710	3,200	2,300	1,700	860	716	374
16	199	605	690	555	385	1,600	2,770	1,600	1,670	1,070	668	356
17	310	605	660	550	380	3,200	2,400	1,750	1,650	1,210	644	344
18	392	636	640	540	375	4,300	2,200	1,740	1,620	1,160	628	344
19	392	644	636	545	350	5,100	2,000	1,850	1,600	1,070	652	350
20	332	692	640	550	330	5,700	1,980	1,850	1,500	1,000	700	356
21	288	796	650	545	325	6,100	1,930	1,850	1,520	932	660	368
22	262	572	680	540	325	6,600	1,890	2,200	1,490	896	628	362
23	277	628	750	540	360	6,990	1,850	2,750	1,460	914	590	366
24	316	636	700	530	380	7,080	1,830	3,250	1,300	923	568	423
25	344	652	650	530	380	6,420	1,820	3,250	1,210	959	568	436
26	350	772	625	530	380	4,810	1,820	2,500	1,120	1,040	568	442
27	350	860	605	525	400	3,150	1,790	2,210	1,070	1,100	568	430
28	339	788	598	525	410	2,270	1,770	2,400	1,060	1,120	568	430
29	332	700	570	520	435	1,900	1,700	3,150	1,050	1,090	568	362
30	332	628	560	510	-----	1,800	1,600	3,750	1,030	1,050	575	344
31	436	-----	580	510	-----	1,800	-----	4,120	-----	1,010	590	-----
TOTAL	8,161	18,205	17,627	17,175	11,840	76,525	67,660	62,610	53,610	29,127	21,550	13,027
MEAN	263	607	569	554	408	2,469	2,255	2,020	1,767	940	695	434
MAX	436	860	750	600	510	7,080	3,500	4,120	4,140	1,210	1,010	560
MIN	181	299	356	510	325	455	1,600	1,300	1,030	636	568	344
AC-FT	16,190	36,110	34,960	34,070	23,480	151,800	134,200	124,200	106,300	57,770	42,740	25,840
(+)	643	651	683	737	824	807	676	764	1,090	1,016	889	838
MEAN*	274	618	580	566	423	2,482	2,267	2,032	1,805	956	710	448
AC-FT*	16,830	36,760	35,650	34,800	24,310	152,610	134,490	125,000	107,400	58,790	43,630	26,680

OBSERVED

CAL YR 1971 TOTAL 145,618.00 MEAN 399 MAX 1,850 MIN 0 AC-FT 288,800
WTR YR 1972 TOTAL 397,117.00 MEAN 1,085 MAX 7,080 MIN 181 AC-FT 787,700

ADJUSTED

MEAN 412 AC-FT 298,200
MEAN 1,098 AC-FT 797,300

+ Diversions in acre-feet by cities of Fargo and Moorhead.

* Adjusted for diversion by Fargo and Moorhead.

RED RIVER OF THE NORTH BASIN

05062000 Buffalo River near Dilworth, Minn.

LOCATION.--Lat 46°57'40", long 96°39'40", in SW 1/4 sec. 6, T.140 N., R.47 W., Clay County, on left bank 4.5 miles southeast of Kragens, 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.--41 years, 125 cfs (90,560 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 2,590 cfs Mar. 19 (gage height, 19.36 ft, backwater from ice); minimum, 20 cfs Sept. 24 (gage height, 2.50 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.

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

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	53	312	172	45	30	36	639	380	425	50	39	38
2	66	374	162	43	30	36	557	361	359	49	35	36
3	96	425	153	42	30	37	483	347	307	47	32	35
4	119	442	148	40	30	37	470	334	270	46	31	37
5	139	436	145	39	30	38	461	326	238	45	29	34
6	154	377	142	38	30	40	452	344	211	45	31	31
7	153	320	137	38	29	42	443	364	186	44	38	29
8	144	292	132	37	29	44	433	368	169	43	42	30
9	136	281	123	36	29	48	425	378	153	40	51	32
10	127	282	118	36	29	53	404	370	138	40	60	30
11	122	283	113	35	29	58	408	350	124	39	64	28
12	116	284	108	35	29	62	434	326	113	36	65	26
13	112	285	103	35	30	66	690	342	104	34	64	29
14	109	288	100	35	30	86	880	531	95	36	61	30
15	106	289	95	34	30	130	979	615	87	36	56	32
16	104	299	90	34	30	375	1,100	670	87	38	51	34
17	170	315	86	34	30	720	1,130	720	87	49	49	40
18	237	332	82	34	30	1,510	1,060	694	81	47	46	36
19	277	347	79	33	30	2,520	943	576	77	42	44	32
20	341	353	75	33	30	2,360	836	436	74	39	41	29
21	342	321	72	33	30	2,120	750	353	75	39	38	29
22	326	298	69	32	30	1,780	673	320	77	41	40	24
23	304	292	66	32	31	1,530	615	320	75	51	54	22
24	284	287	63	32	31	1,410	572	412	72	58	55	21
25	264	272	61	32	32	1,320	538	473	68	56	56	26
26	244	251	58	32	33	1,240	513	422	63	55	55	26
27	231	231	56	31	33	1,160	490	353	59	52	51	22
28	218	212	53	31	34	1,010	462	320	58	50	47	22
29	206	197	51	31	35	846	435	333	59	49	42	22
30	209	184	49	31	-----	742	407	408	55	49	39	23
31	245	-----	47	30	-----	690	-----	462	-----	45	38	-----
TOTAL	5,754	9,161	3,008	1,083	883	22,146	18,682	13,008	4,046	1,390	1,444	885
MEAN	186	305	97.0	34.9	30.4	714	623	420	135	44.8	46.6	29.5
MAX	342	442	172	45	35	2,520	1,130	720	425	58	65	40
MIN	53	184	47	30	29	36	404	320	55	34	29	21
AC-FT	11,410	18,170	5,970	2,150	1,750	43,930	37,060	25,800	8,030	2,760	2,860	1,760
CAL YR 1971	TOTAL	41,254	MEAN	113	MAX	485	MIN	12	AC-FT	81,830		
WTR YR 1972	TOTAL	81,490	MEAN	223	MAX	2,520	MIN	21	AC-FT	161,600		

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.--50 years, 169 cfs (122,400 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 2,220 cfs Mar. 21 (gage height, 9.66 ft, backwater from ice); maximum gage height, 11.93 ft Mar. 20 (backwater from ice); minimum discharge, 39 cfs July 18; minimum gage height, 1.47 ft Oct. 1.

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 fair. Flow slightly regulated by Rice Lake and many other small lakes above station.

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

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	57	633	212	90	65	57	564	942	670	84	93	71
2	208	752	190	90	64	58	579	906	630	78	80	71
3	286	794	174	89	62	59	630	875	570	73	69	73
4	280	758	165	88	62	59	545	850	510	68	60	71
5	271	713	160	87	61	61	533	822	450	66	55	64
6	233	648	155	86	61	63	567	811	400	66	66	58
7	200	555	150	85	60	65	622	808	370	63	83	58
8	174	451	143	84	59	67	591	802	340	61	119	56
9	157	420	136	83	59	68	557	781	310	61	152	54
10	157	453	130	82	59	68	555	752	290	65	166	53
11	147	497	125	81	59	67	574	729	265	62	159	50
12	133	516	122	80	58	65	646	706	245	66	149	47
13	128	516	119	80	58	64	1,390	703	230	68	137	53
14	116	524	117	79	58	66	1,770	784	215	65	132	62
15	114	567	115	78	58	71	1,750	861	200	56	130	66
16	117	569	112	77	58	100	1,740	889	192	49	129	65
17	628	560	110	76	57	250	1,670	850	184	43	117	62
18	1,010	552	108	75	57	750	1,520	794	174	40	113	61
19	1,110	533	105	74	57	1,100	1,350	737	164	41	105	60
20	878	509	104	73	57	1,480	1,260	690	157	53	96	59
21	703	431	103	72	57	1,760	1,210	648	153	72	91	48
22	586	358	101	71	56	1,430	1,170	620	145	79	95	44
23	509	312	99	70	56	1,030	1,200	586	135	138	88	45
24	444	308	98	70	56	910	1,270	557	126	207	84	52
25	398	291	96	69	56	820	1,270	543	119	247	81	47
26	371	295	95	68	56	750	1,230	533	112	230	75	43
27	363	297	94	68	56	680	1,150	524	106	185	71	47
28	348	293	93	67	56	633	1,080	516	100	150	66	53
29	341	280	92	67	56	596	1,030	540	97	170	65	51
30	343	244	91	66	-----	588	984	600	92	150	64	48
31	478	-----	91	65	-----	617	-----	660	-----	120	69	-----
TOTAL	11,288	14,629	3,805	2,390	1,694	14,452	31,007	22,419	7,751	2,976	3,059	1,692
MEAN	364	468	123	77.1	58.4	466	1,034	723	258	96.0	98.7	56.4
MAX	1,110	794	212	90	65	1,760	1,770	942	670	247	166	73
MIN	57	244	91	65	56	57	533	516	92	40	55	43
AC-FT	22,390	29,020	7,550	4,740	3,360	28,670	61,500	44,470	15,370	5,900	6,070	3,360

CAL YR 1971 TOTAL 69,592 MEAN 191 MAX 1,110 MIN 20 AC-FT 138,000
WTR YR 1972 TOTAL 117,162 MEAN 320 MAX 1,770 MIN 40 AC-FT 232,400

NOTE.--No gage-height record Jan. 4 to Feb. 8.

05064000 Wild Rice River at Hendrum, Minn.

LOCATION.--Lat 47°16'05", long 96°47'50", in SE $\frac{1}{4}$ 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.--28 years, 245 cfs (177,500 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 4,550 cfs Apr. 15 (gage height, 23.24 ft); maximum gage height, 24.50 ft Mar. 22 (backwater from ice); minimum discharge, 54 cfs Sept. 24, 25; minimum gage height, 2.75 ft Sept. 24.

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 period, 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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	80	1,330	270	106	76	66	809	1,060	850	108	180	67
2	144	1,550	250	104	75	66	745	1,000	877	105	152	72
3	573	1,580	235	104	75	68	870	958	780	98	121	69
4	760	1,500	225	102	75	70	960	924	710	91	108	67
5	668	1,270	215	102	74	73	884	888	613	84	96	67
6	534	1,100	210	100	74	75	792	872	531	82	92	67
7	431	950	205	100	74	78	856	953	463	80	89	67
8	372	770	195	98	73	80	884	970	421	79	106	65
9	319	676	180	98	73	81	818	926	388	79	129	61
10	279	638	170	96	72	82	770	868	354	77	165	61
11	259	660	165	96	71	82	802	845	325	76	183	57
12	250	700	160	94	71	81	1,060	767	306	76	174	59
13	245	741	155	94	70	80	2,770	745	280	71	162	61
14	216	750	152	92	70	80	4,100	883	260	81	157	65
15	190	762	150	92	69	92	4,540	1,580	242	76	148	66
16	213	879	147	92	69	250	4,450	1,670	223	72	138	64
17	319	852	145	90	69	570	4,000	1,380	210	71	129	61
18	1,190	852	142	90	68	1,020	3,310	1,110	202	60	124	61
19	2,400	821	140	90	68	1,750	2,600	970	194	59	118	61
20	2,750	789	138	88	67	2,350	1,970	857	188	89	112	61
21	2,610	660	135	88	67	2,890	1,620	782	187	78	108	59
22	1,820	594	133	86	67	3,320	1,470	718	177	162	128	55
23	1,150	475	130	86	67	3,300	1,420	682	171	150	112	55
24	894	430	126	84	66	2,800	1,510	665	155	483	108	54
25	751	390	122	82	66	2,450	1,630	654	138	475	94	54
26	673	375	118	82	66	2,200	1,550	660	134	349	88	62
27	619	370	115	80	66	1,900	1,420	659	124	317	81	59
28	568	370	112	80	66	1,530	1,300	629	118	275	76	66
29	544	365	110	78	66	1,280	1,190	645	118	288	73	65
30	530	315	108	76	-----	1,070	1,110	671	113	285	70	66
31	713	-----	108	76	-----	856	-----	763	-----	232	66	-----
TOTAL	23,064	23,514	4,966	2,826	2,030	30,690	52,210	27,754	9,852	4,708	3,687	1,874
MEAN	744	784	160	91.2	70.0	990	1,740	895	328	152	119	62.5
MAX	2,750	1,580	270	106	76	3,320	4,540	1,670	877	483	183	72
MIN	80	315	108	76	66	66	745	629	113	59	66	54
AC-FT	45,750	46,640	9,850	5,610	4,030	60,870	103,600	55,050	19,540	9,340	7,310	3,720

CAL YR 1971 TOTAL 105,807 MEAN 290 MAX 2,750 MIN 28 AC-FT 209,900
WTR YR 1972 TOTAL 187,175 MEAN 511 MAX 4,540 MIN 54 AC-FT 371,300

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.--11 years, 1,867 cfs (1,353,000 acre-ft per year); median of yearly mean discharges, 1,760 cfs (1,280,000 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 16,200 cfs Mar. 24 (gage height, 28.96 ft); minimum, 434 cfs Oct. 1 (gage height, 3.27 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. Records of chemical analyses for the current year are published in Part 2 of Water Resources Data for North Dakota.

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

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	474	2,160	1,710	1,030	891	772	4,750	4,680	7,300	1,530	1,610	902
2	636	2,650	1,620	1,030	902	783	4,600	4,380	7,400	1,520	1,520	902
3	868	2,840	1,450	1,040	902	805	4,810	4,030	6,860	1,490	1,450	853
4	1,310	2,900	1,280	1,040	890	812	5,160	3,730	6,160	1,450	1,370	812
5	1,190	2,830	1,160	1,040	890	826	5,300	3,470	5,270	1,400	1,270	790
6	1,030	2,570	1,120	1,020	890	834	5,500	3,340	4,550	1,350	1,190	780
7	933	1,910	1,150	1,000	890	834	5,600	3,350	4,140	1,310	1,190	769
8	841	1,560	1,180	1,000	891	834	5,700	3,370	3,940	1,280	1,180	765
9	801	1,520	1,200	1,000	883	826	5,600	3,320	3,780	1,250	1,150	758
10	758	1,470	1,230	1,000	864	819	5,500	3,260	3,580	1,210	1,110	747
11	740	1,430	1,220	1,000	857	816	5,650	3,180	3,400	1,140	1,090	708
12	733	1,400	1,150	1,010	841	823	6,300	3,100	3,260	1,080	1,090	672
13	704	1,350	1,040	1,010	823	841	10,000	3,100	3,130	1,040	1,080	664
14	654	1,800	990	1,010	812	891	12,900	3,630	2,980	1,050	1,090	700
15	625	1,770	1,050	982	801	1,020	13,900	5,250	2,800	1,170	1,110	682
16	593	1,650	1,170	948	805	1,640	13,900	6,630	2,670	1,330	1,100	636
17	697	1,530	1,200	933	812	3,950	12,100	6,350	2,560	1,460	1,080	589
18	2,410	1,490	1,150	930	812	6,820	10,800	5,580	2,470	1,520	1,010	559
19	4,060	1,420	1,130	925	808	8,970	9,600	4,920	2,410	1,540	967	550
20	4,520	1,400	1,110	920	808	10,600	8,550	4,520	2,360	1,590	936	541
21	4,520	1,430	1,100	920	780	12,500	7,420	4,170	2,280	1,490	952	518
22	3,910	1,510	1,110	920	765	15,500	6,630	3,860	2,190	1,450	1,070	504
23	2,990	1,580	1,100	920	762	15,100	6,180	3,860	2,120	1,510	1,140	527
24	2,340	1,400	1,090	910	762	15,700	6,000	4,240	2,040	1,860	1,040	547
25	1,980	1,400	1,080	910	769	16,200	5,940	4,730	1,930	1,960	948	559
26	1,780	1,450	1,070	910	776	15,600	5,760	5,200	1,840	1,880	920	603
27	1,840	1,550	1,060	900	780	14,200	5,550	5,300	1,730	1,830	940	625
28	1,550	1,670	1,050	900	780	12,300	5,320	4,880	1,650	1,750	990	632
29	1,470	1,750	1,060	900	769	9,900	5,120	4,720	1,590	1,790	974	625
30	1,450	1,740	1,040	900	-----	7,300	4,930	5,650	1,560	1,810	936	618
31	1,470	-----	1,020	895	-----	5,600	-----	6,600	-----	1,720	910	-----
TOTAL	49,677	53,130	36,090	29,853	24,015	184,416	215,070	136,400	99,950	45,760	34,393	20,137
MEAN	1,602	1,771	1,164	963	828	5,949	7,169	4,400	3,332	1,476	1,109	671
MAX	4,520	2,900	1,710	1,040	902	16,200	13,900	6,630	7,400	1,960	1,610	902
MIN	474	1,350	990	895	762	772	4,600	3,100	1,560	1,040	910	504
AC-FT	98,530	105,400	71,580	59,210	47,630	365,800	426,600	270,500	198,300	90,760	68,220	39,940

CAL YR 1971 TOTAL 438,805 MEAN 1,202 MAX 5,400 MIN 180 AC-FT 870,400
 #TR YR 1972 TOTAL 928,891 MEAN 2,538 MAX 16,200 MIN 474 AC-FT 1,842,000

RED RIVER OF THE NORTH BASIN

05067500 Marsh River near Shelly, Minn.

LOCATION.--Lat 47°24'45", long 96°45'50", in NE 1/4 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.--28 years, 75.6 cfs (54,770 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 2,070 cfs Apr. 15 (gage height, 16.26 ft); 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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9.8	81	14	1.2		0	103	51	17	.10	3.7	.80
2	50	131	14	1.2		0	114	49	15	.10	2.8	.60
3	68	202	12	1.1		0	118	45	12	0	2.3	.40
4	38	199	11	1.1		0	107	43	11	0	1.4	.30
5	45	153	10	1.0		0	128	43	11	0	1.0	.30
6	38	84	8.5	1.0		0	135	48	8.7	0	1.2	.10
7	26	74	7.0	.90		0	116	55	7.7	0	1.1	0
8	19	66	6.0	.90		0	112	52	6.7	0	2.2	0
9	33	48	5.5	.80		0	98	52	6.2	0	3.1	0
10	31	41	5.0	.80		.10	109	45	5.3	0	4.0	.30
11	27	38	4.7	.70		.20	126	41	5.1	0	4.5	.50
12	22	34	4.4	.60		.50	245	38	4.8	0	4.3	.30
13	18	33	4.1	.60		.90	1,170	42	4.5	0	3.4	1.2
14	16	34	3.8	.50		1.6	1,780	92	3.7	0	2.6	1.6
15	14	38	3.5	.50		8.0	1,830	213	3.3	0	2.0	1.8
16	16	49	3.0	.40		65	1,170	164	3.1	0	1.4	1.6
17	22	50	2.6	.40		190	568	104	2.5	0	1.0	2.3
18	39	56	2.3	.30		270	316	71	2.2	0	2.2	2.0
19	165	55	2.1	.30		385	205	56	2.0	4.0	1.6	1.2
20	250	53	1.9	.20		610	149	46	2.0	12	2.0	.70
21	222	48	1.8	.20		1,010	116	38	1.7	24	2.3	.60
22	185	41	1.7	.20		960	100	35	1.6	30	4.0	.30
23	135	35	1.6	.20		790	102	28	1.2	21	4.5	.10
24	94	30	1.5	.10		1,220	132	27	.90	18	2.5	0
25	69	27	1.5	.10		1,460	133	24	.70	13	3.3	0
26	53	25	1.4	.10		1,250	96	24	.60	9.3	4.3	.10
27	44	24	1.4	.10		720	78	22	.50	8.2	2.0	.10
28	36	22	1.4	0		363	68	20	.20	6.7	1.4	.10
29	30	19	1.3	0		225	61	35	.10	6.4	1.0	.10
30	29	17	1.3	0	-----	185	55	19	.10	5.8	.70	.20
31	38	-----	1.3	0	-----	142	-----	19	-----	4.5	1.4	-----
TOTAL	1,881.8	1,807	141.6	15.50	0	9,856.30	9,640	1,641	141.40	163.10	75.20	17.60
MEAN	60.7	60.2	4.57	.50	0	318	321	52.9	4.71	5.26	2.43	.59
MAX	250	202	14	1.2	0	1,460	1,830	213	17	30	4.5	2.3
MIN	9.8	17	1.3	0	0	0	55	19	.10	0	.70	0
AC-FT	3,730	3,580	281	31	0	19,550	19,120	3,250	280	324	149	35
CAL YR 1971	TOTAL	8,564.60	MEAN	23.5	MAX	580	MIN	0	AC-FT	16,990		
WTR YR 1972	TOTAL	25,380.50	MEAN	69.3	MAX	1,830	MIN	0	AC-FT	50,340		

CAL YR 1971	TOTAL 31,972.1	MEAN 87.6	MAX 1,400	MIN 7.1	AC-FT 63,420
WTR YR 1972	TOTAL 56,633.0	MEAN 155	MAX 2,090	MIN 14	AC-FT 112,300

RED RIVER OF THE NORTH BASIN

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, staff gage at same site and datum. Staff gages at Waskish and Redby at datum 69.00 ft lower.

EXTREMES.--Current year: Maximum gage height, 6.33 ft May 25 (affected by wind action); maximum daily, 6.19 ft May 29; minimum daily, 4.60 ft Oct. 4, 14.

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 1971 TO SEPTEMBER 1972

Oct. 31	4.63	Feb. 29	5.14	June 30	5.42
Nov. 30	5.44	Mar. 31	5.18	July 31	5.76
Dec. 31	5.33	Apr. 30	5.76	Aug. 31	5.31
Jan. 31	5.23	May 31	5.86	Sept.30	5.01

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.---39 years, 464 cfs (336,200 acre-ft per year).

EXTREMES.---Current year: Maximum daily discharge, 1,220 cfs May 17; maximum gage height, 7.43 ft July 10 (affected by backwater from aquatic vegetation, and by wind action); minimum discharge, 155 cfs Nov. 7; minimum gage height, 2.36 ft Oct. 30.
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.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	221	165	455	755	822	845	553	738	1,180	927	819	1,030
2	196	174	455	755	820	850	546	759	1,160	923	815	1,040
3	191	175	550	758	820	855	556	782	1,130	919	819	1,020
4	187	160	600	762	820	860	560	759	1,100	896	808	1,000
5	193	160	590	765	820	865	539	748	1,090	878	826	992
6	202	158	580	765	820	870	529	745	1,070	867	893	1,020
7	203	155	585	765	820	880	529	727	1,050	848	870	1,020
8	189	158	670	770	822	890	539	741	1,030	837	900	1,020
9	186	165	675	775	822	895	550	698	992	826	885	1,020
10	184	180	685	780	822	890	574	606	988	830	885	1,010
11	179	519	790	782	825	885	564	598	980	837	889	1,020
12	174	502	820	785	825	860	553	606	965	808	889	1,040
13	170	461	810	795	825	810	384	616	946	709	893	1,060
14	174	445	800	815	828	760	193	616	927	578	923	1,020
15	167	451	795	830	830	730	211	623	911	532	911	1,030
16	157	512	790	840	830	670	235	896	904	495	949	1,020
17	174	498	785	845	830	532	203	1,220	896	485	984	1,030
18	177	464	780	848	828	525	198	1,140	885	491	992	992
19	184	478	775	852	828	532	202	968	867	505	1,000	874
20	170	475	775	855	830	536	205	949	856	525	1,010	844
21	165	472	775	855	830	560	254	938	852	532	1,020	819
22	162	470	770	855	832	539	198	930	852	539	1,040	800
23	157	470	768	852	835	539	184	934	848	539	1,070	800
24	158	465	765	850	835	532	184	938	848	556	1,070	808
25	158	460	760	845	835	550	360	949	852	574	1,060	808
26	162	460	757	840	837	539	770	957	852	634	1,060	815
27	165	458	755	835	840	519	756	1,000	852	727	1,050	808
28	165	456	750	832	840	567	745	1,120	848	756	1,050	819
29	160	455	750	830	842	570	745	1,180	900	774	1,060	815
30	157	455	752	830	-----	570	745	1,200	927	793	1,040	808
31	191	-----	752	825	-----	578	-----	1,180	-----	804	1,030	-----
TOTAL	5,478	11,076	22,119	25,146	24,013	21,603	13,364	26,861	28,558	21,944	29,510	28,202
MEAN	177	369	714	811	828	697	445	866	952	708	952	940
MAX	221	519	820	855	842	895	770	1,220	1,180	927	1,070	1,060
MIN	157	155	455	755	820	519	184	598	848	485	808	800
AC-FT	10,870	21,970	43,870	49,880	47,630	42,850	26,510	53,280	56,640	43,530	58,530	55,940
CAL YR 1971	TOTAL	212,343	MEAN	582	MAX	889	MIN	94	AC-FT	421,200		
WTR YR 1972	TOTAL	257,874	MEAN	705	MAX	1,220	MIN	155	AC-FT	511,500		

05076000 Thief River near Thief River Falls, Minn.

LOCATION.--Lat 48°11'08", long 96°10'11", in NW 1/4 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.--55 years, 155 cfs (112,300 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 2,340 cfs Apr. 18 (gage height, 11.73 ft, from graph based on gage readings); maximum gage height, 15.36 ft Apr. 15 (backwater from ice); minimum discharge, 0.48 cfs Sept. 24, (gage height, 4.04 ft).

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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	268	1,050	40	4.4	1.9	1.6	235	1,330	299	2.4	5.8	9.3
2	461	1,160	36	4.2	1.9	1.7	225	1,290	122	1.6	4.4	5.1
3	548	1,250	33	4.0	1.9	1.8	220	1,260	77	1.4	4.3	5.0
4	608	1,130	31	3.8	1.8	2.1	215	1,150	61	.93	4.1	3.2
5	558	1,130	29	3.6	1.8	2.4	215	762	39	.75	3.6	1.2
6	486	1,290	27	3.5	1.8	2.8	215	685	30	.70	4.0	1.3
7	430	2,100	24	3.4	1.8	3.2	220	671	24	1.3	4.9	1.1
8	387	2,310	23	3.2	1.8	3.6	230	657	19	2.1	6.9	3.0
9	366	2,200	22	3.1	1.8	3.8	245	431	15	1.3	5.2	3.6
10	347	1,970	21	2.9	1.8	4.2	280	295	11	1.2	4.6	2.4
11	326	1,470	20	2.8	1.8	4.7	380	194	8.3	.92	5.1	1.6
12	310	906	18	2.7	1.8	5.5	550	199	7.1	3.9	5.4	1.5
13	296	806	17	2.6	1.8	6.6	900	207	7.6	11	5.4	2.8
14	279	687	16	2.5	1.8	7.6	1,290	230	8.1	7.2	4.8	3.4
15	270	761	16	2.5	1.8	9.2	1,760	262	5.8	5.1	4.0	3.1
16	262	775	15	2.4	1.7	13	2,050	255	9.1	2.9	3.1	1.7
17	373	700	14	2.4	1.7	20	2,250	238	13	2.5	3.2	1.2
18	676	649	13	2.3	1.7	35	2,320	222	13	2.3	3.4	1.6
19	900	592	13	2.3	1.7	60	2,280	208	64	3.5	2.3	1.9
20	850	499	12	2.3	1.7	100	2,070	198	643	10	2.0	2.5
21	740	440	11	2.3	1.7	180	1,790	192	615	11	2.7	1.8
22	646	365	10	2.2	1.7	275	1,800	202	291	33	2.9	1.1
23	564	290	9.0	2.2	1.6	450	1,780	352	146	49	11	.68
24	506	225	8.0	2.2	1.6	610	1,720	367	23	40	11	.60
25	470	170	7.2	2.1	1.6	670	1,670	375	10	33	9.0	.57
26	439	130	6.5	2.1	1.6	660	1,570	384	7.0	25	6.8	.58
27	408	100	6.0	2.1	1.6	580	1,490	381	6.6	20	5.4	1.5
28	353	73	5.5	2.0	1.6	420	1,470	377	5.4	17	4.2	2.7
29	324	54	5.2	2.0	1.6	370	1,430	400	4.6	14	3.4	2.4
30	332	46	4.8	2.0	-----	305	1,370	459	3.3	11	3.3	2.9
31	759	-----	4.6	1.9	-----	265	-----	445	-----	8.7	11	-----
TOTAL	14,542	25,328	517.8	84.0	50.4	5,073.8	34,240	14,678	2,587.9	324.70	157.2	71.33
MEAN	469	844	16.7	2.71	1.74	164	1,141	473	86.3	10.5	5.07	2.38
MAX	900	2,310	40	4.4	1.9	670	2,320	1,330	643	49	11	9.3
MIN	262	46	4.6	1.9	1.6	1.6	215	192	3.3	.70	2.0	.57
AC-FT	28,840	50,240	1,030	167	100	10,060	67,920	29,110	5,130	644	312	141

CAL YR 1971 TOTAL 58,556.64 MEAN 160 MAX 2,310 MIN .10 AC-FT 116,100
WTR YR 1972 TOTAL 97,655.13 MEAN 267 MAX 2,320 MIN .57 AC-FT 193,700

NOTE.--No gage-height record Jan. 21 to Mar. 21.

RED RIVER OF THE NORTH BASIN

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.--12 years, 14.6 cfs (10,580 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 237 cfs Apr. 17 (gage height, 4.87 ft, from graph based on gage readings); maximum gage height, 6.00 ft Mar. 23 (from graph based on gage readings, backwater from ice); minimum discharge, 0.8 cfs Sept. 21, 22.

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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	31	83	9.8	7.1	5.9	3.5	28	25	33	2.4	4.8	2.4
2	33	75	9.5	7.1	5.8	3.3	29	31	33	2.2	3.4	2.2
3	21	69	9.4	7.1	5.7	3.2	29	27	34	3.0	3.4	1.8
4	14	59	9.2	7.1	5.6	3.1	31	24	28	2.4	3.2	1.8
5	11	50	9.1	7.0	5.6	3.0	30	30	23	2.6	2.6	1.8
6	9.6	42	9.0	7.0	5.5	3.0	31	42	17	2.2	15	2.4
7	9.6	35	8.9	7.0	5.4	3.0	33	39	8.5	2.4	15	2.4
8	9.6	28	8.8	6.9	5.4	3.0	34	35	7.6	2.4	36	2.2
9	9.9	27	8.7	6.8	5.3	3.0	36	35	6.6	2.2	26	2.4
10	9.3	25	8.6	6.8	5.2	2.8	37	32	5.9	3.2	24	2.6
11	7.9	24	8.5	6.7	5.2	2.6	44	23	5.2	2.4	21	3.2
12	7.1	22	8.5	6.7	5.1	2.5	68	21	4.1	2.0	17	2.8
13	6.4	21	8.4	6.6	5.0	2.5	90	42	4.1	1.8	13	5.7
14	5.9	26	8.3	6.6	5.0	3.2	130	64	9.0	2.2	10	5.4
15	5.7	34	8.3	6.6	4.9	5.0	166	45	5.4	1.8	7.4	3.7
16	8.2	31	8.2	6.6	4.8	11	211	40	4.3	1.4	5.4	2.8
17	139	32	8.1	6.6	4.7	19	195	33	4.8	1.4	4.8	2.8
18	99	33	8.1	6.5	4.6	23	158	28	9.0	2.0	4.1	1.6
19	85	31	8.0	6.5	4.5	27	135	20	7.6	3.7	4.5	1.0
20	75	29	7.9	6.5	4.4	31	108	16	5.2	6.9	3.9	1.2
21	68	25	7.8	6.5	4.3	34	93	12	4.1	5.4	6.2	.80
22	56	22	7.7	6.5	4.2	37	83	10	4.1	51	5.7	.80
23	43	21	7.6	6.4	4.1	40	83	9.6	2.8	123	4.3	1.0
24	34	20	7.5	6.4	4.0	42	72	14	2.2	50	3.2	1.2
25	27	18	7.5	6.4	3.9	43	61	27	2.0	25	3.0	5.9
26	23	14	7.5	6.3	3.8	44	54	22	1.8	16	3.2	2.8
27	22	13	7.4	6.3	3.7	39	47	19	2.0	14	2.4	2.4
28	21	11	7.3	6.2	3.6	32	40	25	3.7	9.9	1.8	3.2
29	18	11	7.3	6.1	3.6	28	35	52	3.9	8.8	1.4	3.0
30	44	10	7.2	6.1	-----	27	31	45	3.0	7.1	1.4	2.8
31	121	-----	7.1	6.0	-----	27	-----	40	-----	5.2	2.6	-----
TOTAL	1,074.2	941	255.2	205.0	138.8	550.7	2,222	927.6	284.9	366.0	259.7	76.10
MEAN	34.7	31.4	8.23	6.61	4.79	17.8	74.1	29.9	9.50	11.8	8.38	2.54
MAX	139	83	9.8	7.1	5.9	44	211	64	34	123	36	5.9
MIN	5.7	10	7.1	6.0	3.6	2.5	28	9.6	1.8	1.4	1.4	.80
AC-FT	2,130	1,870	506	407	275	1,090	4,410	1,840	565	726	515	151

CAL YR 1971 TOTAL 5,103.60 MEAN 14.0 MAX 165 MIN 1.0 AC-FT 10,120
WTR YR 1972 TOTAL 7,301.20 MEAN 19.9 MAX 211 MIN .80 AC-FT 14,480

PEAK DISCHARGE (BASE, 65 CFS)

DATE	TIME	G.HT.	DISCHARGE	DATE	TIME	G.HT.	DISCHARGE
10-17	0300	4.18	186	4-17	0100	4.87	237
10-31	0200	3.75	154	7-23	0700	3.78	153

05078000 Clearwater River at Plummer, Minn.

LOCATION.--Lat 47°55'24", long 96°02'46", in SE 1/4 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.--33 years, 178 cfs (129,000 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 2,550 cfs Apr. 16 (gage height, 10.33 ft); maximum gage height, 10.93 ft Apr. 15 (backwater from ice); minimum discharge, 39 cfs July 9 (gage height, 2.51 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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	477	1,110	188	65	76	66	340	578	415	78	144	85
2	740	1,220	185	65	75	65	330	522	367	59	132	89
3	802	1,130	180	64	75	65	325	500	344	53	124	86
4	642	1,020	172	64	75	66	320	459	308	66	129	78
5	474	880	160	64	75	67	315	423	277	68	127	73
6	377	694	150	64	75	67	305	435	229	66	150	73
7	312	487	137	64	75	68	300	469	183	62	214	72
8	272	420	127	64	76	68	290	465	146	46	268	78
9	243	390	115	63	77	68	285	402	131	42	317	74
10	222	380	105	63	79	67	290	356	112	53	329	69
11	201	390	100	63	83	66	390	326	95	58	304	66
12	181	395	97	63	84	66	600	334	90	60	286	74
13	171	421	94	63	85	66	1,050	328	89	54	296	93
14	165	449	90	63	84	66	1,850	482	80	50	285	148
15	158	591	86	64	82	67	2,200	624	111	49	258	158
16	149	612	84	64	80	68	2,330	574	109	62	268	145
17	278	553	82	65	78	76	1,930	521	96	75	248	130
18	760	507	80	66	76	85	1,710	458	92	73	227	107
19	983	475	78	68	74	120	1,550	416	93	76	211	96
20	1,130	443	77	71	71	220	1,460	372	106	197	220	88
21	974	396	76	72	70	330	1,360	336	98	206	187	77
22	756	325	74	73	69	380	1,270	319	89	167	183	76
23	620	280	73	74	68	430	1,170	311	72	177	188	71
24	553	255	72	74	68	470	1,120	273	63	322	162	66
25	491	240	71	75	67	530	1,040	254	74	352	155	63
26	442	230	70	76	67	600	948	302	85	256	136	66
27	416	215	69	76	66	570	844	301	85	205	123	64
28	405	205	68	77	66	510	768	295	58	179	110	70
29	364	198	67	77	66	440	689	577	53	172	102	69
30	388	192	66	76	-----	400	623	699	75	163	95	70
31	831	-----	66	76	-----	360	-----	540	-----	147	88	-----
TOTAL	14,977	15,103	3,159	2,116	2,162	6,587	28,002	13,251	4,225	3,693	6,066	2,574
MEAN	483	503	102	68.3	74.6	212	933	427	141	119	196	85.8
MAX	1,130	1,220	188	77	85	600	2,330	699	415	352	329	158
MIN	149	192	66	63	66	65	285	254	53	42	88	63
AC-FT	29,710	29,960	6,270	4,200	4,290	13,070	55,540	26,280	8,380	7,330	12,030	5,110

CAL YR 1971 TOTAL 69,777 MEAN 191 MAX 1,390 MIN 40 AC-FT 138,400
WTR YR 1972 TOTAL 101,915 MEAN 278 MAX 2,330 MIN 42 AC-FT 202,100

PEAK DISCHARGE (BASE, 500 CFS)

DATE	TIME	G.H.T	DISCHARGE	DATE	TIME	G.H.T	DISCHARGE
10-3	1000	6.39	816	3-26	0330	8.16	612
10-20	0800	7.53	1,150	4-16	0130	10.33	2,550
11-2	0400	7.84	1,250	5-15	1030	5.60	635
11-16	0130	5.75	622	5-30	0500	5.94	724

RED RIVER OF THE NORTH BASIN

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 Apr. 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.--12 years, 81.5 cfs (59,050 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 2,070 cfs Apr. 15 (gage height, 13.98 ft, backwater from ice); minimum daily discharge, 5.6 cfs July 15; minimum gage height, 2.70 ft July 15, 18.
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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1,520	860	60	15	10	8.7	145	189	151	16	19	16
2	1,510	770	57	15	10	8.7	155	178	138	11	28	16
3	1,100	650	54	14	10	8.7	155	167	125	7.0	22	16
4	943	500	51	14	10	8.7	155	163	110	6.6	19	16
5	712	320	48	14	10	8.8	145	163	85	13	16	14
6	593	240	46	13	9.8	9.0	140	193	64	9.3	14	22
7	490	180	44	13	9.8	9.0	130	187	49	11	26	16
8	404	150	42	13	9.6	9.0	120	181	40	9.1	67	14
9	346	145	40	13	9.6	9.2	115	176	31	11	68	17
10	334	140	38	13	9.6	9.2	130	171	35	10	56	17
11	298	140	37	12	9.4	9.2	260	169	37	11	52	15
12	183	145	35	12	9.4	9.4	530	169	24	8.6	43	19
13	91	160	34	12	9.4	9.4	1,300	174	22	7.9	40	39
14	56	186	32	12	9.2	9.6	1,800	275	28	6.8	39	42
15	43	235	30	12	9.2	11	1,950	516	36	5.6	38	24
16	38	277	28	12	9.2	20	1,400	390	34	6.8	32	28
17	290	269	27	12	9.0	38	1,030	247	28	6.4	30	22
18	1,260	256	25	12	9.0	60	869	181	26	5.8	27	19
19	990	212	24	12	9.0	130	627	174	37	25	26	18
20	753	174	22	12	9.0	225	536	160	34	48	29	16
21	483	150	21	12	8.8	730	474	160	33	46	33	16
22	305	130	20	11	8.8	610	433	158	31	52	28	14
23	218	110	19	11	8.8	580	407	153	28	101	34	14
24	214	98	19	11	8.8	665	424	147	24	134	24	14
25	158	90	18	11	8.8	590	370	183	21	154	22	14
26	130	84	17	11	8.8	370	322	210	20	101	21	16
27	129	78	17	11	8.7	270	289	195	18	59	19	16
28	121	72	16	11	8.7	210	254	280	19	45	18	17
29	109	68	16	11	8.7	180	228	410	24	35	18	17
30	200	64	15	11	-----	160	202	377	17	28	16	16
31	550	-----	15	11	-----	140	-----	234	-----	26	17	-----
TOTAL	14,571	6,953	967	379	269.1	5,115.6	15,075	6,730	1,370	1,016.9	941	560
MEAN	470	232	31.2	12.2	9.28	165	533	217	45.7	32.8	30.4	18.7
MAX	1,520	860	60	15	10	730	1,950	516	151	154	68	42
MIN	38	64	15	11	8.7	8.7	115	147	17	5.6	14	14
AC-FT	28,900	13,790	1,920	752	534	10,150	29,900	13,350	2,720	2,020	1,870	1,110

CAL YR 1971 TOTAL 39,837.9 MEAN 109 MAX 1,520 MIN 6.8 AC-FT 79,020
WTR YR 1972 TOTAL 53,947.6 MEAN 147 MAX 1,950 MIN 5.6 AC-FT 107,000

05078500 Clearwater River at Red Lake Falls, Minn.

LOCATION.--Lat 47°53'15", long 96°16'25", in NW 1/4 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.--46 years, 311 cfs (225,300 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 6,720 cfs Apr. 16 (gage height, 9.95 ft); maximum gage height, 13.82 ft Mar. 21 (backwater from ice); minimum discharge, 31 cfs July 12 (gage height, 1.79 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.

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

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	773	3,170	325	106	100	106	961	1,310	888	113	208	129
2	2,310	3,320	315	106	98	106	935	1,210	737	115	202	126
3	2,820	3,080	305	105	98	104	983	1,140	667	90	188	132
4	2,390	2,580	295	104	96	104	936	1,080	627	78	180	128
5	1,690	2,190	280	104	96	105	905	1,020	560	86	175	120
6	1,290	1,690	270	103	96	106	853	1,030	480	94	182	120
7	1,120	1,120	260	102	96	106	836	1,090	410	90	300	121
8	969	950	250	100	95	108	778	1,090	350	88	376	120
9	855	870	240	100	96	110	787	1,010	275	74	417	127
10	758	860	225	98	98	110	758	913	210	64	468	123
11	667	865	210	98	104	112	862	846	170	67	452	114
12	591	880	200	98	110	115	1,420	820	160	60	422	123
13	531	940	190	97	112	117	4,040	843	155	64	405	146
14	486	1,120	180	97	112	120	4,950	1,160	160	73	398	176
15	448	1,470	170	97	110	135	5,910	1,690	165	65	373	249
16	416	1,610	160	98	110	170	6,200	1,520	170	64	366	239
17	552	1,450	152	99	108	450	5,010	1,260	180	71	416	221
18	2,050	1,320	145	100	106	870	4,240	1,070	180	80	396	196
19	3,010	1,230	140	100	106	1,200	3,690	952	175	102	349	173
20	2,950	1,110	135	110	104	1,550	3,250	865	167	239	232	157
21	2,340	869	132	115	104	1,750	2,930	781	155	351	334	140
22	1,830	705	128	112	102	2,000	2,680	729	140	273	290	128
23	1,580	610	125	111	102	2,350	2,580	691	127	230	282	123
24	1,390	550	120	110	104	2,200	2,590	658	112	270	275	120
25	1,240	500	118	110	105	2,100	2,370	609	105	476	236	111
26	1,110	450	116	108	106	2,000	2,110	687	108	468	215	113
27	1,010	415	114	108	106	1,850	1,880	724	120	363	190	116
28	929	385	112	106	108	1,550	1,690	677	130	298	175	118
29	866	355	110	104	108	1,400	1,540	829	112	267	160	119
30	844	340	108	102	-----	1,200	1,400	1,360	98	254	150	118
31	2,050	-----	108	100	-----	1,070	-----	1,180	-----	230	140	-----
TOTAL	41,865	37,004	5,738	3,208	2,996	25,374	70,074	30,844	8,093	5,257	9,052	4,246
MEAN	1,350	1,233	185	103	103	819	2,336	995	270	170	292	142
MAX	3,010	3,320	325	115	112	2,350	6,200	1,690	888	476	468	249
MIN	416	340	108	97	95	104	758	609	98	60	140	111
AC-FT	83,040	73,400	11,380	6,360	5,940	50,330	139,000	61,180	16,050	10,430	17,950	8,420
CAL YR 1971	TOTAL 158,110	MEAN 433	MAX 3,350	MIN 57	AC-FT 313,600							
WTR YR 1972	TOTAL 243,751	MEAN 666	MAX 6,200	MIN 60	AC-FT 483,500							

RED RIVER OF THE NORTH BASIN

05079000 Red Lake River at Crookston, Minn.

LOCATION.--Lat 47°46'32", long 96°36'33", in S.W. 1/4 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.--71 years, 1,083 cfs (784,600 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 14,700 cfs Apr. 16 (gage height, 20.28 ft); maximum gage height, 22.03 ft Apr. 14 (backwater from ice); minimum discharge, 730 cfs July 12 (gage height, 4.37 ft).
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 powerplant upstream).

REMARKS.--Records good except those for winter periods, which are fair. Diurnal fluctuation caused by powerplant upstream. Flow partially regulated by outlet dam at Red Lake. Records of chemical analyses for the current year are published in Part 2 of this report.

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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1,650	5,780	1,060	925	935	980	2,210	4,460	3,320	920	887	1,160
2	4,040	6,650	1,050	920	930	990	2,050	4,280	2,830	920	908	1,160
3	5,230	6,590	1,040	915	930	1,000	1,940	4,070	2,400	931	888	1,170
4	5,040	5,980	1,040	905	925	1,010	1,860	3,940	2,210	909	874	1,170
5	4,060	5,030	1,040	900	915	1,020	1,810	3,770	2,070	924	886	1,180
6	3,210	4,350	1,040	892	905	1,030	1,750	3,340	1,940	933	1,010	1,190
7	2,660	2,260	1,030	890	900	1,030	1,700	3,230	1,850	928	1,060	1,280
8	2,320	2,010	1,040	888	890	1,030	1,660	3,260	1,700	903	1,150	1,230
9	2,040	2,670	1,060	886	885	1,020	1,620	3,210	1,620	918	1,290	1,220
10	1,840	3,350	1,080	885	880	1,010	1,610	2,850	1,540	872	1,390	1,230
11	1,650	3,420	1,100	885	880	1,010	1,670	2,550	1,470	892	1,490	1,230
12	1,500	3,430	1,120	882	885	1,000	1,980	2,260	1,460	784	1,420	1,290
13	1,360	3,340	1,130	880	895	995	3,600	2,180	1,440	834	1,360	1,450
14	1,260	3,620	1,130	880	900	990	9,110	2,290	1,420	872	1,350	1,440
15	1,180	4,000	1,140	880	910	980	12,800	2,900	1,330	875	1,310	1,490
16	1,100	4,550	1,130	880	910	1,070	14,300	3,270	1,280	852	1,230	1,570
17	1,220	4,210	1,120	882	915	1,720	13,700	2,950	1,280	765	1,220	1,500
18	3,060	3,750	1,120	885	925	2,250	11,100	2,650	1,250	769	1,240	1,460
19	5,650	3,400	1,110	885	930	2,500	9,430	2,780	1,380	786	1,220	1,330
20	6,050	2,980	1,100	890	935	2,600	8,260	2,830	1,360	843	1,180	1,470
21	5,090	2,370	1,080	890	935	3,800	7,460	2,680	1,810	1,010	1,250	1,410
22	4,110	1,910	1,060	895	940	5,890	6,760	2,490	1,940	1,160	1,250	1,350
23	3,490	1,530	1,040	900	940	4,650	6,350	2,340	1,550	1,070	1,190	1,280
24	3,060	1,320	1,030	910	945	4,160	6,320	2,410	1,350	1,030	1,210	1,180
25	2,720	1,180	1,020	920	945	4,750	5,890	2,390	1,130	1,080	1,190	1,160
26	2,480	1,130	1,000	925	950	4,970	5,470	2,380	1,110	1,210	1,170	1,150
27	2,260	1,110	990	930	960	4,650	5,090	2,510	1,080	1,170	1,180	1,150
28	2,100	1,090	970	940	965	4,080	5,100	2,510	1,000	1,050	1,170	1,160
29	1,930	1,070	950	945	970	3,570	4,960	2,540	969	993	1,160	1,150
30	1,860	1,070	940	945	-----	2,840	4,700	3,250	931	936	1,170	1,140
31	2,700	-----	930	940	-----	2,400	-----	3,700	-----	972	1,170	-----
TOTAL	87,920	95,150	32,690	27,975	26,730	70,995	162,240	92,270	48,020	29,111	36,473	38,350
MEAN	2,836	3,172	1,055	902	922	2,290	5,409	2,976	1,601	939	1,177	1,278
MAX	6,050	6,650	1,140	945	970	5,890	14,300	4,460	3,320	1,210	1,490	1,570
MIN	1,100	1,070	930	880	880	980	1,610	2,180	931	765	874	1,140
AC-FT	174,400	188,700	64,840	55,490	53,020	140,800	321,800	183,000	95,250	57,740	72,340	76,070

CAL YR 1971 TOTAL 525,296 MEAN 1,439 MAX 11,000 MIN 385 AC-FT 1,042,000
WTR YR 1972 TOTAL 747,944 MEAN 2,044 MAX 14,300 MIN 765 AC-FT 1,484,000

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1,000	3,830	4,100	2,450	1,500	1,500	15,100	10,200	10,200	2,440	2,620	2,030
2	1,850	6,050	3,900	2,400	1,500	1,500	12,100	9,650	10,300	2,380	2,500	2,000
3	3,740	8,100	3,800	2,400	1,500	1,500	9,750	9,080	10,000	2,320	2,420	1,990
4	5,340	9,060	3,650	2,350	1,500	1,500	9,200	8,500	9,400	2,300	2,320	1,980
5	6,030	9,320	3,500	2,350	1,500	1,500	8,880	8,000	8,700	2,240	2,240	1,960
6	5,760	8,750	3,400	2,300	1,500	1,500	8,680	7,400	7,500	2,190	2,210	1,960
7	4,800	6,880	3,400	2,300	1,500	1,550	8,520	7,200	6,600	2,160	2,210	1,980
8	3,970	5,300	3,300	2,200	1,500	1,550	8,390	6,950	6,080	2,100	2,210	1,970
9	3,420	4,460	3,200	2,100	1,450	1,550	8,300	6,690	5,650	2,060	2,230	1,970
10	3,060	4,550	3,150	2,000	1,450	1,550	8,270	6,620	5,400	2,030	2,320	1,940
11	2,780	5,100	3,100	2,000	1,450	1,550	8,250	6,520	5,100	1,990	2,380	1,940
12	2,580	5,360	3,100	2,000	1,450	1,550	8,600	6,160	4,850	1,910	2,430	1,960
13	2,400	5,430	3,100	1,900	1,450	1,600	12,000	5,850	4,690	1,840	2,450	2,020
14	2,240	5,430	3,050	1,800	1,450	1,700	18,300	5,660	4,580	1,800	2,420	2,000
15	2,100	5,620	3,000	1,700	1,450	1,900	23,400	5,680	4,390	1,800	2,390	2,000
16	1,960	6,000	2,950	1,700	1,450	2,500	27,600	7,600	4,190	1,830	2,380	2,020
17	1,920	6,300	3,000	1,600	1,450	4,150	30,400	9,800	3,940	1,920	2,340	2,050
18	2,020	6,350	3,050	1,600	1,500	6,200	30,800	9,700	3,860	2,000	2,270	2,030
19	3,630	6,000	3,050	1,500	1,500	8,500	27,900	8,600	3,810	2,110	2,250	1,960
20	7,480	5,550	2,950	1,500	1,500	10,600	26,000	7,850	3,760	2,250	2,200	1,880
21	9,310	5,000	2,900	1,500	1,500	12,700	24,200	7,250	3,740	2,320	2,130	1,830
22	9,660	4,000	2,850	1,500	1,480	14,900	21,600	6,830	3,850	2,380	2,170	1,850
23	8,760	3,150	2,800	1,500	1,480	16,900	19,000	6,320	3,980	2,460	2,220	1,790
24	7,110	2,700	2,750	1,500	1,480	18,400	16,900	6,100	3,750	2,480	2,260	1,750
25	5,860	2,600	2,750	1,500	1,480	19,900	15,700	6,300	3,440	2,590	2,250	1,710
26	4,940	2,500	2,700	1,500	1,480	21,400	14,700	6,900	3,140	2,780	2,170	1,700
27	4,490	2,650	2,650	1,500	1,480	23,000	13,600	7,600	2,950	2,910	2,080	1,710
28	4,080	3,100	2,600	1,500	1,480	23,500	12,500	8,100	2,820	2,880	2,050	1,720
29	3,740	3,400	2,550	1,500	1,500	22,200	11,600	8,100	2,660	2,760	2,060	1,720
30	3,520	4,000	2,500	1,500	-----	20,200	10,900	8,100	2,580	2,680	2,070	1,740
31	3,940	-----	2,450	1,500	-----	17,900	-----	9,600	-----	2,660	2,040	-----
TOTAL	132,990	156,540	95,250	56,650	42,910	266,450	471,140	235,510	155,910	70,570	70,290	57,160
MEAN	4,290	5,218	3,073	1,827	1,480	8,595	15,700	7,597	5,197	2,276	2,267	1,905
MAX	9,660	9,320	4,100	2,450	1,500	23,500	30,800	10,200	10,300	2,910	2,620	2,050
MIN	1,000	2,500	2,450	1,500	1,450	1,500	8,250	5,660	2,580	1,800	2,040	1,700
AC=FT	263,800	310,500	188,900	112,400	85,110	528,500	934,500	467,100	309,200	140,000	139,400	113,400
CAL YR 1971	TOTAL 1,033,230			MEAN 2,831		MAX 15,800		MIN 696		AC=FT 2,049,000		
NYR YR 1972	TOTAL 1,811,370			MEAN 4,949		MAX 30,800		MIN 1,000		AC=FT 3,593,000		

RED RIVER OF THE NORTH BASIN

05087500 Middle River at Argyle, Minn.

LOCATION.--Lat 48°20'27", long 96°49'02", in SE 1/4 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.--22 years (1950-72), 43.8 cfs (31,730 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 729 cfs Apr. 17 (gage height, 10.12 ft); no flow for many days.
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 good except those for winter period, which are fair.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.10	3.0	5.8	.80	.20	0	40	89	15	9.6	0	0
2	.50	2.7	5.4	.70	.20	0	36	79	15	7.6	0	0
3	.10	2.5	5.0	.70	.20	0	34	69	19	6.4	0	0
4	.20	2.3	4.7	.60	.20	0	36	61	18	5.2	0	0
5	.30	2.2	4.4	.60	.20	0	40	55	16	4.6	0	0
6	.30	2.1	4.2	.50	.10	0	42	50	12	4.1	.10	.30
7	.30	2.0	4.1	.50	.10	0	40	45	9.5	3.6	.10	0
8	.20	1.9	3.9	.50	.10	0	38	44	8.5	3.3	.10	0
9	.20	1.8	3.8	.40	.10	0	36	42	6.7	3.0	0	0
10	.20	1.8	3.7	.40	.10	0	35	41	5.5	2.7	0	0
11	.20	1.7	3.6	.40	.10	0	36	38	4.5	2.4	0	0
12	.20	1.7	3.4	.40	.10	0	62	36	4.2	2.8	0	0
13	.20	1.9	3.3	.30	0	0	132	34	5.3	1.9	.10	.10
14	.10	2.2	3.2	.30	0	0	277	31	3.2	1.7	.10	0
15	.20	2.9	3.0	.30	0	0	363	29	2.6	1.6	.10	0
16	.30	3.6	2.8	.30	0	0	556	30	2.4	1.1	0	0
17	1.3	4.8	2.6	.30	0	.10	708	31	2.2	1.1	0	0
18	1.3	6.8	2.4	.30	0	.30	702	31	3.8	.90	0	0
19	.80	10	2.2	.30	0	.90	610	29	5.2	.80	0	0
20	.80	17	2.0	.30	0	2.5	490	28	18	.60	0	0
21	.90	22	1.9	.30	0	6.8	384	26	76	.70	0	0
22	1.4	24	1.7	.20	0	25	303	25	64	.60	0	0
23	1.5	26	1.5	.20	0	55	245	23	50	.50	0	0
24	.80	22	1.4	.20	0	72	213	23	40	.30	0	0
25	.60	17	1.3	.20	0	95	199	23	31	.20	0	0
26	.80	13	1.2	.20	0	80	186	21	25	.20	0	.30
27	.80	9.5	1.1	.20	0	74	163	19	20	.50	0	0
28	1.0	8.0	1.0	.20	0	69	135	18	16	.30	0	0
29	1.1	7.3	1.0	.20	0	60	113	16	13	.20	0	0
30	1.9	6.4	.90	.20	-----	53	100	15	11	.10	0	0
31	3.2	-----	.80	.20	-----	46	-----	14	-----	.10	0	-----
TOTAL	21.80	230.1	87.30	11.20	1.70	639.60	6,354	1,115	522.6	68.70	.60	.70
MEAN	.70	7.67	2.82	.36	.059	20.6	212	36.0	17.4	2.22	.019	.023
MAX	3.2	26	5.8	.80	.20	95	708	89	76	9.6	.10	.30
MIN	.10	1.7	.80	.20	0	0	34	14	2.2	.10	0	0
AC-FT	43	456	173	22	3.4	1,270	12,600	2,210	1,040	136	1.2	1.4

CAL YR 1971 TOTAL 6,819.20 MEAN 18.7 MAX 680 MIN 0 AC-FT 13,530
WTR YR 1972 TOTAL 9,053.30 MEAN 24.7 MAX 708 MIN 0 AC-FT 17,960

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

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	793	3,920	3,490	2,500	1,450	1,450	19,100	17,300	8,740	2,820	2,630	2,230
2	890	4,130	4,130	2,500	1,450	1,450	19,300	15,700	9,380	2,680	2,770	2,210
3	1,200	5,630	4,410	2,450	1,450	1,500	19,400	14,700	9,840	2,540	2,710	2,200
4	2,860	7,040	4,400	2,450	1,450	1,500	19,400	13,700	10,000	2,480	2,580	2,140
5	4,960	8,150	4,240	2,400	1,450	1,500	19,300	12,700	9,970	2,410	2,460	2,140
6	5,800	8,850	4,050	2,400	1,450	1,500	18,600	11,300	9,640	2,370	2,380	2,140
7	6,000	8,910	3,870	2,350	1,450	1,500	17,000	10,100	9,080	2,300	2,340	2,170
8	5,650	8,020	3,690	2,300	1,450	1,500	15,900	8,900	8,320	2,240	2,310	2,140
9	5,000	6,640	3,520	2,250	1,450	1,500	15,000	8,100	7,580	2,180	2,310	2,140
10	4,330	5,440	3,300	2,160	1,450	1,500	14,300	7,600	6,940	2,160	2,310	2,100
11	3,790	4,860	3,110	2,050	1,450	1,550	13,800	7,300	6,410	2,170	2,370	2,100
12	3,380	5,240	2,920	1,900	1,450	1,550	13,200	7,100	6,060	2,140	2,460	2,090
13	3,080	5,670	2,820	1,900	1,450	1,550	13,000	6,900	5,830	2,070	2,530	2,110
14	2,830	5,870	2,780	1,900	1,450	1,550	12,600	6,600	5,640	1,970	2,640	2,140
15	2,620	5,990	2,780	1,850	1,450	1,600	22,500	6,220	5,500	1,910	2,600	2,140
16	2,460	6,120	2,720	1,800	1,450	1,800	24,800	6,200	5,340	1,870	2,560	2,140
17	2,310	6,370	2,620	1,700	1,450	2,000	27,400	7,000	5,060	1,880	2,530	2,170
18	2,200	6,680	2,540	1,650	1,450	4,600	29,500	8,520	4,420	1,920	2,480	2,180
19	2,160	6,850	2,590	1,600	1,450	7,120	30,900	9,170	4,400	2,120	2,470	2,210
20	3,080	6,800	2,660	1,600	1,450	9,030	31,000	9,330	4,280	2,160	2,410	2,140
21	6,120	6,630	2,700	1,550	1,450	11,100	30,500	9,120	4,180	2,280	2,350	2,100
22	8,560	6,200	2,650	1,550	1,450	13,000	30,400	8,740	4,320	2,410	2,320	2,030
23	8,590	5,600	2,650	1,500	1,450	14,000	30,200	8,320	4,730	2,480	2,280	2,000
24	8,720	4,820	2,650	1,500	1,450	15,100	29,900	7,670	4,970	2,560	2,340	2,000
25	8,120	3,900	2,650	1,500	1,430	16,100	29,200	7,490	4,420	2,600	2,400	1,950
26	7,200	3,440	2,600	1,400	1,450	16,800	27,200	7,380	4,090	2,680	2,420	1,900
27	6,350	3,270	2,600	1,400	1,450	17,400	24,900	7,790	3,700	2,880	2,400	1,860
28	5,640	2,720	2,550	1,360	1,450	17,900	22,600	8,100	3,380	3,030	2,320	1,830
29	4,960	2,840	2,530	1,400	1,450	18,300	20,900	8,320	3,160	3,080	2,270	1,840
30	4,520	3,000	2,500	1,400	-----	18,600	19,100	8,360	2,980	2,980	2,230	1,840
31	4,170	-----	2,500	1,400	-----	19,000	-----	8,360	-----	2,890	2,230	-----
TOTAL	136,343	169,600	95,220	57,690	42,030	224,950	666,900	284,290	182,360	74,260	75,610	62,370
MEAN	4,463	5,653	3,072	1,861	1,449	7,256	22,230	9,171	6,079	2,395	2,439	2,079
MAX	8,720	8,910	4,410	2,500	1,450	19,000	31,000	17,300	10,000	3,080	2,830	2,230
MIN	793	2,720	2,500	1,380	1,430	1,450	13,000	6,200	2,980	1,870	2,230	1,830
AC=FT	274,400	336,400	188,900	114,400	83,370	446,200	1,323M	563,900	361,700	147,300	150,000	123,700
CAL YR 1971	TOTAL 2,218,447		MEAN 3,338		MAX 23,300		MIN 793		AC=FT 2,417,000			
WTR YR 1972	TOTAL 2,073,623		MEAN 3,666		MAX 31,000		MIN 793		AC=FT 4,113,000			

RED RIVER OF THE NORTH BASIN

05094000 South Branch Two Rivers at Lake Bronson, Minn.

LOCATION.--Lat 48°43'50", long 96°39'50", in SW $\frac{1}{4}$ SW $\frac{1}{4}$ 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.--31 years (1928-36, 1941-43, 1945-47, 1953-72), 93.1 cfs (67,500 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 1,480 cfs Apr. 15 (gage height, 8.50 ft); minimum, 0.9 cfs Aug. 21, 22 (gage height, 3.15 ft).

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 period, 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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.2	2.2	7.8	2.9	2.4	3.1	112	106	20	3.5	2.4	3.4
2	3.3	2.2	7.5	2.9	2.4	3.0	110	108	17	4.0	2.9	2.6
3	1.6	2.0	7.0	2.8	2.4	3.1	108	106	14	4.3	2.8	2.4
4	1.3	2.5	6.6	2.8	2.4	3.1	106	98	12	4.8	3.1	2.6
5	1.5	4.2	6.3	2.6	2.4	3.1	106	47	12	4.9	3.3	2.8
6	1.6	5.8	6.0	2.7	2.4	3.1	104	24	9.9	5.0	3.1	4.2
7	1.5	7.0	5.8	2.7	2.4	3.2	104	40	9.0	5.1	3.8	3.3
8	1.7	7.5	5.5	2.7	2.5	3.2	102	44	8.0	5.1	4.3	3.3
9	1.8	7.5	5.3	2.6	2.5	3.3	102	42	7.7	5.0	4.0	3.8
10	1.7	7.5	5.1	2.6	2.5	3.4	102	39	6.2	5.7	4.5	3.7
11	1.5	8.0	4.9	2.6	2.6	3.5	100	38	5.7	4.4	4.7	3.6
12	1.5	8.4	4.7	2.6	2.6	3.6	105	35	5.2	4.7	4.5	4.0
13	1.6	9.5	4.6	2.6	2.7	3.9	233	36	5.7	4.1	4.2	4.1
14	1.8	10	4.4	2.5	2.8	4.3	602	38	6.1	4.3	3.2	3.7
15	1.6	12	4.2	2.5	2.8	5.0	1,150	40	4.6	4.1	2.1	3.8
16	1.8	15	4.1	2.5	2.9	5.9	1,110	41	3.7	4.9	1.8	4.3
17	2.5	20	4.0	2.5	3.0	6.9	1,100	40	3.9	5.7	1.3	4.9
18	2.0	24	3.9	2.5	3.0	8.7	1,090	36	5.6	6.4	1.3	4.9
19	2.0	25	3.8	2.5	3.1	12	1,110	30	6.8	6.3	1.2	5.0
20	2.2	23	3.7	2.4	3.1	21	1,100	34	143	5.8	1.1	4.3
21	2.8	20	3.6	2.4	3.1	35	1,010	31	210	5.7	.97	4.9
22	2.5	18	3.5	2.4	3.1	70	858	30	110	5.0	1.1	5.5
23	2.2	16	3.5	2.4	3.2	188	668	27	5.5	4.4	1.7	5.6
24	2.0	14	3.4	2.4	3.2	242	480	26	29	3.8	2.1	5.5
25	2.0	12	3.3	2.4	3.1	257	428	27	48	3.6	1.7	4.7
26	2.0	11	3.3	2.4	3.1	255	325	29	111	3.7	1.6	5.2
27	2.0	10	3.2	2.4	3.1	237	182	33	99	3.5	1.9	4.6
28	2.0	9.6	3.1	2.4	3.1	217	333	31	4.7	3.2	2.1	5.2
29	2.2	8.9	3.1	2.4	3.1	170	199	28	4.1	3.2	1.7	4.7
30	3.4	8.3	3.0	2.4	-----	135	99	24	3.7	3.1	1.6	4.8
31	3.6	-----	3.0	2.4	-----	120	-----	21	-----	2.5	38	-----
TOTAL	64.0	331.1	141.2	79.1	91.0	2,032.4	13,338	1,329	931.1	139.8	114.07	125.4
MEAN	2.06	11.0	4.55	2.55	2.79	65.6	445	42.9	31.0	4.51	3.68	4.18
MAX	3.8	25	7.8	2.9	3.2	257	1,150	108	210	6.4	38	5.6
MIN	1.3	2.0	3.0	2.4	2.4	3.0	99	21	3.7	2.5	.97	2.4
AC-FT	127	657	280	157	161	4,030	26,460	2,640	1,850	277	226	249

CAL YR 1971 TOTAL 109,471.70 MEAN 300 MAX 3,970 MIN 1.3 AC-FT 217,100

WTR YR 1972 TOTAL 18,706.17 MEAN 51.1 MAX 1,150 MIN .97 AC-FT 37,100

RED RIVER OF THE NORTH BASIN

69

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.--60 years (1912-72) 3,146 cfs (2,279,000 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, 30,700 cfs Apr. 23-24; maximum gage height, 78.16 ft Apr. 24; 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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	864	4,120	2,800	2,190	1,670	1,580	19,600	23,800	8,360	3,170	2,960	2,180
2	862	3,880	2,910	2,180	1,650	1,590	19,300	22,200	9,010	2,570	2,890	2,180
3	907	3,950	3,170	2,170	1,640	1,600	19,000	20,300	9,700	2,800	2,820	2,170
4	1,150	4,870	3,440	2,160	1,620	1,600	19,500	18,300	10,400	2,670	2,750	2,140
5	2,340	6,250	3,580	2,150	1,620	1,600	19,900	16,900	10,800	2,580	2,660	2,120
6	3,950	7,320	3,600	2,140	1,620	1,590	19,600	15,100	10,600	2,530	2,550	2,120
7	4,870	7,890	3,560	2,140	1,610	1,590	19,100	13,600	10,200	2,480	2,490	2,120
8	5,170	8,010	3,480	2,140	1,600	1,610	18,400	12,100	9,520	2,440	2,450	2,130
9	5,020	7,580	3,390	2,150	1,590	1,640	17,700	10,800	8,690	2,390	2,420	2,120
10	4,610	6,490	3,260	2,150	1,590	1,650	17,200	9,850	7,870	2,370	2,400	2,100
11	4,130	5,330	3,110	2,150	1,580	1,670	17,100	9,190	7,140	2,310	2,390	2,070
12	3,720	4,620	2,940	2,120	1,580	1,690	17,300	8,730	6,530	2,270	2,400	2,060
13	3,370	4,600	2,750	2,090	1,580	1,710	17,700	8,340	6,120	2,240	2,450	2,060
14	3,090	4,910	2,560	2,060	1,580	1,730	18,800	8,000	5,750	2,190	2,500	2,070
15	2,860	5,180	2,410	2,030	1,580	1,750	21,700	7,650	5,440	2,140	2,530	2,080
16	2,670	5,280	2,360	2,000	1,580	1,790	24,900	7,390	5,180	2,080	2,540	2,090
17	2,520	5,380	2,320	1,970	1,580	2,200	28,100	7,400	4,930	2,040	2,560	2,090
18	2,390	5,550	2,270	1,950	1,590	3,100	29,100	8,030	4,680	2,030	2,570	2,100
19	2,270	5,750	2,220	1,920	1,550	5,200	29,900	8,850	4,470	2,070	2,550	2,110
20	2,210	5,870	2,220	1,890	1,600	7,500	30,200	9,400	4,300	2,140	2,470	2,130
21	2,850	6,170	2,250	1,860	1,600	9,500	30,500	9,520	4,170	2,230	2,430	2,100
22	4,970	5,920	2,280	1,820	1,600	11,400	30,600	9,320	4,130	2,320	2,380	2,070
23	6,730	5,350	2,290	1,780	1,600	12,900	30,700	8,940	4,320	2,410	2,330	2,020
24	7,620	4,650	2,290	1,750	1,590	14,100	30,700	8,470	4,470	2,480	2,300	1,990
25	7,870	3,930	2,280	1,730	1,590	15,100	30,500	8,010	4,530	2,540	2,300	1,970
26	7,590	3,360	2,260	1,710	1,580	15,900	29,900	7,640	4,440	2,610	2,320	1,940
27	6,950	3,470	2,240	1,700	1,580	16,800	29,200	7,560	4,230	2,680	2,340	1,900
28	6,200	3,370	2,230	1,690	1,570	17,400	28,200	7,800	3,960	2,790	2,340	1,860
29	5,500	3,000	2,220	1,690	1,570	17,600	27,100	8,030	3,690	2,940	2,310	1,830
30	4,920	2,840	2,210	1,690	-----	17,800	25,700	8,190	3,390	3,020	2,250	1,820
31	4,490	-----	2,200	1,680	-----	18,900	-----	8,230	-----	3,010	2,200	-----
TOTAL	124,663	154,890	83,100	60,850	46,340	211,790	717,200	337,640	191,020	76,940	76,850	61,740
MEAN	4,021	5,163	2,681	1,963	1,598	6,832	23,910	10,890	6,367	2,482	2,479	2,058
MAX	7,870	8,010	3,600	2,190	1,670	18,900	30,700	23,800	10,800	3,170	2,960	2,180
MIN	862	2,840	2,200	1,680	1,570	1,580	17,100	7,390	3,390	2,030	2,200	1,820
AC-FT	247,300	307,200	164,800	120,700	91,920	420,100	1,423M	669,700	378,900	152,600	152,400	122,500
CAL YR 1971	TOTAL	1,365,504	MEAN	3,741	MAX	26,600	MIN	862	AC-FT	2,708,000		
WTR YR 1972	TOTAL	2,143,023	MEAN	5,855	MAX	30,700	MIN	862	AC-FT	4,251,000		

RED RIVER OF THE NORTH BASIN

05104500 Roseau River below South Fork near Malung, Minn.

LOCATION.--Lat 48°47'30", long 95°44'40", in SW 1/4 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.--26 years, 155 cfs (112,300 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 1,710 cfs Apr. 15 (gage height, 12.67 ft); minimum, 0.7 cfs Sept. 6; minimum gage height, 4.31 ft Sept. 22.

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 period, which are fair. Some flow bypasses the gaging station through a natural overflow channel 0.8 mile upstream and returns to river 0.5 mile downstream. Overflow begins at stage of about 13.0 ft, discharge, 1,800 cfs. These records include any flow in the overflow channel.

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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.5	234	42	13	7.1	3.7	90	309	282	20	14	2.6
2	8.0	267	39	13	6.8	3.6	90	286	231	19	12	2.2
3	13	290	37	11	6.4	3.6	88	259	182	17	12	2.0
4	35	305	36	10	6.6	3.6	88	231	148	15	11	1.9
5	58	301	35	11	5.3	3.5	85	215	124	16	11	.89
6	80	231	33	11	6.0	3.5	85	201	113	13	9.3	1.4
7	89	195	32	11	5.9	3.5	83	190	101	11	9.0	2.6
8	98	187	31	12	5.6	3.4	83	176	83	11	11	1.9
9	107	178	30	12	5.4	3.4	85	166	66	8.8	10	2.1
10	114	170	29	12	5.0	3.4	115	154	55	7.1	10	2.5
11	116	167	28	9.9	4.9	3.4	200	142	49	6.0	10	2.4
12	105	170	26	9.4	4.7	3.5	304	133	43	6.4	8.8	1.7
13	92	182	25	7.7	4.6	3.5	510	133	39	5.8	8.3	2.1
14	85	198	24	9.1	4.5	3.5	1,250	139	36	5.1	8.0	2.2
15	80	221	24	9.2	4.4	3.6	1,670	156	35	4.0	6.8	2.5
16	76	231	22	9.2	4.3	3.8	1,420	161	32	3.2	6.6	2.6
17	78	227	23	9.2	4.3	4.0	1,300	154	31	4.0	6.4	2.3
18	85	221	22	9.3	4.2	4.2	1,280	144	52	4.5	5.6	1.6
19	105	196	20	9.6	4.1	4.6	1,260	135	179	4.2	5.3	2.9
20	126	178	20	9.6	4.1	5.2	1,200	128	187	6.2	4.7	1.9
21	144	135	20	8.5	4.0	7.0	1,060	116	193	8.0	4.9	1.3
22	148	97	19	8.8	4.0	28	884	111	168	8.5	5.6	1.2
23	164	86	19	8.3	3.9	270	764	107	131	11	5.1	1.2
24	168	77	19	8.8	3.9	554	676	101	98	9.6	4.7	1.8
25	158	70	19	8.8	3.8	600	604	100	74	6.8	3.9	1.5
26	139	63	17	7.8	3.8	578	545	98	53	5.5	5.3	1.4
27	128	58	16	7.3	3.8	492	481	101	39	6.4	6.7	1.3
28	120	54	14	8.3	3.7	370	418	114	31	9.3	3.2	1.9
29	114	50	15	8.0	3.7	190	376	179	28	17	2.6	1.7
30	116	46	13	8.0	-----	110	344	249	23	24	2.7	1.5
31	164	-----	13	7.8	-----	95	-----	293	-----	18	3.0	-----
TOTAL	3,118.5	5,085	762	298.6	138.8	3,368.5	17,438	5,181	2,906	311.4	227.5	57.09
MEAN	101	170	24.6	9.63	4.79	109	581	167	96.9	10.0	7.34	1.90
MAX	168	305	42	13	7.1	600	1,670	309	282	24	14	2.9
MIN	5.5	46	13	7.3	3.7	3.4	83	98	23	3.2	2.6	.89
AC-FT	6,190	10,090	1,510	592	275	6,680	34,590	10,280	5,760	618	451	113

CAL YR 1971 TOTAL 35,715.50 MEAN 97.9 MAX 1,580 MIN 1.6 AC-FT 70,840
WTR YR 1972 TOTAL 38,892.39 MEAN 106 MAX 1,670 MIN .89 AC-FT 77,140

(International gaging station)

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

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.2	150	16	3.2	1.7	1.0	1.7	282	52	5.7	1.4	5.6
2	7.5	128	14	3.1	1.7	1.0	1.7	262	46	4.2	1.1	4.7
3	10	103	12	3.0	1.6	1.0	1.9	241	40	3.4	1.2	4.1
4	13	92	11	3.1	1.5	.90	2.3	215	34	1.3	1.4	3.5
5	16	84	9.5	3.0	1.2	.90	2.2	196	31	2.7	1.2	3.0
6	16	75	8.5	3.1	1.1	.90	2.2	181	32	2.5	1.1	7.0
7	18	68	8.0	3.0	1.0	.90	2.1	174	25	1.5	1.5	11
8	15	64	7.4	3.0	.90	.90	2.2	155	23	1.0	2.3	18
9	17	62	7.0	3.0	.90	.90	2.4	139	19	1.8	2.1	16
10	16	61	6.7	2.8	.80	.90	8.0	127	15	1.6	2.3	13
11	15	61	6.5	2.9	.90	1.0	75	120	15	1.5	2.7	12
12	13	61	6.2	2.8	.80	1.0	110	118	14	1.5	2.2	12
13	13	64	6.0	2.6	.80	1.0	185	124	14	1.6	1.9	12
14	13	70	6.0	2.5	.80	1.1	304	156	23	2.6	1.6	12
15	13	93	6.0	2.5	.80	1.2	339	156	23	2.6	1.5	12
16	13	88	6.0	2.4	.80	1.4	364	149	22	2.6	2.2	10
17	20	86	5.5	2.4	1.0	2.0	368	132	18	2.2	2.1	10
18	36	82	5.0	2.3	1.3	4.0	337	121	20	2.0	2.4	9.1
19	42	74	4.9	2.2	1.4	7.0	401	110	61	2.3	2.3	8.5
20	43	65	5.0	2.2	1.4	13	442	106	76	2.5	1.9	7.5
21	35	58	4.9	2.1	1.4	20	464	104	62	1.9	3.3	6.5
22	31	52	4.7	2.1	1.3	33	472	95	47	2.0	3.0	6.8
23	33	49	4.7	2.1	1.2	68	473	87	37	1.9	3.7	6.5
24	28	42	4.2	2.0	1.1	62	446	78	34	1.8	5.8	10
25	30	37	4.2	2.0	1.1	55	400	82	21	2.2	4.9	16
26	28	33	4.2	2.0	1.1	30	363	94	15	2.2	6.0	19
27	29	30	4.0	1.9	1.0	16	344	86	10	2.0	7.1	20
28	27	25	3.7	1.9	1.0	8.4	336	77	11	1.6	5.8	22
29	24	22	3.6	1.9	1.0	4.6	321	73	8.6	1.2	6.7	28
30	29	18	3.4	1.8	-----	2.7	302	67	7.1	1.5	6.1	25
31	120	-----	3.3	1.8	-----	2.1	-----	60	-----	1.5	5.3	-----
TOTAL	769.7	1,986	202.1	76.7	32.50	343.80	6,872.7	4,167	955.7	66.9	94.1	349.8
MEAN	24.8	66.2	6.52	2.47	1.12	11.1	229	134	28.5	2.16	3.04	11.7
MAX	120	150	16	3.2	1.7	68	473	282	76	5.7	7.1	28
MIN	6.2	18	3.3	1.8	.80	.90	1.7	60	7.1	1.0	1.1	3.0
AC-FT	1,530	3,940	401	152	64	682	13,630	8,270	1,700	133	187	694
CAL YR 1971	TOTAL 14,745.70		MEAN 40.4	MAX 310	MIN 1.4	AC-FT 29,250						
WTR YR 1972	TOTAL 15,817.00		MEAN 43.2	MAX 473	MIN .80	AC-FT 31,370						

RED RIVER OF THE NORTH BASIN

05106500 Roseau River at Roseau Lake, Minn.

LOCATION.--Lat 48°54'22", long 95°49'55", in SW $\frac{1}{4}$ SW $\frac{1}{4}$ 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, 1,031.97 ft Apr. 22; minimum recorded, 1,020.49 ft July 28.

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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	20.87								25.07	21.72	21.17	20.77
2	21.06	25.80							24.80	21.66	21.08	20.72
3		25.87							24.34	21.58	20.84	20.68
4		25.91					25.79		23.88	21.47	20.65	20.65
5		25.95								21.37	20.66	20.65
6										21.31	20.73	20.88
7										21.32	20.83	21.12
8										21.22	20.98	21.17
9										21.17	21.03	21.23
10								28.34		21.10	21.68	21.22
11		25.23						27.97		21.11	21.86	21.17
12		25.05						27.62		21.12	21.30	21.16
13		24.92						27.34		21.08	21.09	21.21
14		24.92						27.17	22.00	21.27	21.00	21.19
15		25.15						26.95	22.01	21.20	20.94	21.18
16		25.36						26.72	21.94	21.07	20.88	21.19
17								26.45	21.89	20.98	20.82	21.15
18		25.39					31.49	26.12	21.91	20.82	20.80	21.13
19	22.89						31.71	25.82	26.45	20.69	20.79	21.10
20							31.87	25.62	27.38	20.75	20.75	21.06
21							31.95	25.43	27.14	20.91	20.73	21.05
22							31.94	25.14	26.89	20.97	20.70	20.97
23							31.79	24.85	26.39	20.94	20.67	20.94
24							31.69	24.58	25.74	20.92	20.65	21.04
25							31.61	24.36	24.95	20.79	20.70	21.23
26							31.49	24.23	24.16	20.64	20.72	21.43
27							31.56	24.07	23.41	20.54	20.75	21.51
28								23.98	22.71	20.60	20.79	21.60
29								24.07	22.24	20.58	20.81	21.66
30					-----			24.57	21.93	20.78	20.79	21.72
31		-----			-----			24.99	-----	21.10	20.81	-----
MEAN										21.06	20.90	21.13
MAX										21.72	21.86	21.72
MIN										20.54	20.65	20.65

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 SE¹/₄ 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.--44 years, 268 cfs (194,200 acre-ft per year).

EXTREMES.--Current year: Maximum daily discharge, 1,860 cfs about Apr. 25; minimum, 2.7 cfs Sept. 6 (gage height, 1.06 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 period, and those for periods of no gage-height record, 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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10	396	96	19	10	7.6	350	1,610	397	72	26	13
2	20	480	88	19	10	7.6	340	1,530	368	67	24	11
3	31	498	80	18	10	7.5	335	1,460	313	61	21	9.3
4	37	508	75	17	9.8	7.5	335	1,390	257	53	18	7.7
5	38	514	70	17	9.6	7.5	340	1,300	214	45	15	5.1
6	36	485	65	16	9.4	7.6	350	1,220	189	39	14	7.4
7	54	440	58	16	9.2	7.7	360	1,150	171	40	16	12
8	72	390	52	16	9.0	7.8	375	1,080	151	34	17	21
9	77	365	46	15	8.9	8.0	400	1,010	130	29	19	24
10	84	360	43	15	8.8	8.3	450	951	109	25	24	21
11	100	360	40	14	8.7	8.8	550	902	97	24	35	18
12	110	370	38	14	8.6	9.3	720	837	91	25	26	17
13	103	425	37	14	8.5	10	1,000	784	87	24	18	17
14	96	450	36	13	8.4	12	1,220	747	87	33	15	16
15	92	460	34	13	8.4	18	1,340	707	90	32	12	14
16	89	465	33	13	8.3	25	1,410	662	86	24	11	13
17	90	455	32	12	8.3	35	1,520	620	82	20	11	12
18	101	434	31	12	8.2	46	1,620	568	81	14	11	12
19	129	410	30	12	8.2	60	1,710	519	566	9.1	12	14
20	160	360	29	11	8.1	80	1,770	486	761	9.0	12	13
21	181	325	28	11	8.0	125	1,800	458	722	13	11	11
22	190	290	27	11	8.0	190	1,820	417	681	17	10	11
23	192	265	26	11	7.9	270	1,840	378	609	17	8.9	9.9
24	202	255	25	11	7.8	520	1,850	340	514	16	7.7	17
25	206	250	24	11	7.8	660	1,860	314	405	13	7.7	26
26	199	235	24	11	7.8	650	1,850	296	306	8.6	9.7	39
27	181	190	23	11	7.7	630	1,820	276	223	5.5	10	44
28	169	155	22	10	7.7	600	1,770	261	155	5.3	13	44
29	156	130	21	10	7.6	560	1,730	269	112	6.2	15	48
30	153	110	21	10	-----	450	1,690	325	87	8.7	15	45
31	232	-----	20	10	-----	370	-----	379	-----	20	14	-----
TOTAL	3,590	10,830	1,274	413	248.7	5,406.2	34,525	23,246	8,141	809.4	479.0	572.4
MEAN	116	361	41.1	13.3	8.58	174	1,151	750	271	26.1	15.5	19.1
MAX	232	514	96	19	10	660	1,860	1,610	761	72	35	48
MIN	10	110	20	10	7.6	7.5	335	261	81	5.3	7.7	5.1
AC-FT	7,120	21,480	2,530	819	493	10,720	68,480	46,110	16,150	1,610	950	1,140
CAL YR 1971	TOTAL 78,434.0		MEAN 215	MAX 1,510	MIN 6.6	AC-FT 155,600						
WTR YR 1972	TOTAL 89,534.7		MEAN 245	MAX 1,860	MIN 5.1	AC-FT 177,600						

NOTE.--No gage-height record Apr. 23 to May 9.

RED RIVER OF THE NORTH BASIN

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.

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, 1,690 cfs May 2 (gage height, 7.79 ft); minimum, 9.7 cfs Aug. 7 (gage height, 1.70 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 except those for winter periods and period of no gage-height record, which are fair. 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.

REVISIONS (WATER YEAR).--WSP 1308: 1938(M). WSP 1508: 1917(M), 1920, 1932(M), 1934-35(M). WSP 1913: 1954(M).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	38	229					220	1,680	460	130	12	12
2	40	354					210	1,680	440	100	21	15
3	51						200	1,670	430	90	25	15
4	56						190	1,650	400	85	21	16
5	62						175	1,640	360	80	16	15
6	63						160	1,610	300	75	12	17
7	64						150	1,590	270	69	11	20
8	70						140	1,560	230	66	14	21
9	83						135	1,530	200	65	15	25
10	91						130	1,500	170	64	18	22
11	92						140	1,450	140	58	22	24
12	104						180	1,410	135	52	59	25
13	110						220	1,370	135	54	44	25
14	110						360	1,350	132	56	26	25
15	105						500	1,300	132	55	19	22
16	100						650	1,220	131	58	14	24
17	99						950	1,170	123	53	13	20
18	94						1,220	1,100	120	50	12	23
19	100						1,330	1,010	152	47	13	25
20	122						1,350	950	440	46	12	22
21	152						1,380	840	694	43	13	13
22	173						1,420	740	754	38	12	14
23	184					16	1,450	680	754	36	12	19
24	190					18	1,480	620	719	34	12	21
25	198					55	1,510	570	660	32	12	19
26	204					130	1,560	530	600	28	12	19
27	204					180	1,590	480	500	24	12	21
28	186					210	1,630	430	370	19	13	31
29	177					230	1,660	410	260	16	13	30
30	167					240	1,680	410	185	13	12	31
31	165	-----			-----	230	-----	440	-----	12	13	-----
TOTAL	3,654						23,970	34,590	10,396	1,648	535	631
MEAN	118						799	1,116	347	53.2	17.3	21.0
MAX	204						1,680	1,680	754	130	59	31
MIN	38						130	410	120	12	11	12
MIN-FT	7,250						47,540	68,610	20,620	3,270	1,060	1,250

NOTE.--No gage-height record May 15 to June 14.

05124480 Kawishiwi River near Ely, Minn.

(Hydrologic bench-mark station)

LOCATION.--Lat 47°55'22", long 91°32'06", in SE 1/4 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.--6 years, 255 cfs (13.69 inches per year).

EXTREMES.--Current year: Maximum discharge, 1,380 cfs about May 12 (gage height, 5.75 ft, from recorded range in stage); minimum, 38 cfs Oct. 16, 17 (gage height, 2.84 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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	47	229	480	189	115	81	66	660	395	111	86	210
2	48	270	464	184	115	79	66	760	380	107	82	203
3	50	313	453	179	110	78	65	870	370	102	79	197
4	47	344	438	176	110	78	64	970	360	97	76	189
5	47	373	433	174	108	78	64	1,060	350	94	73	186
6	51	383	422	167	107	79	64	1,130	336	92	72	184
7	51	392	412	163	103	79	60	1,180	318	94	69	192
8	50	412	402	158	102	79	57	1,240	300	92	68	186
9	48	428	392	158	100	78	57	1,280	279	91	65	182
10	47	443	378	156	99	77	57	1,310	255	90	64	179
11	46	453	363	154	97	77	58	1,330	240	88	63	176
12	46	459	344	154	97	77	59	1,350	232	88	63	172
13	44	475	340	154	94	76	72	1,330	222	84	62	182
14	41	486	331	154	92	76	72	1,290	229	84	60	185
15	40	497	318	154	90	74	72	1,230	216	81	60	190
16	39	508	318	150	88	74	73	1,150	203	77	232	195
17	47	530	304	146	86	74	76	1,080	192	76	232	200
18	56	553	291	144	85	74	81	1,000	182	74	240	205
19	59	559	283	141	85	73	95	930	179	73	262	198
20	62	565	275	137	84	72	120	850	167	74	279	192
21	62	571	266	134	82	72	140	790	158	78	296	186
22	63	565	255	134	81	73	165	730	152	90	313	184
23	65	565	255	134	79	74	190	660	146	102	304	182
24	65	565	244	134	79	74	230	600	141	100	296	180
25	66	559	236	135	79	72	265	550	135	99	291	180
26	69	548	229	132	79	72	300	510	132	96	283	179
27	88	530	222	130	79	70	340	480	127	94	270	179
28	128	519	216	127	81	69	395	460	125	92	255	179
29	134	508	210	125	81	69	470	445	127	91	244	176
30	154	491	206	122	-----	68	550	430	118	91	232	172
31	194	-----	197	116	-----	68	-----	420	-----	90	222	-----
TOTAL	2,054	14,093	9,977	4,615	2,687	2,314	4,443	28,075	6,766	2,792	5,293	5,600
MEAN	66.3	470	322	149	92.7	74.6	148	906	226	90.1	171	187
MAX	194	571	480	189	115	81	550	1,350	395	111	313	210
MIN	39	229	197	116	79	68	57	420	118	73	60	172
CFSM	.26	1.86	1.27	.59	.37	.29	.59	3.58	.89	.36	.68	.74
IN.	.30	2.07	1.47	.68	.40	.34	.65	4.13	.99	.41	.78	.82

CAL YR 1971 TOTAL 105,986 MEAN 290 MAX 1,520 MIN 27 CFSM 1.15 IN 15.58
WTR YR 1972 TOTAL 88,709 MEAN 242 MAX 1,350 MIN 39 CFSM .96 IN 13.04

NOTE.--No gage-height record April 18 to June 5.

LAKE OF THE WOODS BASIN

05127000 Kawishiwi River near Winton, Minn.

LOCATION.--Lat 47°56'05", long 91°45'50", in NE 1/4 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).--53 years (1905-06, 1915-17, 1918-19, 1923-72), 1,021 cfs (11.55 inches per year).

EXTREMES.--Current year: Maximum daily discharge, 8,260 cfs May 10; minimum daily, 129 cfs Apr. 9. Period of record: Maximum daily discharge, 16,000 cfs May 18, 1950; no flow at times.

REMARKS.--Records 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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	734	3,420	2,110	863	622	370	535	3,750	1,530	620	960	2,200
2	349	3,720	2,020	895	622	499	535	4,530	1,460	410	960	1,990
3	646	4,500	1,930	863	590	532	535	5,350	1,460	314	921	1,520
4	633	5,380	1,900	895	590	499	500	6,040	1,460	410	960	1,270
5	669	5,200	1,900	895	557	467	500	6,690	1,460	411	928	1,190
6	618	5,090	1,820	948	495	499	439	7,200	1,560	395	863	1,190
7	513	5,010	1,450	900	416	499	463	7,780	1,470	739	798	1,120
8	618	5,090	1,250	960	518	435	398	8,080	1,470	560	841	1,110
9	650	4,530	1,150	928	513	467	129	8,180	1,470	501	765	1,090
10	651	4,030	1,060	928	491	467	560	8,260	1,470	501	697	1,000
11	585	3,500	1,060	960	481	513	303	8,260	1,310	501	634	960
12	651	3,230	1,060	960	481	551	399	8,000	1,040	670	635	960
13	619	3,350	1,120	960	249	551	528	7,860	960	835	603	960
14	630	2,900	829	895	481	518	427	7,600	960	618	603	960
15	794	2,950	738	895	481	551	431	6,980	1,040	435	625	863
16	729	2,760	794	895	481	648	431	6,570	1,010	330	1,150	960
17	902	2,910	1,150	928	449	583	495	6,050	960	469	924	928
18	924	2,700	1,150	768	491	528	615	5,510	960	404	956	960
19	804	2,710	1,150	762	481	517	595	5,400	992	372	1,120	928
20	577	2,830	1,150	762	151	496	724	4,810	960	417	1,180	1,120
21	635	2,760	1,150	762	481	668	984	4,430	960	352	1,090	960
22	799	2,840	1,150	731	416	666	754	4,200	960	565	2,200	960
23	960	2,750	1,150	748	481	697	1,090	3,980	928	672	2,320	992
24	922	2,740	1,150	716	449	785	1,070	3,110	799	724	2,920	1,170
25	1,090	2,720	1,150	748	449	534	1,520	2,540	799	785	2,990	1,050
26	1,060	2,640	1,150	716	462	663	1,620	1,940	804	795	2,630	1,490
27	1,720	2,750	1,150	333	155	580	1,950	2,010	783	860	3,120	2,070
28	2,400	2,730	1,080	714	467	569	2,610	1,720	686	960	2,870	2,260
29	2,470	2,630	960	581	499	537	2,920	2,140	845	1,020	2,750	2,170
30	2,740	2,360	863	649	-----	567	3,280	2,740	716	1,020	2,770	2,040
31	3,110	-----	928	665	-----	470	-----	1,600	-----	1,120	2,670	-----
TOTAL	32,118	102,430	38,672	25,673	13,489	16,926	27,350	163,310	33,282	18,785	45,453	38,441
MEAN	1,036	3,414	1,247	828	465	546	912	5,268	1,109	606	1,466	1,281
MAX	3,110	5,200	2,110	960	622	785	3,280	8,260	1,560	1,120	3,120	2,260
MIN	577	2,360	738	649	155	370	129	1,600	686	314	603	863
Δ	+223	-45	+9	-244	-112	-249	+176	+390	-22	+66	-21	-12
MEAN Δ	1,259	3,369	1,256	584	353	297	1,088	5,658	1,087	672	1,445	1,269
CFSM Δ	1.05	2.81	1.05	0.49	0.29	0.25	0.91	4.72	0.91	0.56	1.20	1.06
IN. Δ	1.21	3.13	1.21	0.56	0.32	0.29	1.01	5.44	1.01	0.65	1.39	1.18

CAL YR 1971 TOTAL 617,472 MEAN 1,692 MAX 8,500 MIN 161 MEAN Δ 1,704 CFSM Δ 1.42 IN. Δ 19.14
 WTR YR 1972 TOTAL 555,929 MEAN 1,519 MAX 8,260 MIN 129 MEAN Δ 1,533 CFSM Δ 1.28 IN. Δ 17.39

Δ 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.

Δ Adjusted for change in reservoir contents.

05127205 Burntside River near Ely, Minn.

LOCATION.--Lat 47°54'55", long 91°56'59", in NE 1/4 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.

AVERAGE DISCHARGE.--5 years, 67.2 cfs.

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

EXTREMES.--Current year: Maximum discharge, 230 cfs May 8 (gage height, 7.44 ft, from graph based on gage readings); minimum daily discharge, 5.2 cfs Oct. 15; minimum gage height, 5.29 ft Sept. 22.

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 fair.

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

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	16	77	98	60	42	32	26	141	101	41	54	32
2	21	81	96	59	41	32	26	199	99	37	51	26
3	15	81	94	58	41	31	26	206	94	35	49	19
4	12	82	91	57	40	31	26	208	92	32	47	14
5	11	84	89	56	39	31	27	211	89	30	44	12
6	12	88	87	55	39	30	27	215	86	28	42	10
7	11	90	86	54	38	30	28	225	81	28	40	9.7
8	11	97	85	54	38	30	28	230	79	28	39	8.8
9	10	79	83	53	37	29	29	223	77	27	39	10
10	9.5	78	82	52	37	30	30	216	71	27	37	17
11	9.0	76	82	51	37	30	31	210	65	28	38	23
12	8.0	76	81	50	37	29	33	207	60	34	35	19
13	8.0	74	81	49	36	30	35	202	61	34	34	18
14	6.8	85	80	49	36	30	38	196	63	37	32	17
15	5.2	102	80	48	36	29	41	190	60	37	34	12
16	7.0	102	79	46	36	29	45	180	60	38	46	11
17	12	109	78	47	36	29	48	176	58	38	54	10
18	19	116	76	47	35	29	51	170	59	40	54	18
19	27	118	74	46	35	29	54	164	62	45	54	14
20	27	116	73	46	35	29	57	158	61	52	54	12
21	26	114	71	45	35	29	63	153	57	53	55	10
22	28	112	70	45	34	29	70	149	54	58	56	9.5
23	26	110	69	45	34	29	76	140	49	65	53	10
24	24	107	68	44	34	28	83	138	42	66	52	11
25	23	105	67	44	33	28	91	131	36	66	49	14
26	21	103	66	44	33	28	102	126	31	64	47	15
27	23	102	65	43	33	27	122	122	25	64	45	14
28	61	100	64	43	33	27	138	118	43	61	43	14
29	57	100	63	42	32	26	152	113	49	61	40	12
30	64	98	62	42	-----	26	174	110	47	60	39	11
31	72	-----	61	42	-----	26	-----	108	-----	55	35	-----
TOTAL	684.5	2,854	2,401	1,518	1,052	904	1,777	5,385	1,911	1,369	1,391	433.0
MEAN	22.1	95.1	77.5	49.0	36.3	29.2	59.2	174	63.7	44.2	44.9	14.4
MAX	72	118	98	60	42	32	174	230	101	66	56	32
MIN	5.2	74	61	42	32	26	26	108	25	27	32	8.8

CAL YR 1971 TOTAL 24,868.3 MEAN 68.1 MAX 293 MIN 5.2
 WTR YR 1972 TOTAL 21,679.5 MEAN 59.2 MAX 230 MIN 5.2

LAKE OF THE WOODS BASIN

05127210 Armstrong Creek near Ely, Minn.

LOCATION---Lat 47°53'48", long 91°55'50", in SW 1/4 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.

AVERAGE DISCHARGE---5 years, 5.21 cfs (13.37 inches per 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, 45 cfs Apr. 29 (gage height, 3.98 ft); maximum gage height, 4.17 ft Apr. 21 (from graph based on gage readings, backwater from ice); minimum daily discharge, 0.3 cfs Feb. 23 to Mar. 7.
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 poor.

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

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	12	21	4.9	1.1	1.0	.30	1.0	36	1.0	.40	1.5	1.2
2	14	17	4.0	1.1	1.0	.30	.90	32	.90	.40	1.4	1.0
3	10	14	3.5	1.1	.90	.30	.90	29	.90	.40	1.4	.90
4	7.6	12	3.1	1.0	.90	.30	.90	24	1.0	.40	1.4	.70
5	5.4	12	2.8	1.0	.80	.30	.80	21	1.2	.40	1.4	.80
6	5.1	10	2.6	1.0	.80	.30	.80	20	1.2	.40	1.3	1.0
7	4.5	7.4	2.4	1.0	.70	.30	.80	19	1.3	.60	1.3	.90
8	4.5	6.7	2.2	1.0	.70	.40	.90	17	1.1	.50	1.7	.80
9	4.2	6.0	2.1	.90	.70	.40	.90	13	1.0	.40	1.6	.70
10	3.8	5.7	2.0	.90	.60	.40	1.0	11	.90	.40	1.4	.60
11	3.7	5.4	1.9	.90	.60	.40	2.0	9.6	.80	1.2	1.4	.80
12	3.6	5.1	1.9	.90	.50	.50	3.5	8.4	.70	1.6	1.4	.80
13	3.6	5.0	1.8	.80	.50	.50	5.8	8.0	.90	1.6	1.3	1.2
14	4.2	11	1.8	.80	.50	.60	8.5	7.7	1.2	2.1	1.3	1.0
15	4.5	19	1.8	.80	.50	.70	10	7.5	.90	2.4	1.7	1.0
16	6.0	18	1.7	.80	.50	.80	13	6.5	.80	2.2	6.0	.90
17	8.6	17	1.6	.80	.40	1.0	16	5.5	1.5	2.2	6.2	.80
18	12	21	1.6	.90	.40	1.1	19	4.7	3.5	2.1	4.0	.80
19	16	20	1.5	.90	.40	1.3	21	4.0	4.3	1.8	2.8	.70
20	13	17	1.5	1.0	.40	1.4	25	3.5	2.9	4.5	3.2	.90
21	11	15	1.5	1.0	.40	1.5	27	2.9	2.5	3.2	2.8	.90
22	9.1	13	1.4	1.0	.40	1.5	29	2.4	2.1	7.5	3.3	.80
23	7.6	12	1.4	1.1	.30	1.4	30	2.0	1.7	6.5	2.4	.70
24	6.5	10	1.4	1.2	.30	1.3	25	1.6	1.2	4.6	2.1	.70
25	7.0	8.9	1.3	1.2	.30	1.2	28	1.2	.90	2.6	1.7	.70
26	15	8.2	1.3	1.2	.30	1.2	31	1.1	.60	1.7	1.6	.80
27	21	7.5	1.2	1.1	.30	1.2	37	1.1	.50	1.6	1.4	1.0
28	33	7.0	1.2	1.1	.30	1.1	42	1.0	.60	2.1	1.3	.70
29	23	6.4	1.1	1.0	.30	1.1	43	1.1	.50	1.9	1.0	.60
30	20	5.7	1.1	1.0	-----	1.1	41	1.1	.50	1.6	.90	.60
31	25	-----	1.1	.90	-----	1.0	-----	1.0	-----	1.5	1.1	-----
TOTAL	324.5	344.0	60.7	30.50	15.70	25.20	465.70	303.9	39.10	60.80	63.30	25.00
MEAN	10.5	11.5	1.96	.98	.54	.81	15.5	9.80	1.30	1.96	2.04	.83
MAX	33	21	4.9	1.2	1.0	1.5	43	36	4.3	7.5	6.2	1.2
MIN	3.6	5.0	1.1	.80	.30	.30	.80	1.0	.50	.40	.90	.60
CFSM	1.98	2.17	.37	.19	.10	.15	2.93	1.85	.25	.37	.39	.16
IN.	2.28	2.42	.43	.21	.11	.18	3.27	2.14	.27	.43	.45	.18
CAL YR 1971	TOTAL 2,012.90	MEAN 5.51	MAX 61	MIN .40	CFSM 1.04	IN 14.15						
WTR YR 1972	TOTAL 1,758.40	MEAN 4.80	MAX 43	MIN .30	CFSM .91	IN 12.37						

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LOCATION.--Lat 47°53'33", long 91°54'55", in S.W. 1/4 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.

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

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	11	28	6.8	3.4	2.2	.80	2.2	67	3.1	.50	2.4	.90
2	14	24	6.3	3.3	2.1	.80	2.2	60	2.5	.60	2.0	.70
3	11	22	6.0	3.3	2.0	.80	2.2	55	2.0	.50	1.7	.60
4	6.4	20	5.7	3.2	2.0	.80	2.3	47	1.6	.40	1.5	.50
5	5.0	18	5.4	3.1	1.9	.80	2.4	40	1.2	.40	1.3	.50
6	4.7	16	5.2	3.0	1.8	.80	2.3	38	1.1	.50	1.1	1.1
7	3.4	14	5.1	2.9	1.8	.80	2.2	35	1.0	.60	.90	1.0
8	3.2	12	5.0	2.9	1.7	.90	2.2	33	.90	.50	1.9	.70
9	2.9	11	4.8	2.8	1.6	.90	2.1	28	.80	.40	1.4	.60
10	2.5	10	4.7	2.8	1.5	.90	2.1	23	.80	.40	1.1	.80
11	2.1	9.3	4.6	2.8	1.5	.90	2.2	21	.80	1.2	1.2	5.0
12	1.8	8.5	4.5	2.8	1.4	.90	2.4	19	.80	5.6	1.1	1.1
13	1.6	8.0	4.3	2.7	1.3	1.0	3.1	18	1.7	6.0	1.0	1.6
14	1.3	14	4.3	2.7	1.2	1.0	4.0	17	1.4	2.1	.90	1.3
15	1.2	17	4.2	2.7	1.1	1.1	5.4	16	1.1	3.3	.70	1.0
16	1.3	16	4.2	2.7	1.1	1.3	9.0	14	1.0	2.9	10	.90
17	3.0	18	4.1	2.7	1.0	1.5	14	14	2.3	2.6	15	.90
18	6.0	24	4.0	2.7	1.0	1.6	16	13	4.0	2.4	7.7	.80
19	13	23	4.0	2.6	.90	1.8	18	12	5.0	1.9	4.7	.50
20	11	20	3.9	2.6	.90	1.9	31	11	4.4	8.9	4.2	1.2
21	6.6	17	3.9	2.6	.90	2.3	36	10	3.7	7.7	4.3	1.7
22	5.0	15	3.8	2.5	.80	2.9	35	9.3	1.9	20	5.2	1.1
23	4.0	13	3.8	2.5	.80	3.1	32	7.6	1.2	18	3.6	1.0
24	3.0	12	3.8	2.5	.80	3.0	30	6.3	.90	13	3.2	.90
25	2.5	11	3.7	2.5	.80	2.8	38	6.3	.70	9.6	2.8	.90
26	2.8	10	3.7	2.4	.80	2.6	52	5.0	.70	7.2	2.2	1.5
27	6.1	9.2	3.7	2.4	.80	2.4	65	4.8	.80	6.0	1.7	1.2
28	36	8.4	3.6	2.3	.80	2.2	71	4.6	1.0	5.6	1.4	1.3
29	23	7.9	3.6	2.3	.80	2.1	75	4.3	1.0	4.7	1.4	1.3
30	28	7.3	3.5	2.3	-----	2.2	72	4.2	.50	4.0	1.3	1.3
31	33	-----	3.4	2.2	-----	2.3	-----	4.2	-----	3.4	1.1	-----
TOTAL	256.2	443.6	137.6	84.2	37.30	49.20	633.3	647.6	49.90	140.90	90.00	33.90
MEAN	8.26	14.8	4.44	2.72	1.29	1.59	21.1	20.9	1.66	4.55	2.90	1.13
MAX	36	28	6.8	3.4	2.2	3.1	75	67	5.0	20	15	5.0
MIN	1.2	7.3	3.4	2.2	.80	.80	2.1	4.2	.50	.40	.70	.50
CFSM	.93	1.67	.50	.31	.15	.18	2.39	2.36	.19	.51	.33	.13
IN.	1.08	1.87	.58	.35	.16	.21	2.67	2.73	.21	.59	.38	.14
CAL YR 1971	TOTAL 3,016.30		MEAN 8.26	MAX 100	MIN .10	CFSM .93	IN 12.69					
WTR YR 1972	TOTAL 2,603.70											

LAKE OF THE WOODS BASIN

05127219 Shagawa Lake tributary at Ely, Minnesota

LOCATION.--Lat 47°54'24", long 91°52'23", in NE $\frac{1}{4}$ SW $\frac{1}{4}$ 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 1971 to current year.

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.--Current year: Maximum discharge, 23 cfs Oct. 19 (gage height, 2.69 ft); no flow at times.

Period of record: Maximum discharge, 48 cfs June 17, 1971 (gage height, 2.96 ft); no flow at times each year.

REMARKS.--Records good. On March 20, 1972, storm sewer carrying runoff from business and residential areas in basin was diverted 1,700 ft upstream from gage to open mine pit.

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

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.84	.71	.13	.10	.08	.10	.12	.18	.03	.01	.04	.03
2	2.3	.84	.11	.10	.08	.10	.13	.22	.03	.01	.05	.03
3	.34	.57	.10	.10	.08	.10	.12	.16	.03	.02	.04	.03
4	.23	.48	.15	.10	.08	.06	.12	.14	.03	.02	.04	.06
5	.79	.71	.12	.09	.08	.06	.10	.21	.04	.02	.03	.04
6	.49	.32	.18	.09	.08	.09	.11	.23	.04	.02	.04	.12
7	.48	.28	.12	.09	.08	.07	.10	.15	.03	.02	.06	.05
8	.22	.29	.10	.09	.08	.08	.09	.13	.02	.02	.06	.04
9	.15	.28	.11	.09	.08	.08	.09	.11	.04	.02	.03	.06
10	.13	.25	.09	.09	.08	.08	.50	.10	.04	.02	.03	.05
11	.12	.27	.07	.08	.08	.07	.32	.10	.06	.04	.03	.04
12	.13	.28	.10	.08	.08	.13	.21	.09	.05	.27	.03	.16
13	.10	.24	.23	.08	.08	.24	.18	.09	.11	.05	.03	.11
14	.09	1.3	.39	.08	.08	.18	.38	.09	.04	.06	.02	.06
15	.09	.63	.40	.08	.08	.12	.82	.08	.03	.04	.51	.06
16	.06	.35	.20	.08	.08	.10	1.6	.07	.03	.08	.76	.06
17	2.6	1.3	.16	.08	.07	.12	.83	.07	.03	.09	.27	.05
18	.31	1.2	.12	.08	.07	.14	.66	.06	.07	.04	.10	.06
19	1.8	.67	.12	.08	.07	.16	.78	.06	.17	.05	.08	.06
20	.28	.29	.12	.08	.07	.18	.74	.05	.04	.48	.08	.23
21	.29	.23	.11	.08	.07	.14	.49	.05	.03	.51	.13	.07
22	.20	.23	.11	.08	.07	.11	.39	.06	.03	.79	.10	.06
23	.20	.20	.11	.08	.07	.10	.33	.05	.03	.30	.14	.06
24	.17	.24	.11	.08	.07	.13	.40	.04	.03	.15	.06	.06
25	.16	.17	.11	.08	.07	.14	.41	.03	.03	.11	.06	.06
26	.16	.18	.10	.08	.07	.13	.41	.03	.03	.09	.06	.09
27	5.8	.21	.10	.08	.07	.13	.31	.03	.04	.08	.05	.05
28	1.2	.16	.10	.08	.08	.31	.24	.04	.06	.09	.05	.05
29	.78	.23	.10	.08	.10	.17	.21	.04	.03	.07	.02	.05
30	2.5	.23	.10	.08	-----	.15	.18	.04	.03	.06	0	.05
31	1.1	-----	.10	.08	-----	.13	-----	.03	-----	.06	0	-----
TOTAL	24.11	13.34	4.27	2.62	2.23	3.90	11.37	2.83	1.30	3.69	3.00	2.00
MEAN	.78	.44	.14	.085	.077	.13	.38	.091	.043	.12	.097	.067
MAX	5.8	1.3	.40	.10	.10	.31	1.6	.23	.17	.79	.76	.23
MIN	.06	.16	.07	.08	.07	.06	.09	.03	.02	.01	0	.03
CFSM	1.10	.62	.20	.12	.11	.18	.54	.13	.06	.17	.14	.09
IN.	1.26	.70	.22	.14	.12	.20	.60	.15	.07	.19	.16	.10

WTR YR 1972 TOTAL 74.66 MEAN .20 MAX 5.8 MIN 0 CFSM .28 IN 3.91

NOTE.--No gage-height record Jan. 26 to Feb. 28.

05127220 Burgo Creek near Ely, Minn.

LOCATION.--Lat 47°55'32", long 91°51'40", in SW 1/4 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.

AVERAGE DISCHARGE.--5 years, 3.98 cfs (17.78 inches per 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, 41 cfs Apr. 29 (gage height, 6.98 ft); no flow for several days in June, July.

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, 1972.

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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.5	16	3.2	.80	.50	.10	.30	24	.20	0	.50	.30
2	3.5	13	2.8	.80	.40	.10	.30	21	.20	.10	.40	.30
3	3.7	11	2.6	.80	.40	.10	.30	20	.10	.10	.40	.30
4	3.4	9.1	2.4	.70	.40	.10	.30	10	.10	.10	.40	.20
5	2.0	7.7	2.1	.70	.40	.10	.30	14	0	0	.40	.20
6	3.9	6.2	2.0	.70	.40	.10	.30	13	0	0	.40	.20
7	3.6	5.0	1.9	.70	.40	.10	.30	12	0	0	.30	.30
8	2.6	4.0	1.8	.70	.30	.10	.30	11	0	0	.30	.20
9	2.2	3.7	1.7	.70	.30	.10	.40	9.1	0	.10	.30	.20
10	2.0	3.4	1.6	.70	.30	.10	.40	7.3	0	.10	.30	.20
11	2.6	3.2	1.6	.60	.30	.20	.50	5.4	0	.10	.30	.20
12	2.3	3.1	1.5	.60	.30	.20	.60	4.6	0	.20	.30	.20
13	2.0	2.9	1.5	.60	.30	.20	.80	5.0	.30	.20	.30	.30
14	1.4	3.0	1.4	.60	.20	.20	1.2	5.8	.20	.20	.30	.20
15	1.8	5.2	1.2	.60	.20	.20	1.9	5.4	.10	.20	.30	.20
16	1.8	5.2	1.3	.60	.20	.20	2.9	4.8	0	.30	8.2	.20
17	3.1	5.6	1.3	.60	.20	.20	4.8	3.6	0	.40	24	.20
18	7.7	8.6	1.2	.60	.20	.20	7.2	2.9	.20	.30	20	.10
19	12	9.6	1.2	.60	.20	.20	13	2.6	.40	.20	17	.10
20	13	9.1	1.2	.60	.20	.20	26	1.7	.30	.60	15	.10
21	17	8.6	1.1	.60	.20	.30	26	1.2	.20	.50	13	.40
22	9.6	8.1	1.1	.60	.20	.30	24	.90	.10	1.2	25	.20
23	8.0	7.4	1.0	.60	.10	.30	22	.90	.10	.30	5.6	.20
24	6.4	6.7	1.0	.50	.10	.30	20	.90	.10	4.0	2.0	.10
25	5.2	6.0	1.0	.50	.10	.30	21	.70	.10	3.2	1.5	.10
26	4.0	5.4	.90	.50	.10	.30	27	.60	.10	2.3	1.1	.10
27	4.4	4.7	.90	.50	.10	.30	35	.60	0	1.1	.80	.10
28	21	4.2	.90	.50	.10	.30	37	.50	0	1.0	.60	.10
29	19	3.8	.80	.50	.10	.30	40	.40	0	.90	.50	.10
30	20	3.5	.80	.50	-----	.30	30	.30	0	.70	.40	.10
31	19	-----	.80	.50	-----	.30	-----	.30	-----	.60	.40	-----
TOTAL	210.3	102.0	45.90	19.00	7.20	6.30	344.10	196.50	2.80	21.70	140.30	5.70
MEAN	6.78	6.43	1.48	.61	.25	.20	11.5	6.34	.093	.70	4.53	.19
MAX	21	16	3.2	.80	.50	.30	40	24	.40	4.0	25	.40
MIN	1.8	2.9	.80	.50	.10	.10	.30	.30	0	0	.30	.10
CFSM	2.23	2.12	.49	.20	.08	.07	3.78	2.09	.03	.23	1.49	.06
IN.	2.57	2.36	.56	.23	.09	.08	4.21	2.40	.03	.27	1.72	.07

CAL YR 1971 TOTAL 1,457.20 MEAN 3.99 MAX 77 MIN .10 CFSM 1.31 IN 17.83
WTR YR 1972 TOTAL 1,192.80 MEAN 3.26 MAX 40 MIN 0 CFSM 1.07 IN 14.60

LAKE OF THE WOODS BASIN

05127225 Shagawa Lake at Ely, Minn.

LOCATION.--Lat 47°54'18", long 91°53'00", in NE¹/₄ 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, 1,339.30 ft May 8; minimum observed, 1,337.27 ft Sept. 25.

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 1971 TO SEPTEMBER 1972

Oct. 29	1337.89	Feb. 29	1337.58	June 30	1337.62
Nov. 30	1338.41	Mar. 31	1337.55	July 31	1337.93
Dec. 29	1337.99	Apr. 28	1338.71	Aug. 31	1337.74
Jan. 31	1337.73	May 31	1338.43	Sept. 29	1337.29

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

05127230 Shagawa River at Ely, Minn.

LOCATION.--Lat 47°55'09", long 91°50'08", in SW 1/4 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.

AVERAGE DISCHARGE.--5 years, 103 cfs.

EXTREMES.--Current year: Maximum discharge, 361 cfs May 8 (gage height, 6.07 ft); minimum, 16 cfs Sept. 28, 30 (gage height, 4.11 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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	25	110	155	85	64	53	42	301	159	52	74	54
2	28	116	151	82	63	53	42	322	152	50	72	51
3	33	127	149	80	62	52	42	333	144	50	68	47
4	35	127	142	78	62	52	41	337	136	49	66	45
5	34	138	142	76	61	52	41	339	128	49	62	41
6	35	136	139	75	60	52	41	351	123	47	59	39
7	35	131	134	75	60	52	41	356	118	46	56	39
8	35	123	133	73	60	52	40	358	117	45	56	36
9	35	122	131	71	59	51	40	354	115	43	54	33
10	35	117	126	70	59	48	40	352	111	41	50	31
11	33	118	125	69	57	48	40	344	107	40	48	29
12	31	117	122	70	56	47	43	337	102	42	47	28
13	31	118	121	71	56	45	43	328	99	48	46	34
14	31	121	118	72	56	45	44	317	95	52	42	33
15	29	132	119	70	55	44	47	309	94	51	42	28
16	26	137	122	68	55	45	52	296	93	49	60	27
17	31	149	119	68	54	45	56	288	86	53	68	26
18	35	160	115	69	56	43	59	273	82	53	71	25
19	43	164	115	66	56	43	64	261	82	53	72	27
20	44	172	110	67	56	43	72	248	81	59	72	29
21	46	175	109	65	56	44	85	237	81	63	74	31
22	48	176	106	67	55	46	100	228	81	73	73	26
23	49	176	103	68	56	46	111	220	75	86	72	23
24	47	174	101	68	56	45	121	210	69	87	72	23
25	47	175	100	68	55	45	136	202	67	84	70	21
26	47	173	97	67	55	43	154	194	64	82	68	23
27	58	170	95	66	55	41	183	187	58	81	68	22
28	74	167	93	65	54	41	216	180	57	83	66	23
29	81	162	94	65	53	41	251	174	56	81	63	23
30	96	160	93	65	-----	41	281	169	55	81	61	2.
31	105	-----	88	66	-----	42	-----	165	-----	79	59	-----
TOTAL	1,362	4,343	3,667	2,185	1,662	1,440	2,568	8,570	2,887	1,852	1,931	938
MEAN	43.9	145	118	70.5	57.3	46.5	85.6	276	96.2	59.7	62.3	31.3
MAX	105	176	155	85	64	53	281	358	159	87	74	54
MIN	25	110	88	65	53	41	40	165	55	40	42	21

CAL YR 1971 TOTAL 37,571.3 MEAN 103 MAX 408 MIN 8.6
WTR YR 1972 TOTAL 33,405.0 MEAN 91.3 MAX 358 MIN 21

LAKE OF THE WOODS BASIN

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.--44 years (1925-27, 1930-72), 1,383 cfs (10.79 inches per year).

EXTREMES.--Current year: Maximum discharge, 7,240 cfs May 17 (gage height, 7.02 ft); minimum, 551 cfs Oct. 1 (gage height, 2.96 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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	573	1,790	3,230	1,540	1,190	773	878	2,340	3,650	1,300	998	2,150
2	625	1,960	3,160	1,510	1,170	762	880	2,680	3,460	1,260	982	2,170
3	661	2,160	3,090	1,490	1,150	760	871	3,020	3,260	1,200	972	2,150
4	673	2,450	3,000	1,470	1,130	763	872	3,350	3,110	1,140	965	2,090
5	715	2,710	2,950	1,450	1,110	761	870	3,710	2,940	1,080	962	2,000
6	740	2,950	2,880	1,430	1,090	770	870	4,140	2,820	1,040	963	1,940
7	750	3,200	2,810	1,410	1,060	772	863	4,540	2,690	1,000	955	1,880
8	748	3,430	2,740	1,390	1,040	769	852	4,950	2,620	966	966	1,800
9	743	3,540	2,630	1,370	1,010	763	836	5,340	2,540	950	962	1,750
10	735	3,640	2,510	1,370	995	760	812	5,730	2,400	934	968	1,690
11	717	3,700	2,400	1,370	978	750	791	6,100	2,330	918	973	1,620
12	715	3,740	2,300	1,370	957	743	785	6,430	2,260	999	968	1,580
13	708	3,740	2,220	1,380	939	742	857	6,700	2,200	1,010	958	1,570
14	692	3,690	2,150	1,360	913	742	850	6,940	2,150	1,010	951	1,520
15	684	3,630	2,090	1,350	892	751	848	7,090	2,050	1,000	934	1,460
16	694	3,610	2,020	1,350	877	765	845	7,180	1,980	988	1,380	1,420
17	755	3,620	1,950	1,330	863	771	870	7,190	1,910	997	1,460	1,360
18	803	3,620	1,900	1,310	864	773	893	7,140	1,860	969	1,490	1,330
19	848	3,620	1,850	1,320	858	769	906	7,020	1,850	945	1,500	1,300
20	861	3,600	1,820	1,310	852	762	939	6,830	1,790	954	1,500	1,310
21	965	3,550	1,790	1,310	825	779	988	6,620	1,720	970	1,510	1,290
22	864	3,510	1,770	1,300	809	799	1,040	6,370	1,680	1,010	1,490	1,270
23	870	3,490	1,740	1,290	802	807	1,120	6,100	1,620	1,010	1,510	1,240
24	879	3,470	1,720	1,290	797	814	1,190	5,780	1,560	990	1,630	1,220
25	891	3,410	1,700	1,310	750	823	1,250	5,420	1,500	992	1,760	1,200
26	906	3,400	1,670	1,290	783	832	1,340	5,080	1,460	991	1,860	1,200
27	942	3,380	1,660	1,270	777	839	1,460	4,730	1,430	981	1,940	1,230
28	1,130	3,350	1,640	1,250	769	846	1,630	4,450	1,430	983	1,990	1,250
29	1,260	3,310	1,610	1,230	761	849	1,830	4,270	1,420	972	2,040	1,320
30	1,450	3,270	1,590	1,220	-----	855	2,060	4,030	1,350	981	2,100	1,400
31	1,600	-----	1,570	1,200	-----	871	-----	3,830	-----	991	2,130	-----
TOTAL	26,137	68,420	68,140	41,840	27,049	24,335	31,096	165,100	65,040	31,531	41,767	46,710
MEAN	843	3,293	2,198	1,260	933	785	1,037	5,326	2,168	1,017	1,347	1,557
MAX	1,600	3,740	3,230	1,540	1,190	971	2,060	7,190	3,650	1,300	2,130	2,170
MIN	573	1,790	1,570	1,200	761	742	785	2,340	1,350	918	934	1,200
CFS 4	.48	1.89	1.26	.74	.54	.45	.60	3.06	1.25	.58	.77	.89
IN	.56	2.41	1.46	.89	.58	.52	.66	3.53	1.39	.67	.89	1.00
CAL YR 1971	TOTAL 738,778	MEAN 2,024	MAX 7,250	MIN 381	CFSM 1.16	IN 15.79						
WTR YR 1972	TOTAL 667,235	MEAN 1,823	MAX 7,190	MIN 573	CFSM 1.05	IN 14.27						

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 at various sites on Lac la Croix.
 October 1933 to March 13, 1963, nonrecording gage at present site and datum.

AVERAGE DISCHARGE.--50 years (1922-72), 3,780 cfs (9.93 inches per year).

EXTREMES.--Current year: Maximum discharge, 12,900 cfs May 24 (elevation, 1,188.38 ft); minimum, 1,580 cfs Oct.
 1 (elevation, 1,182.78 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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1,620	4,500	8,730	5,440	3,790	2,840	2,410	4,650	11,000	5,640	6,190	4,940
2	1,700	4,680	8,660	5,340	3,740	2,800	2,400	5,080	10,800	5,540	6,120	4,880
3	1,710	4,890	8,540	5,230	3,720	2,770	2,330	5,490	10,400	5,440	6,070	4,840
4	1,710	5,210	8,450	5,130	3,680	2,760	2,360	5,880	10,100	5,260	6,040	4,720
5	1,790	5,340	8,380	5,050	3,550	2,730	2,340	6,290	9,760	5,170	5,970	4,570
6	1,820	5,520	8,310	4,950	3,630	2,720	2,350	6,780	9,460	5,090	5,880	4,630
7	1,870	5,800	8,200	4,850	3,570	2,730	2,330	7,250	9,180	4,990	5,810	4,510
8	1,900	6,100	8,080	4,810	3,530	2,700	2,290	7,740	8,890	4,890	5,750	4,580
9	1,930	6,300	7,990	4,720	3,500	2,680	2,290	8,200	8,650	4,790	5,650	4,560
10	1,960	6,590	7,900	4,680	3,470	2,650	2,280	8,650	8,390	4,710	5,570	4,520
11	1,990	6,890	7,760	4,530	3,430	2,630	2,280	9,080	8,160	4,670	5,500	4,430
12	2,020	7,160	7,650	4,560	3,330	2,620	2,300	9,590	7,940	4,600	5,450	4,390
13	2,060	7,390	7,510	4,500	3,350	2,590	2,350	10,100	7,810	4,550	5,370	4,380
14	2,070	7,670	7,420	4,460	3,330	2,570	2,360	10,500	7,650	4,450	5,270	4,300
15	2,110	7,850	7,300	4,420	3,260	2,560	2,370	10,900	7,490	4,400	5,210	4,180
16	2,170	8,080	7,210	4,360	3,240	2,560	2,380	11,400	7,330	4,340	5,610	4,130
17	2,340	8,310	7,050	4,390	3,210	2,550	2,420	11,700	7,140	4,290	5,660	4,050
18	2,440	8,520	6,950	4,330	3,170	2,560	2,480	12,000	6,980	4,230	5,700	4,000
19	2,540	8,710	6,840	4,210	3,140	2,550	2,520	12,300	6,880	4,210	5,760	3,950
20	2,580	8,830	6,740	4,180	3,120	2,540	2,550	12,500	6,790	4,640	5,790	3,870
21	2,640	8,900	6,630	4,160	3,090	2,530	2,610	12,700	6,730	4,840	5,770	3,700
22	2,710	9,020	6,530	4,140	3,050	2,520	2,690	12,800	6,630	5,170	5,760	3,740
23	2,770	9,070	6,420	4,060	3,020	2,500	2,780	12,800	6,510	5,420	5,710	3,660
24	2,840	9,070	6,320	4,040	2,980	2,480	2,900	12,900	6,340	5,590	5,640	3,570
25	2,880	9,050	6,210	4,080	2,950	2,460	3,020	12,700	6,190	5,780	5,590	3,480
26	2,930	9,050	6,110	4,040	2,930	2,440	3,160	12,500	6,110	5,940	5,540	3,440
27	3,170	9,000	6,000	4,010	2,900	2,430	3,370	12,300	5,920	6,050	5,460	3,430
28	3,540	8,950	5,900	3,970	2,890	2,420	3,640	12,200	6,010	6,110	5,330	3,300
29	3,780	8,880	5,790	3,910	2,860	2,400	3,940	12,000	5,970	6,150	5,280	3,250
30	4,080	8,810	5,690	3,880	-----	2,400	4,280	11,600	5,750	6,190	5,200	3,230
31	4,150	-----	5,580	3,850	-----	2,400	-----	11,300	-----	6,160	5,050	-----
TOTAL	75,820	224,140	222,850	138,380	95,600	80,090	79,830	311,880	233,060	159,300	174,700	123,430
MEAN	2,445	7,471	7,189	4,464	3,297	2,584	2,651	10,060	7,769	5,139	5,635	4,114
MAX	4,150	9,070	8,730	5,440	3,790	2,840	4,280	12,900	11,000	6,190	6,190	4,940
MIN	1,620	4,500	5,580	3,850	2,860	2,400	2,280	4,650	5,750	4,210	5,050	3,230
CFSM	.47	1.45	1.39	.86	.64	.50	.51	1.95	1.50	.99	1.09	.80
IN.	.55	1.61	1.60	1.00	.59	.58	.57	2.24	1.58	1.15	1.26	.89

CAL YR 1971 TOTAL 2,035,810 MEAN 5,578 MAX 12,700 MIN 1,470 CFSM 1.08 IN 14.65
 #TR YR 1972 TOTAL 1,919,080 MEAN 5,243 MAX 12,900 MIN 1,670 CFSM 1.01 IN 13.81

LAKE OF THE WOODS BASIN

05128200 Vermilion Lake near Soudan, Minn.

LOCATION.--Lat 47°49'52", long 92°16'20", in ~~SW~~^{SE} 1/4 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 15, 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, 1,358.70 ft May 17 (affected by wind action); maximum daily, 1,358.68 ft May 9, 10; minimum, 1,357.10 ft Oct. 1.

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 1971 TO SEPTEMBER 1972

Oct. 31	1,358.03	Feb. 29	1,357.28	June 30	1,357.60
Nov. 30	1,358.13	Mar. 31	1,357.25	July 31	1,357.66
Dec. 31	1,357.67	Apr. 30	1,358.32	Aug. 31	1,357.77
Jan. 26	1,357.51	May 31	1,358.17	Sept.30	1,357.41

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 SE 1/4 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.--50 years, 317 cfs (8.91 inches per year).

EXTREMES.--Current year: Maximum discharge, 1,250 cfs May 11 (gage height, 6.20 ft); minimum, 125 cfs Oct. 1 (gage height, 3.71 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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	141	694	763	425	277	211	175	928	719	323	364	390
2	168	719	747	420	271	210	175	991	712	305	340	366
3	178	724	722	415	271	209	173	1,040	663	301	327	350
4	165	789	699	410	268	207	172	1,070	659	285	322	332
5	178	789	691	405	265	207	170	1,110	623	278	304	320
6	194	762	676	403	262	210	168	1,160	602	273	288	306
7	211	789	659	400	255	211	165	1,200	579	265	286	296
8	210	822	649	395	255	208	165	1,210	544	261	287	288
9	210	794	646	390	249	203	164	1,210	522	242	282	278
10	217	800	635	385	246	203	163	1,210	499	252	286	270
11	210	797	623	380	246	197	162	1,210	481	262	268	262
12	222	789	615	372	238	193	168	1,210	465	267	268	258
13	227	792	600	365	235	191	198	1,180	469	276	265	252
14	222	791	589	360	230	187	201	1,170	472	270	284	246
15	217	784	573	350	224	188	204	1,150	437	260	288	240
16	227	789	574	342	222	194	206	1,130	439	264	334	238
17	265	805	562	335	217	191	215	1,110	439	262	351	234
18	291	816	555	330	222	190	227	1,090	434	249	410	232
19	294	840	544	325	222	185	247	1,070	436	265	449	234
20	298	807	529	320	222	183	277	1,030	408	287	485	238
21	305	820	512	313	214	189	319	1,010	411	316	479	240
22	308	838	498	307	214	191	371	993	405	359	491	242
23	320	841	479	302	214	189	433	963	382	372	497	242
24	335	819	470	308	217	186	492	934	365	364	490	240
25	335	810	464	322	215	184	553	903	353	379	492	233
26	335	800	452	316	213	181	617	864	351	391	487	230
27	403	788	445	310	211	178	681	834	347	391	481	225
28	475	783	442	304	209	177	738	813	355	384	466	222
29	539	777	438	299	209	172	805	779	355	385	450	219
30	634	772	433	291	-----	173	867	759	328	378	425	217
31	654	-----	430	284	-----	175	-----	736	-----	360	408	-----
TOTAL	8,988	23,740	17,714	10,883	6,813	5,973	9,671	32,067	14,254	9,526	11,654	7,940
MEAN	290	791	571	351	235	193	322	1,034	475	307	376	265
MAX	654	841	763	425	277	211	867	1,210	719	391	497	390
MIN	141	694	430	284	209	172	162	736	328	242	265	217
CFSM	.60	1.64	1.18	.73	.49	.40	.67	2.14	.98	.64	.78	.55
IN.	.69	1.83	1.36	.84	.52	.46	.74	2.47	1.10	.73	.90	.61

CAL YR 1971 TOTAL 174,290 MEAN 478 MAX 841 MIN 73 CFSM .99 IN 13.42
WTR YR 1972 TOTAL 159,223 MEAN 435 MAX 1,210 MIN 141 CFSM .90 IN 12.26

LAKE OF THE WOODS BASIN

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 1972 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 Boundary 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, 1,108.78 ft Nov. 5; minimum, 1,104.00 ft Apr. 16.

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 1971 TO SEPTEMBER 1972

Oct. 31	8.54	Feb. 29	5.57	June 30	7.53
Nov. 30	8.31	Mar. 31	4.49	July 31	8.10
Dec. 31	6.95	Apr. 30	5.09	Aug. 31	7.81
Jan. 31	6.12	May 31	7.17	Sept. 30	7.31

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 NE 1/4 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.

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.--30 years, 125 cfs (9.08 inches per year).

EXTREMES.--Current year: Maximum discharge, 1,220 cfs Apr. 21 (gage height, 4.16 ft); minimum daily, 17 cfs Mar. 6-13; minimum gage height, 0.40 ft Mar. 13.

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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	71	656	115	42	22	18	40	894	152	47	90	154
2	90	610	110	41	22	18	41	855	142	43	81	160
3	104	553	105	40	22	18	42	805	128	41	75	142
4	112	483	101	39	21	18	42	745	119	39	69	133
5	113	424	98	38	21	18	42	693	110	35	65	127
6	110	363	95	37	21	17	42	678	101	34	76	130
7	103	304	93	36	20	17	43	638	95	34	100	140
8	94	281	90	35	20	17	42	604	86	31	147	138
9	87	245	87	34	20	17	43	557	79	32	193	134
10	85	224	84	34	20	17	44	505	72	34	216	129
11	77	211	80	33	20	17	51	449	70	103	221	124
12	68	200	78	32	20	17	60	397	68	136	201	123
13	63	194	75	31	19	17	60	362	65	146	174	163
14	58	193	72	31	19	18	74	345	69	145	149	182
15	54	203	69	30	19	18	113	334	67	128	130	188
16	50	212	67	29	19	18	206	321	63	106	126	180
17	78	223	64	28	19	19	346	300	58	101	140	166
18	110	233	62	28	19	19	447	294	55	93	158	153
19	136	237	60	27	19	20	669	280	107	89	185	143
20	145	238	59	26	18	22	880	257	119	85	348	150
21	142	214	57	26	18	27	1,150	235	109	112	363	167
22	135	195	56	25	18	28	1,200	220	95	170	432	171
23	125	180	55	24	18	29	1,130	215	81	257	412	167
24	113	170	53	24	18	30	984	200	68	267	372	157
25	107	162	51	24	18	31	898	186	60	266	315	144
26	101	150	50	24	18	33	905	172	52	242	262	156
27	226	140	49	23	18	36	948	161	48	207	231	161
28	400	132	47	23	18	38	970	158	51	173	208	165
29	495	126	46	23	18	39	1,000	181	48	142	201	161
30	642	121	45	23	-----	40	968	178	49	121	180	154
31	718	-----	44	22	-----	40	-----	167	-----	104	167	-----
TOTAL	5,012	7,877	2,217	932	562	731	13,480	12,386	2,486	3,563	6,087	4,562
MEAN	162	263	71.5	30.1	19.4	23.6	449	400	82.9	115	196	152
MAX	718	656	115	42	22	40	1,200	894	152	267	432	188
MIN	50	121	44	22	18	17	40	158	48	31	65	123
CFSM	.87	1.41	.38	.16	.10	.13	2.40	2.14	.44	.62	1.05	.81
IN.	1.00	1.57	.44	.19	.11	.15	2.68	2.46	.49	.71	1.21	.91

CAL YR 1971 TOTAL 61,831 MEAN 169 MAX 2,110 MIN 18 CFSM .90 IN 12.30
WTR YR 1972 TOTAL 59,895 MEAN 164 MAX 1,200 MIN 17 CFSM .88 IN 11.91

PEAK DISCHARGE (BASE, 500 CFS)

DATE	TIME	G.H.	DISCHARGE	DATE	TIME	G.H.	DISCHARGE
10-31	0400	3.28	733	4-21	2230	4.16	1,220

LAKE OF THE WOODS BASIN

05131000 Dark River near Chisholm, Minn.

LOCATION---Lat 47°41'27", long 92°49'15", in SW 1/4 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 north-east 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---26 years, 38.0 cfs (10.20 inches per year).

EXTREMES---Current year: Maximum discharge, 318 cfs Apr. 21 (gage height, 4.25 ft); minimum daily discharge, 11 cfs Feb. 20-28; minimum gage height, 1.46 ft Feb. 20-23.

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 current water year computed by U.S. Steel Corporation and reviewed by Geological Survey.

REVISIONS (WATER YEARS)---WSP 1508: 1943(M), 1947-48(M), 1950.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	58	207	40	19	13	12	32	189	43	33	43	53
2	57	198	38	18	13	12	32	194	44	32	38	44
3	62	178	37	17	13	12	30	181	44	31	34	38
4	67	156	34	17	13	12	29	164	41	29	29	34
5	70	136	34	17	13	13	29	151	39	27	27	31
6	71	116	34	16	13	13	29	156	37	27	28	34
7	66	102	33	17	13	13	29	141	34	27	28	35
8	62	90	32	17	13	12	29	129	31	26	36	32
9	57	78	33	16	12	12	30	119	30	25	37	31
10	53	69	30	16	12	12	32	108	27	27	38	30
11	47	63	29	16	12	12	34	98	26	60	40	29
12	43	57	27	15	12	12	39	89	26	62	37	29
13	40	54	26	16	12	12	44	82	27	72	34	48
14	38	55	26	16	12	12	50	80	31	82	31	44
15	34	57	27	16	12	12	58	77	29	81	28	41
16	32	59	27	15	12	12	80	74	28	74	34	37
17	50	69	27	15	12	13	112	73	27	74	57	35
18	54	74	26	15	12	14	133	72	27	68	48	31
19	58	74	24	16	12	14	174	69	51	61	44	29
20	61	68	24	16	11	15	246	67	51	61	125	35
21	64	61	23	16	11	16	310	63	48	67	171	41
22	64	56	22	16	11	18	306	59	47	98	182	37
23	61	53	22	16	11	16	290	58	42	115	181	35
24	57	51	22	16	11	18	259	54	37	110	164	33
25	52	49	22	15	11	21	238	50	31	111	142	30
26	48	47	22	15	11	26	224	47	27	103	121	35
27	79	45	21	15	11	32	215	43	26	91	103	34
28	117	43	20	15	11	35	207	42	26	79	88	34
29	156	42	20	14	12	36	200	48	28	68	77	32
30	221	40	20	14	-----	34	194	46	30	57	67	29
31	221	-----	19	14	-----	23	-----	43	-----	50	60	-----
TOTAL	2,220	2,447	841	492	347	536	3,714	2,866	1,035	1,928	2,172	1,060
MEAN	71.6	81.6	27.1	15.9	12.0	17.3	124	92.5	34.5	62.2	70.1	35.3
MAX	221	207	40	19	13	36	310	194	51	115	182	53
MIN	32	40	19	14	11	12	29	42	26	25	27	29
CFSM	1.42	1.61	.54	.31	.24	.34	2.45	1.83	.68	1.23	1.39	.70
IN.	1.63	1.80	.62	.36	.26	.39	2.73	2.11	.76	1.42	1.60	.78

CAL YR 1971 TOTAL 20,460 MEAN 56.1 MAX 611 MIN 11 CFSM 1.11 IN 15.04
WTR YR 1972 TOTAL 19,658 MEAN 53.7 MAX 310 MIN 11 CFSM 1.06 IN 14.45

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.--49 years (1911-16, 1928-72), 1,041 cfs (8.17 inches per year).

EXTREMES.--Current year: Maximum discharge, 13,700 cfs Apr. 21 (gage height, 30.05 ft, backwater from ice); maximum gage height, 31.21 ft Apr. 21 (backwater from ice jam); minimum daily discharge, 130 cfs Mar. 7-11; minimum gage height, 6.23 ft July 10.
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 months, which are fair.

REVISIONS (WATER YEARS).--WSP 955: Drainage area. WSP 1508: 1913, 1916, 1928-32, 1934.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	506	8,410	1,220	335	200	135	320	6,920	1,610	427	1,350	951
2	905	7,850	1,150	330	198	135	315	6,570	1,500	399	1,260	838
3	1,250	6,920	1,080	325	195	133	312	6,390	1,250	458	1,090	752
4	1,430	6,120	1,010	320	192	132	310	6,000	1,050	483	921	690
5	1,470	5,230	930	315	190	132	307	5,510	912	439	777	634
6	1,430	4,460	870	310	186	132	305	5,180	822	393	678	587
7	1,340	3,700	830	305	182	130	302	5,210	738	362	608	551
8	1,280	3,100	780	302	178	130	300	5,040	667	336	568	537
9	1,230	2,720	740	300	175	130	300	4,710	597	320	586	578
10	1,160	2,780	700	298	172	130	300	4,270	538	313	671	623
11	1,080	2,590	670	294	170	130	325	3,840	501	336	746	601
12	991	2,280	640	290	167	132	380	3,450	464	461	751	557
13	907	2,090	610	285	165	132	460	3,130	463	687	734	535
14	833	1,850	590	280	162	140	640	2,920	471	1,140	705	543
15	760	2,140	570	275	160	160	1,050	2,750	532	1,400	693	703
16	697	2,150	550	270	157	190	1,650	2,570	646	1,460	644	925
17	937	2,220	540	268	155	215	2,200	2,410	763	1,320	669	910
18	1,790	2,360	525	265	153	230	4,000	2,260	747	1,130	1,930	819
19	2,430	2,500	510	260	150	240	5,800	2,170	691	978	2,550	726
20	2,620	2,440	500	257	148	250	8,800	2,070	678	1,280	3,230	657
21	2,390	2,340	485	253	146	275	12,400	1,930	807	1,580	3,940	612
22	2,200	2,180	470	250	145	305	9,700	1,790	1,020	2,630	5,100	674
23	1,980	2,050	460	245	143	320	9,390	1,650	1,030	4,440	4,830	756
24	1,700	1,920	445	240	142	330	8,590	1,570	885	6,380	4,400	800
25	1,500	1,740	430	232	140	345	7,970	1,440	739	6,080	3,650	799
26	1,390	1,560	415	227	140	360	7,540	1,300	625	5,300	2,970	744
27	1,720	1,500	395	220	138	360	7,360	1,170	541	4,320	2,360	693
28	5,250	1,440	380	215	136	350	7,350	1,080	512	3,390	1,870	688
29	7,690	1,380	365	210	135	340	7,350	1,120	495	2,670	1,520	720
30	7,790	1,310	355	207	-----	330	7,220	1,330	469	2,150	1,260	745
31	9,240	-----	345	203	-----	325	-----	1,470	-----	1,740	1,110	-----
TOTAL	66,896	91,330	19,560	8,386	4,720	6,778	113,246	99,260	22,763	54,802	54,171	20,948
MEAN	2,158	3,044	631	271	163	219	3,775	3,202	759	1,768	1,747	698
MAX	9,240	8,410	1,220	335	200	360	12,400	6,920	1,610	6,380	5,100	951
MIN	506	1,310	345	203	135	130	300	1,080	463	313	568	535
CFSM	1.25	1.76	.36	.16	.09	.13	2.18	1.85	.44	1.02	1.01	.40
IN.	1.44	1.96	.42	.18	.10	.15	2.44	2.13	.49	1.18	1.16	.45

CAL YR 1971 TOTAL 728,658 MEAN 1,996 MAX 20,600 MIN 235 CFSM 1.15 IN 15.67
WTR YR 1972 TOTAL 562,860 MEAN 1,538 MAX 12,400 MIN 130 CFSM .89 IN 12.10

LAKE OF THE WOODS BASIN

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.--44 years (1928-1972), 694 cfs (6.46 inches per year).

EXTREMES.--Current year: Maximum discharge, 6,510 cfs Apr. 21 (gage height, 10.58 ft); maximum gage height, 12.15 ft Apr. 19 (from floodmark, backwater from ice); minimum discharge, 193 cfs July 8, 9 (gage height, 3.18 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. Prior to 1971, a powerplant, located a quarter of a mile upstream, caused some diurnal fluctuation at low flows. 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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	381	4,810	800	450	260	232	270	3,480	892	269	1,030	545
2	525	4,600	770	430	258	232	280	3,460	807	260	906	521
3	591	4,420	740	420	255	232	285	3,530	740	246	806	506
4	643	3,940	720	410	252	231	290	3,400	677	233	719	464
5	667	3,390	710	395	250	230	288	3,230	614	219	642	479
6	666	2,940	690	385	248	230	285	3,270	551	207	579	466
7	663	2,460	670	375	243	230	280	3,320	497	203	540	464
8	631	1,990	650	370	240	230	280	3,270	455	201	574	465
9	599	1,760	640	365	235	230	285	3,130	416	197	648	461
10	568	1,760	630	355	232	230	290	2,920	384	211	653	456
11	538	1,840	615	350	232	230	305	2,700	360	489	659	446
12	516	1,790	608	340	230	232	340	2,500	370	1,170	654	441
13	498	1,740	602	335	230	235	380	2,340	443	1,460	616	484
14	484	1,670	590	330	232	238	470	2,270	477	1,460	575	585
15	471	1,740	580	325	235	240	600	2,200	541	1,410	541	634
16	463	1,790	570	320	240	242	1,000	2,120	553	1,230	538	642
17	729	1,820	560	315	240	245	2,250	2,030	491	1,100	726	627
18	1,460	1,900	550	310	240	248	3,800	1,960	444	1,000	891	604
19	1,650	1,940	540	305	238	250	5,300	1,970	420	891	1,010	579
20	1,730	1,900	535	300	238	255	5,700	1,960	484	1,000	1,070	556
21	1,680	1,660	535	295	238	260	6,330	1,810	548	1,120	1,090	560
22	1,570	1,360	540	290	238	265	5,570	1,630	560	1,760	1,020	564
23	1,400	1,150	550	285	238	270	4,960	1,500	520	2,880	909	553
24	1,260	1,080	560	278	238	272	4,670	1,370	462	3,380	812	571
25	1,150	1,010	570	275	235	265	4,470	1,270	409	2,980	769	561
26	1,080	989	575	272	235	260	4,270	1,180	367	2,570	730	557
27	1,320	950	575	270	235	255	4,070	1,090	334	2,220	694	552
28	3,160	910	570	270	235	257	3,930	995	320	1,900	656	550
29	3,690	870	550	268	235	260	3,780	946	308	1,610	617	549
30	3,660	840	510	265	-----	262	3,640	974	286	1,390	587	550
31	4,490	-----	475	262	-----	265	-----	968	-----	1,190	575	-----
TOTAL	38,933	61,019	18,780	10,215	6,955	7,613	68,668	68,753	14,730	36,456	22,836	16,022
MEAN	1,256	2,034	606	330	240	246	2,289	2,219	491	1,176	737	534
MAX	4,490	4,810	800	450	260	272	6,330	3,530	892	3,380	1,090	642
MIN	381	840	475	262	230	230	270	946	286	197	538	441
CFSM	.86	1.39	.42	.23	.16	.17	1.57	1.52	.34	.81	.50	.37
IN.	.99	1.55	.48	.26	.18	.19	1.75	1.75	.38	.93	.58	.41

CAL YR 1971 TOTAL 359,892 MEAN 986 MAX 6,970 MIN 143 CFSM .68 IN 9.17
 WTR YR 1972 TOTAL 371,020 MEAN 1,014 MAX 6,330 MIN 197 CFSM .69 IN 9.45

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.--44 years, 12,860 cfs (9.00 inches per year).

EXTREMES.--Current year: Maximum discharge, 47,500 cfs Nov. 3 (gage height, 16.06 ft); maximum gage height, 16.49 ft Dec. 16 (backwater from ice); minimum discharge, 5,820 cfs Oct. 1 (gage height, 3.12 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 period, 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.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6,400	42,600	29,700	27,600	12,600	12,100	12,800	25,500	14,800	9,720	20,300	13,200
2	6,960	46,700	29,100	25,300	12,700	12,400	12,700	25,000	14,700	10,000	18,800	13,000
3	8,140	47,200	28,900	25,100	12,500	12,300	12,500	24,700	14,300	9,490	21,300	12,700
4	9,660	46,300	28,700	24,600	12,300	12,400	12,300	24,500	14,000	7,490	21,600	12,600
5	10,800	44,600	28,600	24,400	12,500	12,400	12,600	23,900	13,600	6,520	19,400	12,800
6	11,400	43,000	28,400	24,300	12,600	12,400	12,400	23,300	13,300	7,350	18,300	12,700
7	12,400	41,800	28,300	24,100	12,600	12,400	12,200	22,900	12,500	7,780	18,000	12,800
8	12,900	39,700	28,200	23,000	12,700	12,300	12,200	22,800	11,700	8,100	17,800	12,800
9	13,300	38,100	28,200	22,900	12,400	12,300	12,100	22,500	11,300	7,560	16,700	12,800
10	13,200	37,600	28,200	22,600	11,800	12,200	12,000	21,700	11,500	7,700	16,100	12,800
11	12,700	37,200	28,100	22,800	12,300	12,300	12,200	20,900	11,600	8,600	16,100	12,500
12	12,300	36,900	28,000	22,300	12,600	12,300	11,900	20,100	11,500	9,150	16,100	11,900
13	11,800	36,400	27,900	21,700	12,600	12,300	11,700	19,300	11,600	9,560	16,000	11,800
14	11,500	36,200	27,700	20,500	12,600	12,100	11,800	19,000	11,700	10,700	15,900	11,500
15	11,500	36,100	27,500	20,200	12,500	12,500	12,800	18,800	11,900	11,600	15,400	11,500
16	11,200	36,000	27,300	19,200	12,600	12,400	15,200	18,500	12,100	12,200	14,200	11,800
17	11,800	36,200	27,100	17,800	12,600	12,400	18,200	18,100	12,200	11,800	13,800	12,000
18	13,500	36,500	26,900	16,700	12,700	12,500	20,200	17,700	12,100	11,500	14,400	12,000
19	16,400	36,600	27,100	13,500	12,600	12,400	23,500	17,300	11,900	13,100	15,600	11,600
20	17,900	36,500	27,100	12,800	12,600	12,400	26,600	17,000	12,100	17,200	16,800	11,200
21	18,000	36,100	26,900	12,800	12,600	12,600	30,200	16,900	11,700	20,500	17,500	11,100
22	18,000	34,600	26,800	12,700	12,700	12,500	35,800	16,600	11,400	23,000	18,800	11,200
23	18,100	33,400	26,900	12,800	12,500	12,500	34,300	16,300	11,300	24,800	18,800	10,200
24	17,100	33,000	27,000	12,700	12,400	12,600	30,300	16,100	11,200	27,500	18,200	9,330
25	16,100	31,900	27,700	12,800	12,500	12,600	28,400	15,700	10,700	31,900	17,400	9,240
26	16,600	29,700	27,800	12,600	12,500	12,700	27,300	15,300	10,300	35,200	16,700	9,430
27	17,600	31,400	28,200	12,800	12,500	13,100	26,500	14,600	10,800	34,900	16,000	9,210
28	22,800	32,300	28,100	12,700	12,500	13,000	26,200	14,100	9,840	33,200	15,200	9,380
29	30,300	32,300	27,300	12,700	12,300	13,000	26,000	14,000	9,680	31,600	14,900	9,280
30	36,600	31,500	27,100	12,600	-----	12,900	25,800	14,500	9,410	30,200	14,500	9,230
31	40,300	-----	26,800	12,700	-----	12,900	-----	14,600	-----	28,300	13,700	-----
TOTAL	487,260	1,118,444	861,600	571,300	362,900	387,200	578,700	592,200	356,730	518,220	524,300	343,600
MEAN	15,720	37,280	27,790	18,430	12,510	12,490	19,290	19,100	11,890	16,720	16,910	11,450
MAX	40,300	47,200	29,700	27,600	12,700	13,100	35,800	25,500	14,800	35,200	21,600	13,200
MIN	6,400	29,700	26,800	12,600	11,800	12,100	11,700	14,000	9,410	6,520	13,700	9,210
CFSM	.81	1.92	1.43	.95	.64	.64	.99	.98	.61	.86	.87	.59
IN.	.93	2.14	1.65	1.10	.70	.74	1.11	1.14	.68	.99	1.01	.66

CAL YR 1971 TOTAL 6,749,240 MEAN 18,490 MAX 47,200 MIN 4,900 CFSM .95 IN 12.94
WTR YR 1972 TOTAL 6,702,410 MEAN 18,310 MAX 47,200 MIN 6,400 CFSM .94 IN 12.85

LAKE OF THE WOODS BASIN

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.--16 years, 341 cfs (8.53 inches per year).

EXTREMES.--Current year: Maximum discharge, 3,340 cfs Apr. 17 (gage height, 12.92 ft, from floodmark); minimum daily, 11 cfs Feb. 27 to Mar. 6; minimum gage height, 2.04 ft Sept. 5, 6.

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 months, which are fair.

DISCHARGE, IN CURIC FFFT PER SECCND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	178	1,670	218	41	14	11	76	966	536	115	497	36
2	482	1,670	202	40	14	11	80	918	515	96	422	33
3	653	1,580	185	39	13	11	86	876	474	86	363	35
4	729	1,510	169	38	13	11	84	815	420	79	306	30
5	763	1,420	156	37	12	11	80	765	366	72	257	23
6	773	1,270	145	36	12	11	74	732	322	60	223	33
7	741	1,050	134	34	12	12	68	706	271	52	203	74
8	711	1,050	124	33	12	12	63	667	243	46	244	118
9	733	1,020	116	31	12	12	60	629	204	43	366	112
10	705	954	107	30	12	12	63	596	172	41	345	93
11	662	916	101	29	12	12	100	552	159	42	302	81
12	615	843	93	28	12	12	160	526	152	56	265	76
13	565	800	87	27	13	12	240	528	149	90	229	85
14	530	795	82	26	13	13	450	630	168	107	200	121
15	498	870	76	26	13	15	1,260	778	249	122	180	123
16	465	879	72	25	13	18	2,420	788	262	142	169	110
17	684	857	69	24	13	22	3,180	746	233	136	165	101
18	1,140	855	66	24	12	27	2,820	651	204	109	162	91
19	1,320	838	63	23	12	34	2,400	631	194	117	148	79
20	1,280	784	60	23	12	41	2,280	586	211	938	136	70
21	1,190	631	58	22	12	58	2,070	575	215	1,820	125	62
22	1,100	538	56	21	12	80	1,840	575	190	1,890	113	62
23	1,010	472	55	21	12	105	1,730	556	165	1,720	102	55
24	924	420	54	20	12	125	1,600	531	141	1,540	89	51
25	857	377	52	20	12	125	1,460	541	121	1,280	75	49
26	809	346	50	19	12	120	1,330	580	102	1,070	61	58
27	793	317	48	19	11	110	1,230	519	90	923	50	62
28	815	292	47	18	11	95	1,140	459	88	868	43	75
29	771	266	45	17	11	85	1,080	469	90	792	38	96
30	786	237	43	16	-----	80	1,010	521	104	691	32	113
31	1,440	-----	42	15	-----	78	-----	537	-----	588	40	-----
TOTAL	24,719	25,527	2,875	822	356	1,381	30,534	19,989	6,810	15,731	5,950	2,207
MEAN	797	851	92.7	26.5	12.3	44.5	1,018	645	227	507	192	73.6
MAX	1,440	1,670	218	41	14	125	3,180	966	536	1,890	497	123
MIN	178	237	42	15	11	11	60	459	88	41	32	23
CFSM	1.47	1.57	.17	.05	.02	.08	1.87	1.19	.42	.93	.35	.14
IN.	1.69	1.75	.20	.06	.02	.09	2.09	1.37	.47	1.08	.41	.15

CAL YR 1971 TOTAL 119,346.7 MEAN 327 MAX 2,160 MIN 7.8 CFSM .60 IN 8.18
 WTR YR 1972 TOTAL 136,501.0 MEAN 374 MAX 3,180 MIN 11 CFSM .69 IN 9.38

05139500 West Branch Warroad River near Warroad, Minn.
(Formerly published as Warroad River near Warroad, Minn.)

LOCATION.--Lat 48°52'00", long 95°21'20", in SE 1/4 sec.12, T.162 N., R.37 W., Roseau County, on downstream handrail 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. Prior to October 1971, published as Warroad River near Warroad. 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.--26 years, 44.8 cfs (5.53 inches per year).

EXTREMES.--Current year: Maximum discharge, 732 cfs Apr. 19 (gage height, 7.60 ft); maximum gage height, 7.71 ft Apr. 18 (backwater from ice); minimum discharge, 0.1 cfs on several days in August and September.
Period of record: Maximum discharge, 1,780 cfs Apr. 15, 1965 (gage height, 9.95 ft); no flow at times.

REMARKS.--Records fair.

REVISIONS (WATER YEARS).--WSP 1308: 1949(M). WSP 1508: 1947(M).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.20	133	25	7.3	4.0	3.9	15	193	69	17	.80	.10
2	.20	147	23	7.1	4.0	4.0	13	167	70	14	.80	.10
3	4.2	169	21	6.9	3.9	4.0	13	158	66	14	.60	.10
4	6.9	173	20	6.7	3.9	4.1	12	135	53	11	.50	.10
5	9.3	176	19	6.6	3.9	4.1	12	121	43	9.0	.60	.20
6	10	167	18	6.5	3.9	4.2	12	89	32	6.9	.80	.40
7	11	167	17	6.4	3.8	4.2	12	89	16	3.8	.80	.50
8	9.3	155	16	6.3	3.8	4.3	11	84	15	2.5	1.5	.40
9	8.8	148	15	6.2	3.8	4.4	11	81	12	1.6	1.3	.40
10	8.8	141	14	6.2	3.8	4.6	13	74	13	1.4	1.2	.30
11	8.5	132	14	6.1	3.8	4.7	25	70	18	1.2	1.0	.30
12	8.2	118	13	6.0	3.7	4.8	60	66	22	1.2	.80	.30
13	8.8	111	12	5.9	3.7	5.0	90	71	24	.80	1.3	.20
14	9.3	113	11	5.9	3.7	5.1	175	74	21	.80	1.3	.20
15	16	118	11	5.8	3.7	5.4	280	87	22	.60	1.2	.20
16	27	128	11	5.7	3.7	5.8	350	87	24	.90	.80	.20
17	29	139	10	5.6	3.7	6.5	470	81	27	.60	.80	.20
18	34	129	10	5.4	3.7	7.5	610	72	28	.60	.60	.30
19	57	123	10	5.2	3.7	8.8	714	70	30	.90	.50	.30
20	80	115	9.7	5.1	3.7	10	667	69	28	1.3	.70	.40
21	89	100	9.4	4.9	3.7	13	632	66	32	3.9	.80	.40
22	87	80	9.2	4.7	3.7	18	592	62	30	4.5	.60	.40
23	80	62	9.1	4.6	3.7	30	516	54	27	3.8	.40	.60
24	73	48	9.0	4.5	3.8	38	507	50	46	2.6	.30	.60
25	74	42	8.8	4.4	3.8	45	453	49	27	1.5	.20	.60
26	77	38	8.6	4.3	3.8	43	393	61	28	1.3	.20	1.2
27	80	35	8.4	4.3	3.8	40	286	67	27	.80	.10	1.3
28	87	32	8.2	4.2	3.9	35	284	67	17	.70	.10	1.2
29	89	30	8.0	4.2	3.9	27	238	72	15	.60	.10	1.0
30	103	27	7.8	4.1	-----	21	214	79	14	.80	.90	1.2
31	113	-----	7.6	4.0	-----	18	-----	60	-----	.80	.30	-----
TOTAL	1,298.50	3,296	393.8	171.1	110.0	433.4	7,680	2,625	896	111.40	21.90	13.70
MEAN	41.9	110	12.7	5.52	3.79	14.0	256	84.7	29.9	3.59	.71	.46
MAX	113	176	25	7.3	4.0	45	714	193	70	17	1.5	1.3
MIN	.20	27	7.6	4.0	3.7	3.9	11	49	12	.60	.10	.10
CFSM	.38	1.00	.12	.05	.03	.13	2.33	.77	.27	.03	.007	.004
IN.	.44	1.11	.13	.06	.04	.15	2.50	.89	.30	.04	.007	.004
CAL YR 1971	TOTAL 15,020.10	MEAN 41.2	MAX 466	MIN .10	CFSM .37	IN 5.08						
WTR YR 1972	TOTAL 17,050.80	MEAN 46.6	MAX 714	MIN .10	CFSM .42	IN 5.77						

LAKE OF THE WOODS BASIN

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.--11 years (1946-51, 1967-72), 3.68 cfs (3.52 inches per year).

EXTREMES.--Current year: Maximum discharge, 110 cfs Apr. 19 (gage height, 5.86 ft); maximum gage height, 6.32 ft Apr. 15 (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 fair.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0	.93	.10			0	2.4	5.4	.50			
2	0	1.7	.10			0	2.2	4.8	.50			
3	0	2.1	.10			0	2.1	4.3	.40			
4	0	1.9	.10			0	2.1	3.5	.40			
5	0	1.4	.10			0	2.0	3.3	.30			
6	0	1.2	.10			0	1.9	3.0	.30			
7	0	1.1	.10			0	1.9	2.6	.20			
8	0	1.1	.10			0	1.9	2.4	.20			
9	0	1.0	.10			0	2.2	2.2	.20			
10	0	1.0	0			0	3.0	2.1	.20			
11	0	1.0	0			0	5.0	2.1	.10			
12	0	1.0	0			0	10	2.2	.10			
13	0	1.1	0			0	25	2.5	0			
14	0	1.4	0			0	35	3.0	0			
15	0	3.0	0			.10	45	3.5	0			
16	0	4.1	0			.20	54	3.7	0			
17	0	3.9	0			.30	62	3.6	0			
18	0	3.1	0			.40	59	3.3	0			
19	.20	2.3	0			.50	65	3.0	.30			
20	.30	1.5	0			.80	38	2.7	.30			
21	.40	1.1	0			2.2	32	2.5	.20			
22	.40	.70	0			4.5	29	2.2	.10			
23	.30	.50	0			8.0	27	1.9	.10			
24	.30	.40	0			11	27	1.5	.10			
25	.20	.30	0			9.5	22	1.3	.10			
26	.20	.20	0			7.0	14	1.0	0			
27	.10	.20	0			5.5	10	1.0	0			
28	.10	.10	0			4.3	7.2	.80	0			
29	.10	.10	0			3.5	6.1	.80	0			
30	.20	.10	0		-----	2.9	5.7	.60	0			
31	.40	-----	0		-----	2.5	-----	.50	-----			
TOTAL	3.20	39.50	.90	0	0	63.20	599.7	77.30	4.60	0	0	0
MEAN	.10	1.32	.029	0	0	2.04	20.0	2.49	.15	0	0	0
MAX	.40	4.1	.10	0	0	11	55	5.4	.50	0	0	0
MIN	0	.10	0	0	0	0	1.9	.50	0	0	0	0
CFSM	.007	.09	.002	0	0	.14	1.41	.18	.01	0	0	0
IN.	.008	.10	.002	0	0	.17	1.57	.20	.01	0	0	0
CAL YR 1971	TOTAL	588.00	MEAN	1.61	MAX	137	MIN	0	CFSM	.11	IN	1.54
ATR YR 1972	TOTAL	788.40	MEAN	2.15	MAX	65	MIN	0	CFSM	.15	IN	2.07

05140500 East Branch Warroad River near Warroad, Minn.

LOCATION.--Lat 48°51'30", long 95°18'40", in SE 1/4 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.--13 years (1947-54, 1967-72), 23.6 cfs (3.14 inches per year).

EXTREMES.--Current year: Maximum discharge, 288 cfs Apr. 19 (gage height, 7.85 ft); no flow Aug. 18 to Sept. 30.

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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10	45	15	3.3	2.6	2.6	5.0	79	33	.70	.20	
2	11	64	14	3.2	2.6	2.6	4.9	72	23	.60	.20	
3	11	70	13	3.2	2.6	2.6	4.8	65	16	.50	.20	
4	11	64	12	3.2	2.7	2.6	4.8	66	12	.30	.20	
5	12	55	11	3.1	2.7	2.7	4.7	55	14	.30	.10	
6	12	53	9.6	3.1	2.7	2.7	4.7	55	14	.20	.10	
7	12	50	8.6	3.1	2.7	2.7	4.7	46	11	.10	.20	
8	17	45	7.6	3.0	2.7	2.7	4.6	43	10	.20	.30	
9	19	40	6.8	3.0	2.7	2.7	5.0	41	10	.20	.40	
10	17	38	6.2	3.0	2.6	2.8	6.4	39	8.2	.20	.30	
11	15	40	5.7	2.9	2.6	2.8	11	39	8.0	.20	.20	
12	13	43	5.2	2.9	2.6	2.9	25	38	7.2	.20	.20	
13	10	47	4.8	2.9	2.6	3.0	45	37	6.2	.20	.20	
14	8.5	49	4.6	2.8	2.5	3.1	65	37	6.0	.40	.10	
15	8.8	51	4.4	2.8	2.5	3.2	110	37	4.2	.30	.10	
16	14	52	4.2	2.7	2.5	3.3	159	44	3.7	.20	.10	
17	15	50	4.0	2.7	2.5	3.4	243	42	3.7	.20	.10	
18	18	47	3.9	2.7	2.5	3.6	246	39	4.0	.20	0	
19	29	45	3.8	2.7	2.5	3.8	255	38	20	.20	0	
20	36	41	3.7	2.6	2.5	4.5	230	37	27	.30	0	
21	30	39	3.6	2.6	2.5	5.7	220	35	26	.40	0	
22	20	36	3.5	2.6	2.5	7.5	208	31	24	.30	0	
23	13	32	3.5	2.6	2.5	13	207	30	19	.40	0	
24	11	29	3.5	2.6	2.5	20	207	27	18	.30	0	
25	9.5	27	3.5	2.6	2.5	17	191	26	14	.40	0	
26	8.0	24	3.5	2.6	2.5	11	178	26	13	.80	0	
27	6.0	21	3.5	2.6	2.6	8.0	150	25	7.6	.70	0	
28	5.5	19	3.4	2.6	2.6	6.5	137	25	4.9	.50	0	
29	8.0	18	3.4	2.6	2.6	5.5	113	29	3.1	.40	0	
30	30	16	3.4	2.6	-----	5.2	95	37	.70	.40	0	
31	34	-----	3.3	2.6	-----	5.1	-----	37	-----	.30	0	-----
TOTAL	474.3	1,250	186.2	87.5	74.7	164.8	3,144.6	1,267	371.50	10.60	3.20	0
MEAN	15.3	41.7	6.01	2.82	2.58	5.32	105	40.9	12.4	.34	.10	0
MAX	36	70	15	3.3	2.7	20	255	79	33	.80	.40	0
MIN	5.5	16	3.3	2.6	2.5	2.6	4.6	25	.70	.10	0	0
CFSM	.15	.41	.06	.03	.03	.05	1.03	.40	.12	.003	.001	0
IN.	.17	.46	.07	.03	.03	.06	1.15	.46	.14	.003	.001	0

CAL YR 1971 TOTAL 6,883.40 MEAN 18.9 MAX 211 MIN 0 CFSM .19 IN 2.51
 WTR YR 1972 TOTAL 7,034.40 MEAN 19.2 MAX 255 MIN 0 CFSM .19 IN 2.57

UPPER MISSISSIPPI RIVER BASIN

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, 597,000 acre-ft Aug. 31 (gage height, 10.45 ft); minimum, 468,500 acre-ft Mar. 21, 23, 24 (gage height, 8.53 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 1971 TO SEPTEMBER 1972

Date	Gage height (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept.30.....	9.59	538,100	-
Oct. 31.....	10.26	583,500	+45,400
Nov. 30.....	9.88	557,200	-26,300
Dec. 31.....	9.62	540,100	-17,100
CAL YR 1971.....	-	-	+17,100
Jan. 31.....	9.27	517,100	-23,000
Feb. 28.....	8.83	488,300	-28,900
Mar. 31.....	8.64	475,800	-12,500
Apr. 30.....	9.56	536,100	+60,300
May 31.....	10.32	587,800	+51,700
June 30.....	10.17	577,400	-10,400
July 31.....	10.24	582,200	+4,800
Aug. 31.....	10.45	597,000	+14,800
Sept.30.....	9.83	553,800	-43,200
WTR YR 1972.....	-	-	+15,700

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 Winnibogoshish 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).--88 years, 511 cfs (4.81 inches per year).

EXTREMES.--Current year: Maximum daily discharge, 1,020 cfs Nov. 20; minimum daily, 90 cfs Mar. 31 to Apr. 5. 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; seven discharge measurements made and records reviewed by Geological Survey.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	500	780	1,010	995	973	965	90	103	785	106	658	605
2	500	1,000	1,010	995	973	962	90	103	783	106	658	599
3	500	1,000	1,010	995	973	962	90	104	780	106	477	599
4	500	990	1,010	995	978	962	90	104	780	106	262	599
5	500	990	1,010	992	973	962	90	104	778	106	102	599
6	500	995	1,010	992	973	960	95	105	778	106	103	594
7	500	990	1,010	992	973	960	95	105	775	106	105	592
8	495	990	1,010	990	973	960	95	105	776	106	106	608
9	495	990	1,010	990	973	958	95	105	773	106	106	608
10	495	990	1,010	990	973	958	100	105	682	106	106	605
11	500	990	1,010	990	973	958	101	312	682	107	106	605
12	495	990	1,010	990	971	958	101	315	682	510	106	605
13	495	975	1,000	992	973	958	101	315	682	510	106	605
14	500	975	1,000	992	973	958	101	315	682	510	106	608
15	495	990	1,000	976	973	955	102	315	684	408	106	608
16	490	985	1,000	973	978	955	102	524	682	408	106	608
17	495	1,000	1,000	973	970	955	102	524	582	404	106	608
18	495	1,010	1,000	973	970	955	102	599	583	404	106	608
19	500	1,010	1,000	983	968	955	102	710	583	404	106	608
20	500	1,020	1,000	980	968	955	102	708	484	404	106	603
21	500	1,010	1,000	980	968	955	102	703	484	404	106	608
22	500	1,000	1,000	980	968	955	102	701	390	404	166	610
23	500	1,000	1,000	983	968	765	103	696	195	400	420	605
24	500	1,000	1,000	983	968	575	103	423	106	500	569	605
25	500	1,000	1,000	983	965	360	103	555	107	676	585	608
26	500	1,000	1,000	966	965	360	103	605	108	674	575	605
27	544	1,000	1,000	966	965	369	103	605	108	666	580	610
28	719	1,010	1,000	966	965	192	103	605	108	661	575	608
29	708	1,010	1,000	966	965	100	103	605	106	658	570	613
30	790	1,010	1,000	973	-----	100	103	703	106	661	599	610
31	790	-----	995	973	-----	90	-----	790	-----	658	599	-----
TOTAL	16,501	29,700	31,115	30,467	28,149	23,992	2,974	12,671	15,834	11,491	9,087	18,156
MEAN	532	990	1,004	983	971	774	99.1	409	528	371	293	605
MAX	790	1,020	1,010	995	978	965	103	790	785	676	658	613
MIN	490	780	995	966	965	90	90	103	106	106	102	592
CFSM	.37	.69	.70	.68	.67	.54	.07	.28	.37	.26	.20	.42
IN.	.43	.77	.80	.79	.73	.62	.08	.33	.41	.30	.23	.47

CAL YR 1971 TOTAL 208,202 MEAN 570 MAX 1,200 MIN 101 CFSM .40 IN 5.37
WTR YR 1972 TOTAL 230,137 MEAN 629 MAX 1,020 MIN 90 CFSM .44 IN 5.94

LEECH LAKE RIVER BASIN

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, 331,800 acre-ft Aug. 31 (gage height, 2.38 ft); minimum, 172,400 acre-ft Mar. 14-18 (gage height, 1.10 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 1971 TO SEPTEMBER 1972

Date	Gage height (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30.....	1.40	207,900	-
Oct. 31.....	1.85	264,800	+56,900
Nov. 30.....	1.78	255,900	-8,900
Dec. 31.....	1.58	230,700	-25,200
CAL YR 1971.....	-	-	+62,700
Jan. 31.....	1.38	205,300	-25,400
Feb. 29.....	1.20	183,300	-22,000
Mar. 31.....	1.14	176,700	-6,600
Apr. 30.....	1.80	258,500	+81,800
May 31.....	2.16	303,900	+45,400
June 30.....	1.88	268,600	-35,300
July 31.....	2.04	288,800	+20,200
Aug. 31.....	2.38	331,800	+43,000
Sept. 30.....	2.06	291,400	-40,400
WTR YR 1972.....	-	-	+83,500

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 (unadjusted).--88 years, 351 cfs, (4.10 inches per year).

EXTREMES.--Current year: Maximum daily discharge, 1020 cfs Nov. 20; minimum daily, 99 cfs Mar. 28 to Apr. 2, and Apr. 6-9.

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 tail-water 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; seven discharge measurements made and records reviewed by Geological Survey.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	495	775	940	805	687	774	99	105	950	105	125	622
2	492	775	890	805	690	774	99	105	945	105	125	619
3	500	925	900	800	690	780	100	106	948	105	122	619
4	500	920	905	775	695	778	100	106	945	105	119	622
5	500	920	905	770	700	775	100	106	940	105	116	619
6	500	925	905	775	690	790	99	315	940	105	113	617
7	500	900	910	785	695	780	99	315	938	105	110	622
8	500	900	910	780	702	740	99	315	938	104	107	618
9	500	900	900	785	700	750	99	315	925	104	106	700
10	500	900	875	775	700	790	100	525	740	104	107	692
11	500	920	850	775	705	800	100	525	525	104	106	692
12	495	920	800	740	720	837	100	525	523	105	106	691
13	495	920	780	690	750	850	100	650	520	105	107	692
14	500	920	785	690	765	850	100	652	522	105	106	696
15	492	920	800	690	765	878	100	653	420	106	106	700
16	490	910	810	700	770	885	101	754	420	105	106	798
17	490	1,000	790	720	778	887	101	748	418	105	107	790
18	495	1,010	785	735	740	890	101	854	417	105	107	782
19	500	979	790	790	725	890	102	950	418	105	107	785
20	500	1,020	800	715	765	888	103	965	417	105	107	783
21	500	983	800	715	782	890	103	965	414	105	107	925
22	500	980	800	715	750	890	104	960	208	105	108	890
23	500	962	810	705	765	712	104	960	105	106	321	895
24	500	970	810	690	780	502	105	420	105	107	535	895
25	500	969	780	625	780	264	105	633	105	107	530	900
26	500	957	775	640	780	264	105	840	105	107	629	810
27	550	973	800	670	790	263	105	828	105	109	622	815
28	708	978	800	675	800	99	105	828	105	111	622	815
29	683	977	800	665	805	99	105	820	105	113	619	825
30	788	977	800	675	-----	99	105	975	105	115	619	825
31	797	-----	805	685	-----	99	-----	975	-----	120	622	-----
TOTAL	16,470	28,085	25,810	22,560	21,464	20,567	3,048	18,793	15,271	3,302	7,549	22,354
MEAN	531	936	833	728	740	663	102	606	509	107	244	745
MAX	797	1,020	940	805	805	890	105	975	950	120	629	925
MIN	490	775	775	625	687	99	99	105	105	104	106	617
CFSM	.46	.80	.72	.63	.64	.57	.09	.52	.44	.09	.21	.64
IN.	.53	.90	.83	.72	.69	.66	.10	.60	.49	.11	.24	.72

CAL YR 1971 TOTAL 147,767 MEAN 405 MAX 1,020 MIN 94 CFSM .35 IN 4.73
WTR YR 1972 TOTAL 205,273 MEAN 561 MAX 1,020 MIN 99 CFSM .48 IN 6.57

MISSISSIPPI RIVER MAIN STEM

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 and at mile 1.184 upstream from Ohio River.

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, 90,650 acre-ft April 30 (gage height, 11.35 ft); minimum, 33,520 acre-ft Mar. 15 (gage height, 7.21 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 1971 TO SEPTEMBER 1972

Date	Gage height (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept.30.....	9.14	59,130	-
Oct. 31.....	9.03	57,520	-1,610
Nov. 30.....	8.06	44,630	-12,890
Dec. 31.....	7.55	37,880	-6,750
CAL YR 1971.....	-	-	+5,030
Jan. 31.....	7.55	37,880	0
Feb. 29.....	7.33	35,110	-2,770
Mar. 31.....	8.13	45,620	+10,510
Apr. 30.....	11.35	90,650	+45,030
May 31.....	9.30	61,490	-29,160
June 30.....	8.90	55,740	-5,750
July 31.....	9.18	59,700	+3,960
Aug. 31.....	9.06	57,920	-1,780
Sept.30.....	8.94	56,330	-1,590
WTR YR 1972.....	-	-	-2,800

05211000 Mississippi River at Grand Rapids, Minn.

LOCATION.--Lat 47°13'56", long 93°31'48", in SW 1/4 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.--89 years, 1,145 cfs.

EXTREMES.--Current year: Maximum discharge, 2,800 cfs Nov. 4 (gage height, 8.64 ft, backwater from Prairie River); maximum gage height, 9.18 ft: May 2 (backwater from Prairie River); minimum discharge, 171 cfs July 3 (gage height, 2.89 ft).

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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1,280	2,180	2,220	2,020	2,000	1,930	2,370	2,300	2,190	358	958	1,190
2	1,270	2,350	2,220	2,020	1,990	1,920	2,390	2,500	2,140	392	910	1,240
3	1,260	2,520	2,210	2,020	1,990	1,920	2,290	2,650	2,250	380	874	1,300
4	1,330	2,690	2,210	2,010	1,990	1,920	2,240	2,640	2,080	414	874	1,260
5	1,280	2,660	2,210	2,010	1,990	1,920	2,090	2,630	2,140	329	895	1,230
6	1,250	2,510	2,210	2,010	1,990	1,920	1,930	2,610	2,000	317	853	1,300
7	1,290	2,480	2,200	2,010	1,990	1,920	1,820	2,600	2,040	397	832	1,220
8	1,290	2,440	2,200	2,010	1,990	1,910	1,420	2,580	1,980	427	926	1,230
9	1,230	2,420	2,200	2,000	1,990	1,910	869	2,560	1,940	380	1,020	1,280
10	1,290	2,370	2,190	2,000	1,980	1,910	737	2,480	1,890	375	1,020	1,240
11	1,260	2,300	2,160	2,000	1,980	1,910	738	2,400	1,890	371	916	1,240
12	1,270	2,290	2,120	1,990	1,980	1,910	710	2,380	1,840	418	740	1,200
13	1,270	2,280	2,090	1,990	1,980	1,910	746	2,370	1,720	524	720	1,320
14	1,280	2,250	2,060	1,980	1,970	1,910	785	2,390	1,700	556	689	1,370
15	1,300	2,220	2,030	1,970	1,970	1,900	896	2,390	1,640	505	453	1,420
16	1,240	2,230	2,010	1,970	1,970	1,900	964	2,380	1,580	492	309	1,400
17	1,260	2,250	2,010	1,960	1,960	1,900	963	2,400	1,420	594	354	1,470
18	1,330	2,630	2,010	1,960	1,960	1,900	1,340	2,560	1,410	725	342	1,420
19	1,260	2,540	2,030	1,970	1,960	1,900	1,280	2,520	1,500	619	337	1,440
20	1,300	2,510	2,050	1,970	1,960	1,990	1,260	2,400	1,310	585	337	1,540
21	1,320	2,530	2,080	1,970	1,960	2,020	850	2,350	1,340	684	363	1,540
22	1,320	2,530	2,070	1,980	1,950	2,130	480	2,210	1,120	781	519	1,550
23	1,290	2,460	2,070	1,980	1,950	2,160	490	2,120	1,140	1,420	781	1,680
24	1,280	2,350	2,060	1,980	1,950	2,290	500	1,950	1,090	1,250	817	1,630
25	1,280	2,330	2,060	1,990	1,950	2,340	520	1,900	1,100	1,090	817	1,630
26	1,270	2,280	2,050	1,990	1,940	2,380	540	1,780	1,060	827	879	1,680
27	1,450	2,250	2,040	1,990	1,940	2,440	550	1,760	812	874	817	1,740
28	1,480	2,240	2,040	1,990	1,930	2,480	600	1,830	649	812	948	1,750
29	1,840	2,230	2,030	2,000	1,930	2,440	1,260	2,040	457	895	921	1,710
30	2,160	2,220	2,030	2,000	-----	2,440	1,740	2,230	329	937	995	1,710
31	2,200	-----	2,020	2,000	-----	2,440	-----	2,040	-----	916	1,050	-----
TOTAL	42,430	71,540	65,190	61,740	57,090	63,870	35,368	71,950	45,757	19,644	23,266	42,930
MEAN	1,369	2,385	2,103	1,992	1,969	2,060	1,179	2,321	1,525	634	751	1,431
MAX	2,200	2,690	2,220	2,020	2,000	2,480	2,390	2,650	2,250	1,420	1,050	1,750
MIN	1,230	2,180	2,010	1,960	1,930	1,900	480	1,760	329	317	309	1,190

CAL YR 1971 TOTAL 489,526 MEAN 1,341 MAX 3,590 MIN 190
WTR YR 1972 TOTAL 600,775 MEAN 1,641 MAX 2,690 MIN 309

PRAIRIE RIVER BASIN

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. Datum of gage is 1,294.81 ft above mean sea level, datum of 1929. Prior to Aug. 31, 1967, nonrecording gage at site 125 ft downstream at same datum.

AVERAGE DISCHARGE.--5 years, 247 cfs (9.32 inches per year).

EXTREMES.--Current year: Maximum discharge, 1,540 cfs Apr. 25 (gage height, 9.42 ft); minimum daily, 55 cfs Feb. 25-29; minimum gage height, 2.39 ft Oct. 1.

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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	67	744	236	101	62	56	59	1,270	313	87	353	199
2	73	837	218	99	61	57	59	1,240	294	85	323	185
3	77	918	204	97	60	58	61	1,200	275	83	292	172
4	81	973	192	96	60	59	63	1,170	250	79	261	161
5	87	1,010	182	94	60	60	62	1,140	230	74	239	150
6	95	1,010	174	92	59	62	61	1,140	209	69	223	142
7	97	978	166	90	59	63	62	1,120	189	66	206	142
8	103	933	159	89	58	64	63	1,090	174	64	209	133
9	108	896	155	87	58	66	63	1,050	157	64	201	126
10	109	826	150	86	58	68	62	1,000	140	64	200	122
11	110	760	146	85	58	70	64	962	129	82	207	121
12	107	723	142	83	57	72	67	926	123	92	212	118
13	104	660	138	82	57	74	74	889	116	117	220	135
14	100	607	135	81	57	77	94	854	108	162	228	131
15	99	557	132	80	57	80	135	814	103	204	229	132
16	94	517	130	79	57	83	240	780	101	233	227	137
17	112	488	127	78	57	85	440	740	95	261	218	144
18	128	470	124	77	56	87	652	698	92	267	205	149
19	132	449	121	76	56	86	776	642	101	266	196	150
20	136	440	120	75	56	84	889	588	101	268	185	157
21	144	420	118	74	56	79	988	528	97	265	191	162
22	157	406	117	72	56	75	1,100	480	103	281	243	155
23	166	380	115	71	56	72	1,250	447	108	318	232	150
24	172	364	112	70	56	70	1,420	407	107	333	228	149
25	175	348	110	69	55	67	1,510	371	107	350	226	147
26	177	324	109	68	55	65	1,520	338	101	371	225	153
27	266	304	108	67	55	63	1,490	305	97	393	225	153
28	420	287	106	66	55	62	1,440	284	100	412	226	151
29	477	267	104	65	55	61	1,380	330	100	410	224	152
30	532	259	102	64	-----	60	1,320	343	93	401	217	149
31	654	-----	100	63	-----	59	-----	330	-----	382	210	-----
TOTAL	5,359	18,155	4,352	2,476	1,662	2,144	17,464	23,476	4,313	6,603	7,081	4,427
MEAN	173	605	140	79.9	57.3	69.2	582	757	144	213	228	148
MAX	654	1,010	236	101	62	87	1,520	1,270	313	412	353	199
MIN	67	259	100	63	55	56	59	284	92	64	185	118
CFSM	.48	1.68	.39	.22	.16	.19	1.62	2.10	.40	.59	.63	.41
IN.	.55	1.88	.45	.26	.17	.22	1.80	2.43	.45	.68	.73	.46

CAL YR 1971 TOTAL 103,293 MEAN 283 MAX 2,550 MIN 35 CFSM .79 IN 10.67
 WTR YR 1972 TOTAL 97,512 MEAN 266 MAX 1,520 MIN 55 CFSM .74 IN 10.08

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.--8 years, 65.3 cfs.

EXTREMES.--Current year: Maximum discharge, 456 cfs Apr. 22 (gage height, 5.50 ft); minimum, 10 cfs June 18 (gage height, 4.46 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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	47	323	80	37	32	41	65	300	53	15	46	44
2	44	331	76	36	32	38	62	284	51	15	41	42
3	71	322	75	35	32	41	62	264	47	16	39	40
4	74	313	72	34	32	43	61	255	42	15	31	37
5	81	282	69	33	32	43	61	252	36	15	27	34
6	85	256	67	32	32	43	61	246	35	14	30	37
7	86	243	65	31	32	43	59	240	31	13	29	39
8	81	221	64	31	32	43	56	228	28	14	36	35
9	80	200	63	30	32	43	58	212	28	14	33	32
10	75	187	60	30	32	41	59	190	20	17	32	29
11	69	170	57	29	32	41	59	175	16	21	32	26
12	67	159	55	31	32	41	65	157	16	23	28	25
13	60	144	53	34	32	41	75	144	18	25	25	34
14	56	129	54	34	32	41	77	136	15	22	27	30
15	56	119	54	34	33	43	81	132	14	21	26	29
16	60	126	56	34	33	45	100	127	14	19	27	27
17	68	131	54	32	33	48	155	117	13	25	27	26
18	76	133	53	31	34	48	236	102	14	25	25	26
19	76	135	51	31	34	50	313	97	30	23	26	26
20	82	134	49	31	35	52	369	94	33	29	33	29
21	84	136	47	31	35	59	425	84	32	36	43	27
22	85	131	46	31	36	65	454	90	32	46	63	31
23	84	127	45	31	36	65	440	94	31	49	62	31
24	82	121	43	31	37	65	425	89	29	47	61	28
25	79	115	42	31	38	67	400	84	27	48	61	29
26	80	110	41	31	38	67	386	79	25	48	58	29
27	108	106	39	31	39	67	363	70	24	53	56	30
28	160	100	38	31	40	65	353	68	22	60	53	25
29	205	93	39	31	40	65	330	71	21	54	53	24
30	251	86	38	31	-----	62	310	66	16	50	49	24
31	284	-----	38	31	-----	65	-----	57	-----	47	46	-----
TOTAL	2,916	5,183	1,683	991	989	1,581	6,020	4,604	813	919	1,225	925
MEAN	94.1	173	54.3	32.0	34.1	51.0	201	149	27.1	29.6	39.5	30.8
MAX	284	331	80	37	40	67	454	300	53	60	63	44
MIN	47	86	38	29	32	38	56	57	13	13	25	24
CAL YR 1971	TOTAL 33,073	MEAN 90.6	MAX 687	MIN 12								
WTR YR 1972	TOTAL 27,849	MEAN 76.1	MAX 454	MIN 13								

SANDY RIVER BASIN

05218500 Sandy Lake at Libby, Minn.

LOCATION.--Lat $46^{\circ}47'20''$, long $93^{\circ}19'10''$, 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, 79,540 acre-ft May 2 (gage height, 11.65 ft); minimum, 27,570 acre-ft Mar. 13, 14, 15 (gage height, 6.05 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 1971 TO SEPTEMBER 1972

Date	Gage height (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept.30.....	8.59	48,710	-
Oct. 31.....	8.90	51,570	+2,860
Nov. 30.....	8.75	50,180	-1,390
Dec. 31.....	7.61	40,070	-10,110
CAL YR 1971.....	-	-	-1,110
Jan. 31.....	6.44	30,550	-9,520
Feb. 29.....	6.15	28,170	-2,380
Mar. 31.....	6.51	30,940	+2,770
Apr. 30.....	11.58	78,740	+47,800
May 31.....	9.25	54,940	-23,800
June 30.....	9.09	53,360	-1,580
July 31.....	9.35	55,930	+2,570
Aug. 31.....	9.39	56,130	+200
Sept.30.....	9.26	54,940	-1,190
WTR YR 1972.....	-	-	+6,230

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).--77 years (1895-1972, 212 cfs (6.84 inches per year).

EXTREMES.--Current year: Maximum daily discharge, 1880 cfs May 3, minimum daily, 32 cfs Mar. 27. 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.--Ten 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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	88	387	1,130	237	100	82	38	1,500	398	67	1,560	1,530
2	86	832	1,160	240	102	78	42	1,700	396	69	1,560	1,050
3	83	1,090	980	243	102	82	42	1,880	398	69	1,560	1,110
4	80	920	795	246	100	78	60	1,680	398	69	1,020	1,140
5	120	825	759	246	100	82	82	1,470	398	69	1,050	780
6	116	784	756	246	100	78	110	1,400	190	69	720	820
7	116	773	550	246	100	78	132	1,360	198	40	720	780
8	118	777	276	246	102	78	76	1,360	200	40	1,200	760
9	118	769	285	243	102	78	65	1,360	103	41	1,740	390
10	118	785	291	240	102	78	72	1,390	105	40	1,260	324
11	120	788	312	237	102	78	78	1,400	108	40	1,410	328
12	120	788	282	237	102	78	82	1,420	107	41	1,260	130
13	120	788	222	237	100	78	82	1,410	49	139	1,470	135
14	120	791	228	237	98	78	204	1,420	53	132	930	130
15	120	798	225	234	98	76	420	1,410	55	132	942	130
16	120	797	222	231	96	74	573	1,420	56	130	942	130
17	120	798	198	225	94	72	858	1,420	57	129	510	130
18	120	798	180	222	92	68	956	1,440	58	129	522	130
19	118	798	168	219	92	60	934	1,460	61	127	906	130
20	116	798	174	216	92	60	836	1,470	58	127	1,150	135
21	116	804	174	213	88	56	800	1,500	58	126	750	220
22	114	851	180	210	86	52	962	1,140	59	188	720	215
23	114	924	180	210	86	44	1,220	1,250	60	800	840	430
24	114	940	186	210	84	34	1,040	1,340	61	1,080	1,080	610
25	116	981	195	198	86	34	492	1,360	62	1,060	1,350	615
26	118	1,060	210	198	86	34	556	828	63	1,760	1,350	800
27	168	1,050	222	198	84	32	714	963	63	1,620	1,410	780
28	206	1,040	225	195	82	34	1,520	694	63	1,570	1,440	780
29	196	1,030	231	186	82	38	1,490	740	65	1,530	1,440	780
30	465	1,030	234	180	-----	38	1,490	282	66	1,850	1,530	780
31	420	-----	237	180	-----	38	-----	412	-----	1,860	1,560	-----
TOTAL	4,384	25,594	11,467	6,906	2,740	1,948	16,026	39,879	4,066	15,143	35,902	16,202
MEAN	141	853	370	223	94.5	62.8	534	1,286	136	488	1,158	540
MAX	465	1,090	1,160	246	102	82	1,520	1,880	398	1,860	1,740	1,530
MIN	80	387	168	180	82	32	38	282	49	40	510	130
CFSM	.33	2.03	.88	.53	.22	.15	1.27	3.05	.32	1.16	2.75	1.28
IN.	.39	2.26	1.01	.61	.24	.17	1.42	3.52	.36	1.34	3.17	1.43

CAL YR 1971 TOTAL 122,932.00 MEAN 337 MAX 2,120 MIN 0 CFSM .80 IN 10.86
 WTP YR 1972 TOTAL 180,257.00 MEAN 493 MAX 1,880 MIN 32 CFSM 1.17 IN 15.93

MISSISSIPPI RIVER MAIN STEM

05220500 Mississippi River below Sandy River, near Libby, Minn.

LOCATION.--Lat 46°47'23", long 93°19'43", in SE 1/4 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.--42 years, 1972 cfs (5.29 inches per year).

EXTREMES.--Current year: Maximum discharge, 7,010 cfs May 7 (gage height, 14.06 ft); minimum, 625 cfs July 8 (gage height, 2.79 ft).

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. 98, 100, 102, 106).

REVISIONS (WATER YEARS).--WSP 1914: 1958.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1,120	4,260	3,440	2,520	2,310	2,100	2,330	5,730	3,460	968	3,400	3,250
2	1,420	4,570	3,740	2,510	2,310	2,090	2,370	6,200	3,440	846	3,260	2,960
3	1,650	4,760	3,630	2,510	2,310	2,080	2,340	6,610	3,410	832	2,890	2,950
4	1,780	5,000	3,520	2,510	2,300	2,080	2,350	6,780	3,350	827	2,630	2,790
5	1,880	5,100	3,400	2,490	2,300	2,080	2,320	6,870	3,230	837	2,440	2,560
6	1,910	5,170	3,300	2,490	2,300	2,070	2,270	6,970	3,010	846	2,330	2,520
7	1,890	5,220	3,220	2,480	2,290	2,050	2,220	7,000	2,910	768	2,450	2,770
8	1,840	5,220	3,140	2,470	2,280	2,040	2,140	6,990	2,780	741	3,110	2,680
9	1,810	5,200	3,070	2,470	2,280	2,040	2,070	6,940	2,610	772	3,180	2,310
10	1,790	5,190	3,030	2,470	2,270	2,030	1,950	6,860	2,510	804	2,980	2,190
11	1,740	5,170	3,000	2,460	2,270	2,030	1,740	6,750	2,430	768	3,070	2,040
12	1,730	5,130	2,970	2,460	2,270	2,030	1,540	6,610	2,350	814	2,930	1,850
13	1,700	5,080	2,930	2,460	2,260	2,020	1,660	6,460	2,270	879	2,620	1,930
14	1,690	5,020	2,890	2,460	2,250	2,020	1,810	6,350	2,220	907	2,380	2,050
15	1,670	4,960	2,840	2,460	2,240	2,030	2,150	6,220	2,120	1,120	2,340	2,070
16	1,670	4,900	2,820	2,450	2,220	2,040	2,950	6,080	2,050	1,190	2,150	2,050
17	1,700	4,920	2,790	2,450	2,220	2,050	3,870	5,930	1,990	1,220	1,780	2,040
18	1,750	5,020	2,760	2,440	2,210	2,070	4,340	5,740	1,920	1,260	1,720	2,040
19	1,810	5,070	2,720	2,430	2,200	2,080	4,710	5,560	1,880	1,380	1,930	2,050
20	1,870	5,110	2,680	2,430	2,190	2,090	5,080	5,420	1,920	1,490	1,910	2,120
21	1,870	5,120	2,650	2,430	2,180	2,110	5,390	5,190	1,910	1,470	1,850	2,330
22	1,940	5,040	2,630	2,430	2,170	2,130	5,530	4,880	1,800	1,720	3,110	2,460
23	2,000	5,000	2,610	2,420	2,150	2,140	5,610	4,740	1,740	2,480	4,010	2,570
24	1,950	4,880	2,600	2,410	2,140	2,160	5,460	4,600	1,610	2,970	4,190	2,670
25	1,880	4,600	2,590	2,400	2,130	2,170	5,010	4,260	1,540	3,290	4,190	2,770
26	1,840	4,400	2,580	2,380	2,120	2,200	4,940	3,810	1,500	3,490	4,050	2,870
27	2,040	4,250	2,560	2,360	2,110	2,220	5,050	3,550	1,500	3,600	3,930	2,870
28	2,670	4,150	2,550	2,350	2,110	2,240	5,310	3,280	1,480	3,850	3,790	2,900
29	3,080	4,050	2,540	2,330	2,100	2,240	5,510	3,140	1,320	3,710	3,640	2,930
30	3,470	3,940	2,530	2,320	2,100	2,290	5,570	3,200	1,150	3,560	3,550	2,930
31	3,890	-----	2,520	2,310	-----	2,300	-----	3,400	-----	3,470	3,480	-----
TOTAL	61,050	145,500	40,650	75,560	64,490	65,360	105,720	172,130	67,410	52,959	91,290	74,520
MFAN	1,969	4,850	2,924	2,437	2,224	2,108	3,524	5,553	2,247	1,708	2,945	2,484
MAX	3,890	5,220	3,840	2,520	2,310	2,300	5,610	7,000	3,460	3,850	4,190	3,250
MIN	1,120	3,940	2,520	2,310	2,100	2,020	1,580	3,140	1,150	741	1,720	1,850
CFSM	.39	.96	.58	.48	.44	.42	.70	1.10	.44	.34	.58	.49
IN.	.45	1.07	.67	.56	.47	.48	.78	1.27	.50	.39	.67	.55

CAL YR 1971 TOTAL 912,923 MEAN 2,501 MAX 8,290 MIN 457 CFSM .49 IN 6.71
WTR YR 1972 TOTAL 1,066,639 MEAN 2,914 MAX 7,000 MIN 741 CFSM .58 IN 7.84

NOTE.--No gage-height record Dec. 2 to Jan. 2.

05227500 Mississippi River at Aitkin, Minn.

LOCATION.--Lat 46°32'26", long 93°42'26", in W $\frac{1}{2}$ 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.--27 years, 2,906 cfs (6.43 inches per year).

EXTREMES.--Current year: Maximum daily discharge, 10,500 cfs Apr. 24, 25; minimum, 772 cfs Oct. 1. River gage: Maximum discharge, 5,830 cfs Apr. 24 (gage height, 14.72 ft); minimum, 772 cfs Oct. 1 (gage height, 2.41 ft). Diversion gage: Maximum discharge, 4,740 cfs Apr. 24 (gage height, 14.70 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. 98, 100, 102, 106). 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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	882	5,460	5,140	2,840	2,390	2,320	3,570	9,450	4,870	1,590	5,710	6,110
2	1,210	6,030	5,000	2,820	2,380	2,320	3,570	9,520	4,880	1,380	5,570	5,670
3	1,480	6,660	4,920	2,810	2,380	2,320	3,580	9,680	4,850	1,220	5,340	5,120
4	1,760	6,980	4,870	2,790	2,370	2,320	3,600	9,750	4,730	1,140	4,800	4,740
5	1,930	7,450	4,770	2,780	2,370	2,330	3,580	9,750	4,570	1,100	4,430	4,440
6	2,030	7,700	4,650	2,750	2,360	2,320	3,540	10,000	4,340	1,070	4,440	3,990
7	2,060	7,620	4,520	2,740	2,350	2,320	3,480	10,100	4,300	1,050	4,740	3,800
8	2,070	7,570	4,410	2,730	2,350	2,320	3,430	10,100	3,800	994	5,460	3,860
9	2,040	7,500	4,270	2,720	2,350	2,330	3,340	10,100	3,520	960	5,010	3,830
10	2,000	7,380	4,140	2,700	2,340	2,330	3,230	9,950	3,290	954	6,070	3,480
11	1,970	7,230	4,040	2,690	2,340	2,320	3,140	9,740	3,120	987	5,810	3,180
12	1,920	7,060	3,910	2,680	2,340	2,330	3,330	9,580	3,310	1,310	5,670	2,920
13	1,900	6,850	3,790	2,660	2,340	2,340	3,790	9,380	2,880	1,030	5,390	2,700
14	1,870	6,670	3,670	2,630	2,340	2,360	4,310	9,290	2,940	1,120	5,010	2,650
15	1,850	6,580	3,550	2,620	2,340	2,370	4,900	9,120	2,790	1,240	4,700	2,750
16	1,850	6,470	3,500	2,580	2,340	2,430	5,650	8,890	2,660	1,360	4,530	2,760
17	1,850	6,660	3,450	2,570	2,340	2,470	7,010	8,620	2,550	1,430	4,170	2,730
18	1,890	7,020	3,410	2,570	2,340	2,510	8,280	8,350	2,410	1,450	4,020	2,670
19	1,960	7,190	3,390	2,550	2,330	2,540	8,820	7,930	2,380	1,460	3,980	2,640
20	2,020	7,340	3,370	2,540	2,320	2,610	9,270	7,660	2,410	1,550	3,970	2,700
21	2,090	7,280	3,340	2,520	2,330	2,710	9,570	7,540	2,420	1,690	3,990	2,800
22	2,130	7,080	3,310	2,510	2,320	2,830	9,940	7,340	2,440	1,360	4,530	2,920
23	2,190	6,940	3,250	2,500	2,320	3,020	10,300	6,970	2,310	3,140	5,640	3,120
24	2,230	6,740	3,190	2,480	2,320	3,160	10,530	5,660	2,180	4,040	6,300	3,180
25	2,230	6,430	3,120	2,460	2,320	3,320	10,500	6,430	2,050	4,470	6,700	3,320
26	2,220	6,190	3,050	2,450	2,320	3,380	10,300	5,980	1,940	4,690	6,800	3,490
27	2,380	5,930	3,000	2,440	2,320	3,450	10,030	5,510	1,860	4,320	6,840	3,730
28	2,780	5,770	2,940	2,420	2,320	3,510	9,870	5,060	1,840	5,290	6,830	3,690
29	3,420	5,560	2,900	2,410	2,320	3,550	9,670	4,910	1,840	5,570	6,780	3,680
30	4,000	5,330	2,880	2,410	-----	3,550	9,220	4,900	1,760	5,890	6,650	3,640
31	4,960	-----	2,860	2,400	-----	3,550	-----	4,850	-----	5,900	6,430	-----
TOTAL	67,172	202,670	116,610	80,770	67,900	83,550	193,230	253,110	90,640	71,755	167,310	106,250
MEAN	2,167	6,756	3,762	2,605	2,341	2,695	6,443	8,165	3,021	2,315	5,397	3,542
MAX	4,960	7,700	5,140	2,840	2,390	3,560	10,500	10,100	4,880	5,900	6,840	6,110
MIN	882	5,330	2,860	2,400	2,320	2,320	3,140	4,850	1,760	954	3,970	2,640
CFSM	.35	1.10	.61	.42	.38	.44	1.35	1.33	.49	.38	.88	.58
IN.	.41	1.23	.71	.49	.41	.51	1.17	1.53	.55	.43	1.01	.64
CAL YR 1971	TOTAL 1,201,743	MEAN 3,292	MAX 12,200	MIN 605	CFSM .54	IN 7.28						
ATR YR 1972	TOTAL 1,501,037	MEAN 4,101	MAX 10,500	MIN 882	CFSM .67	IN 9.09						

PINE RIVER BASIN

05230500 Pine River Reservoir at Cross Lake, Minn.

LOCATION.--Lat 46°40'09", long 94°06'44", in SW 1/4 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, 102,800 acre-ft July 28 (gage height, 13.32 ft); minimum, 71,600 acre-ft Mar. 19 (gage height, 10.99 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 1971 TO SEPTEMBER 1972

Date	Gage height (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept.30.....	12.73	94,670	-
Oct. 31.....	13.06	99,180	+4,510
Nov. 30.....	11.88	83,310	-15,870
Dec. 31.....	11.78	81,920	-1,390
CAL YR 1971.....	-	-	-4,140
Jan. 31.....	11.50	78,150	-3,770
Feb. 29.....	11.16	73,790	-4,360
Mar. 31.....	11.37	76,560	+2,770
Apr. 30.....	12.79	95,410	+18,850
May 31.....	12.96	97,790	+2,380
June 30.....	13.11	99,770	+1,980
July 31.....	13.15	100,400	+630
Aug. 31.....	12.93	97,390	-3,010
Sept.30.....	12.84	96,200	-1,190
WTR YR 1972.....	-	-	+1,530

05231000 Pine River at Cross Lake Dam, at Cross Lake, Minn.

LOCATION.--Lat 46°40'09", long 94°06'44", in SW 1/4 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).--86 years, 214 cfs (5.17 inches per year).

EXTREMES.--Current year: Maximum daily discharge, 1690 cfs Nov. 4; minimum daily, 130 cfs Apr. 10-14. 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; nine discharge measurements made and records reviewed by Geological Survey.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	180	1,030	430	260	255	250	250	930	622	160	890	670
2	185	1,080	310	270	255	255	250	930	640	186	890	545
3	185	1,180	310	265	260	255	250	975	640	200	762	475
4	180	1,690	305	270	255	250	250	985	640	245	750	475
5	175	1,610	310	270	255	255	250	985	640	245	420	475
6	170	1,400	310	270	260	255	250	985	554	245	810	370
7	170	1,390	310	270	255	255	250	985	391	246	900	270
8	170	1,320	310	270	255	250	230	985	330	245	981	228
9	170	1,120	301	265	255	250	180	985	330	218	1,170	220
10	170	1,120	270	260	255	250	130	985	230	200	1,220	220
11	170	1,080	270	265	255	250	130	890	230	200	1,220	220
12	170	872	270	265	255	250	130	880	230	200	1,060	172
13	170	680	270	265	250	250	130	795	230	288	1,060	170
14	170	675	270*	260	255	250	130	795	291	290	1,060	170
15	165	680	270	260	255	250	250	795	370	333	1,040	170
16	165	680	270	260	255	250	255	715	370	393	1,040	160
17	165	700	265	265	255	250	250	653	259	430	952	160
18	165	945	265	260	255	250	320	562	245	427	830	160
19	165	929	270	265	250	250	450	550	245	425	810	160
20	165	805	265	255	255	250	570	300	245	420	810	160
21	165	805	270	260	255	250	570	315	265	420	810	247
22	160	785	270	260	250	250	570	315	235	420	853	255
23	175	570	270	260	250	250	576	336	235	478	695	255
24	255	555	270	260	255	250	770	404	170	540	695	255
25	250	560	270	260	250	250	800	460	160	540	695	255
26	250	560	265	260	250	250	880	495	160	540	670	255
27	293	560	265	260	250	250	930	510	160	540	670	255
28	625	555	265	255	250	250	930	510	160	727	670	255
29	625	531	265	255	255	250	930	580	160	900	670	255
30	640	460	265	260	-----	250	930	631	160	900	670	255
31	815	-----	265	255	-----	250	-----	640	-----	900	670	-----
TOTAL	7,678	26,927	8,791	8,135	7,365	7,775	12,791	21,861	9,597	12,501	26,443	8,192
MEAN	248	898	284	262	254	251	426	705	320	403	853	273
MAX	815	1,690	430	270	260	255	930	985	640	900	1,220	670
MIN	160	460	265	255	250	250	130	300	160	160	420	160
CFSM	.44	1.60	.51	.47	.45	.45	.76	1.25	.57	.72	1.52	.49
IN.	.51	1.78	.58	.54	.49	.51	.85	1.45	.64	.83	1.75	.54
CAL YR 1971	TOTAL 101,284	MEAN 277	MAX 1,690	MIN 40	CFSM .49	IN 6.70						
WTR YR 1972	TOTAL 158,056	MEAN 432	MAX 1,690	MIN 130	CFSM .77	IN 10.46						

CROW WING RIVER BASIN

05244000 Crow Wing River at Nimrod, Minn.

LOCATION.--Lat 46°38'25", long 94°52'44", in SE 1/4 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.--33 years (1939-72), 479 cfs (6.44 inches per year).

EXTREMES.--Current year: Maximum discharge, 1,580 cfs Apr. 18 (gage height, 4.57 ft); maximum gage height, 5.84 ft Mar. 26 (backwater from ice) from floodmark; minimum discharge, 326 cfs July 11 (gage height, 3.04 ft).
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 winter period, 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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	399	1,220	520	376	382	380	950	1,150	845	407	479	553
2	503	1,190	460	374	386	378	1,010	1,200	824	410	457	543
3	511	1,150	540	371	289	376	850	1,180	819	418	444	533
4	536	1,070	620	369	392	374	814	1,130	794	408	419	519
5	554	1,020	584	366	355	376	778	1,140	784	388	413	509
6	565	955	554	364	398	378	720	1,280	766	361	458	511
7	560	812	524	363	402	380	707	1,240	748	354	529	501
8	557	824	502	361	405	383	697	1,180	723	348	586	494
9	546	978	486	360	408	388	680	1,130	703	344	606	477
10	533	955	472	360	410	394	697	1,090	671	333	609	470
11	528	850	461	359	411	400	765	1,060	656	362	614	475
12	517	805	451	359	412	407	822	1,040	638	398	615	483
13	513	786	443	358	412	415	1,060	1,080	629	416	604	502
14	503	779	435	358	411	420	1,130	1,120	661	429	628	505
15	490	792	432	358	410	435	1,240	1,100	657	432	628	484
16	487	798	425	359	409	450	1,410	1,060	637	431	621	474
17	525	818	420	359	408	455	1,500	1,030	605	419	615	462
18	610	831	415	360	406	470	1,550	999	592	424	610	455
19	647	838	410	360	404	490	1,560	970	641	422	611	453
20	633	831	406	361	402	540	1,560	981	640	425	587	463
21	623	870	403	362	400	750	1,540	1,160	610	449	563	450
22	617	708	400	363	398	980	1,550	1,090	588	504	583	440
23	615	818	397	364	395	1,160	1,570	1,010	562	540	564	437
24	609	919	393	365	393	1,220	1,540	984	517	522	545	437
25	609	838	390	366	391	1,260	1,470	964	467	498	549	450
26	613	720	388	368	389	1,240	1,370	916	433	493	552	457
27	884	844	386	370	387	1,200	1,310	909	431	502	562	447
28	1,020	805	384	371	385	1,160	1,260	931	435	501	560	416
29	933	734	382	373	382	1,110	1,210	975	437	492	551	407
30	1,040	586	380	376	-----	1,070	1,160	914	415	477	544	407
31	1,310	-----	378	379	-----	1,010	-----	876	-----	480	548	-----
TOTAL	19,590	26,144	13,841	11,312	11,572	20,449	34,480	32,889	18,928	13,387	17,254	14,214
MEAN	632	871	446	365	399	660	1,149	1,061	631	432	557	474
MAX	1,310	1,220	620	379	412	1,260	1,570	1,280	845	540	628	553
MIN	399	586	378	358	382	374	680	876	415	333	413	407
CFSM	.63	.86	.44	.36	.40	.65	1.14	1.05	.62	.43	.55	.47
IN.	.72	.96	.51	.42	.43	.75	1.27	1.21	.70	.49	.64	.52
CAL YR 1971	TOTAL 185,337	MEAN 508	MAX 1,450	MIN 210	CFSM .50	IN 6.83						
WTR YR 1972	TOTAL 234,060	MEAN 640	MAX 1,570	MIN 333	CFSM .63	IN 8.62						

05245100 Long Prairie River at Long Prairie, Minn.

LOCATION.--Lat 45°58'30", long 94°51'56", in NE¼NW¼ sec.20, T.129 N., R.33 W., Todd County, on right bank 90 ft upstream from bridge on First Avenue at Long Prairie and 400 ft downstream from Venewitz Creek.

PERIOD OF RECORD.--October 1971 to September 1972.

GAGE.--Water-stage recorder. Datum of gage is 1,281.74 ft above mean sea level, datum of 1929.

EXTREMES.--Maximum discharge during period, 3,270 cfs July 22 (gage height, 9.37 ft); minimum daily discharge, 49 cfs Oct. 12.

REMARKS.--Records good except those for winter periods and period of no gage height record, which are poor.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	68	622	211	119	85	88	760	423	419	211	904	409
2	70	594	210	118	85	88	750	415	425	195	836	395
3	69	647	205	117	85	88	740	405	423	184	776	377
4	66	640	200	116	85	88	730	395	403	179	720	363
5	68	636	190	115	85	88	710	397	375	179	675	350
6	60	560	185	115	85	88	700	403	355	184	904	342
7	58	495	180	115	85	88	680	405	329	186	1170	334
8	54	435	170	115	85	89	670	405	302	190	1120	329
9	56	438	160	115	85	89	660	405	274	188	1100	323
10	53	419	155	115	85	89	650	409	252	183	1160	320
11	51	393	150	115	85	90	640	411	236	194	1120	317
12	49	391	145	115	85	92	635	399	228	254	1020	316
13	52	380	140	110	85	94	635	405	219	337	904	312
14	51	365	135	105	85	96	635	435	214	411	804	310
15	56	350	134	100	85	106	630	438	199	407	724	308
16	72	340	133	95	86	160	630	430	188	501	703	305
17	100	350	132	92	86	250	630	428	179	672	619	305
18	130	375	131	91	87	300	605	425	174	706	584	301
19	160	405	130	90	87	400	570	423	196	644	570	299
20	173	429	129	90	87	500	513	407	200	570	549	334
21	174	430	128	90	87	660	507	399	200	721	546	335
22	178	429	127	90	87	780	510	389	198	2900	534	328
23	183	420	126	90	87	850	510	385	196	2120	534	318
24	190	400	125	90	87	910	510	389	199	1690	477	311
25	200	375	124	90	87	940	510	397	205	1880	459	308
26	222	350	123	89	87	920	507	405	210	1940	450	306
27	270	315	122	87	87	900	492	407	217	1650	459	304
28	328	285	121	85	87	860	471	411	221	1370	453	301
29	332	255	121	85	87	830	448	413	229	1200	442	294
30	410	230	121	85	-----	800	435	415	229	1070	425	289
31	510	-----	119	85	-----	770	-----	415	-----	980	428	-----
TOTAL	4,513	12,753	4,582	3,129	2,491	12,191	18,073	12,688	7,694	24,096	22,169	9,743
MEAN	146	425	148	101	85.9	393	602	409	256	777	715	325
MAX	510	647	211	119	87	940	760	438	425	2,900	1,170	409
MIN	49	230	119	85	85	88	435	385	174	179	425	289
AC-FT	8,950	25,300	9,090	6,210	4,940	24,180	35,850	25,170	15,260	47,790	43,970	19,320

WTR YR 1972 TOTAL 134,122 MEAN 366 MAX 2,900 MIN 49 AC-FT 266,000

CROW WING RIVER BASIN

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, 63,670 acre-ft Nov. 23 (gage height, 6.45 ft); minimum, 46,020 acre-ft Jan. 10, 11 (gage height, 5.10 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 1971 TO SEPTEMBER 1972

Date	Gage height (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept.30.....	5.78	54,940	-
Oct. 31.....	6.33	62,080	+7,140
Nov. 30.....	5.54	51,770	-10,310
Dec. 31.....	5.17	47,010	-4,760
CAL YR 1971.....	-	-	-5,950
Jan. 31.....	5.25	48,000	+990
Feb. 29.....	5.33	48,990	+990
Mar. 31.....	5.37	49,590	+600
Apr. 30.....	5.87	56,130	+6,540
May 31.....	6.08	58,710	+2,580
June 30.....	6.27	61,290	+2,580
July 31.....	6.14	59,500	-1,790
Aug. 31.....	6.13	59,500	0
Sept.30.....	6.09	58,910	-590
WTR YR 1972.....	-	-	+3,970

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).--61 years, 106 cfs (5.02 inches per year).

EXTREMES.--Current year: Maximum daily discharge, 600 cfs Nov. 2-5; minimum daily, 42 cfs June 18, and Aug. 5. 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; thirteen discharge measurements made and records reviewed by Geological Survey.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	106	580	250	150	91	98	245	185	390	120	265	385
2	109	600	250	150	91	113	245	185	390	117	215	270
3	112	600	240	150	91	113	245	190	390	120	78	170
4	113	600	240	150	91	115	230	190	385	117	60	170
5	114	600	230	150	91	115	225	260	380	117	42	100
6	114	580	230	150	91	114	225	427	300	114	43	100
7	109	580	180	150	91	129	218	485	180	117	144	100
8	109	580	180	150	91	129	200	485	180	148	145	60
9	108	565	180	150	90	132	170	525	180	148	262	60
10	107	555	180	150	91	129	165	525	117	144	280	57
11	106	550	180	150	91	154	142	510	114	175	288	60
12	102	540	180	150	91	146	126	505	55	180	330	60
13	103	535	180	125	91	146	129	400	43	175	325	60
14	103	525	180	100	92	146	132	508	43	222	325	57
15	103	520	180	75	91	146	271	500	43	242	325	57
16	108	520	180	75	91	198	275	475	43	239	325	60
17	110	520	180	75	94	198	420	425	43	239	330	60
18	110	525	150	75	92	194	475	400	42	275	340	60
19	116	525	150	75	92	194	515	255	43	275	380	57
20	117	515	150	80	92	194	595	185	43	275	375	60
21	117	510	150	85	94	204	555	185	43	275	375	175
22	116	510	150	90	94	199	565	185	43	325	390	175
23	116	505	150	95	94	199	580	190	43	407	415	175
24	115	500	150	100	95	206	580	190	43	450	415	170
25	114	495	150	100	95	203	580	240	43	450	410	170
26	112	490	150	100	95	203	580	260	43	450	410	170
27	175	485	150	100	94	213	550	260	44	440	410	170
28	310	475	150	100	93	232	520	260	44	440	410	175
29	315	470	150	100	95	260	410	265	84	440	410	170
30	330	460	150	95	-----	260	285	475	84	440	415	95
31	580	-----	150	95	-----	250	-----	400	-----	293	385	-----
TOTAL	4,579	16,015	5,520	3,540	2,675	5,332	10,453	10,530	3,918	7,969	9,322	3,708
MEAN	148	534	178	114	92.2	172	348	340	131	257	301	124
MAX	580	600	250	150	95	260	595	525	390	450	415	385
MIN	102	460	150	75	90	98	126	185	42	114	42	57
CFSM	.52	1.86	.62	.40	.32	.60	1.21	1.18	.46	.90	1.05	.43
IN.	.59	2.08	.72	.46	.35	.69	1.35	1.36	.51	1.03	1.21	.48

CAL YR 1971 TOTAL 58,629 MEAN 161 MAX 600 MIN 31 CFSM .56 IN 7.60
WTR YR 1972 TOTAL 83,561 MEAN 228 MAX 600 MIN 42 CFSM .79 IN 10.83

CROW WING RIVER BASIN

05247500 Crow Wing River near Pillager, Minn.

LOCATION.--Lat 46°18'18", long 94°22'38", in SW 1/4 sec.30, T.133 N., R.29 W., Cass County, at Sylvan dam powerplant of Minnesota Power & Light Co., 3.6 miles above mouth and 4.9 miles southeast of Pillager.

PERIOD OF RECORD.--October 1968 to current year. Records for August 1924 to September 1968 available in files of the Minnesota district office.

EXTREMES.--1968-69: Maximum daily discharge, 16,600 cfs Apr. 12, 13; minimum daily, 244 cfs Aug. 29.

1969-70: Maximum daily discharge, 6,380 cfs May 2; minimum daily, 152 cfs Sept. 21.

1970-71: Maximum daily discharge, 7,500 cfs Apr. 10; minimum daily, 303 cfs Oct. 12.

Current year: Maximum daily discharge, 11,700 cfs July 24; minimum daily, 680 cfs Feb. 24.

Period of record: Maximum daily discharge, 16,600 cfs Apr. 12, 13, 1969; minimum daily, 152 cfs Sept. 21, 1970.

Maximum daily discharge since 1924, 18,300 cfs Apr. 14, 1965.

REMARKS.--Records fair. Discharge computed on basis of powerplant records. Flow partly regulated by powerplant records. Flow partly regulated by powerplants and Gull Lake (see p. 114).

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 1968 TO SEPTEMBER 1969

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1,020	1,580	887	821	647	860	1,090	4,210	1,430	1,130	796	362
2	1,020	1,560	1,040	805	683	862	1,090	4,190	1,500	1,130	856	389
3	934	1,560	1,030	795	725	827	977	4,110	1,720	989	871	327
4	947	1,500	1,080	768	755	855	1,330	4,240	1,650	938	746	355
5	894	1,460	818	772	728	976	1,800	4,440	1,640	967	789	464
6	942	1,380	595	789	798	913	2,760	4,670	1,490	898	767	416
7	918	1,460	542	734	785	852	4,300	4,950	1,380	857	760	513
8	894	1,310	663	868	762	891	5,040	4,760	1,390	924	660	492
9	955	1,310	781	742	779	851	8,620	4,660	1,310	966	674	569
10	948	1,350	917	759	762	911	12,300	4,410	1,190	945	546	530
11	1,100	1,310	984	723	738	835	15,600	4,120	1,150	914	518	512
12	1,070	1,270	1,000	689	797	860	15,600	3,760	1,160	821	582	546
13	1,070	1,130	1,010	738	751	865	15,600	3,610	984	804	556	461
14	1,040	1,170	800	663	815	889	14,900	3,150	1,050	867	440	607
15	1,060	1,310	792	827	798	859	13,700	2,760	966	862	562	514
16	1,210	1,180	725	683	798	864	11,800	2,680	926	987	539	492
17	1,600	1,200	748	633	798	865	10,700	2,810	977	1,050	474	476
18	2,320	1,170	682	724	798	898	9,700	2,750	799	1,050	500	476
19	2,590	1,020	844	737	798	969	8,480	2,560	982	1,090	428	513
20	2,810	890	807	735	767	997	7,640	2,140	912	996	386	457
21	2,890	1,140	855	742	692	986	6,840	2,090	752	910	413	507
22	2,700	1,320	992	726	764	991	7,050	2,360	846	902	467	750
23	2,670	1,390	809	839	858	1,030	7,030	2,070	791	985	381	490
24	2,520	1,160	811	678	761	1,100	9,260	2,080	858	1,030	433	573
25	2,360	1,100	814	673	824	1,130	4,940	1,850	858	1,100	429	680
26	2,250	1,220	849	710	794	1,160	4,610	1,810	1,220	996	350	614
27	2,110	917	791	757	755	1,330	4,360	1,740	1,090	1,090	313	605
28	1,860	959	825	778	824	1,280	4,350	1,580	1,130	1,020	501	581
29	1,860	929	859	697	-----	1,170	4,270	1,480	1,110	874	244	585
30	1,750	930	864	698	-----	1,110	4,120	1,430	1,130	918	348	658
31	1,720	-----	779	654	-----	1,070	-----	1,430	-----	1,000	402	-----
TOTAL	50,032	37,185	25,993	22,959	21,544	30,058	222,857	94,900	34,491	30,010	16,731	15,514
MEAN	1,514	1,240	838	741	773	970	7,429	3,061	1,150	968	540	517
MAX	2,890	1,580	1,080	868	868	1,330	15,600	4,950	1,720	1,130	871	750
MIN	818	890	542	633	647	827	977	1,430	752	804	244	327

WTR YR 1969 TOTAL 602,374 MEAN 1,650 MAX 15,600 MIN 244

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1969 TO SEPTEMBER 1970

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	715	1,250	942	755	635	598	659	5,260	2,020	1,120	531	282
2	691	1,100	844	755	588	598	479	5,383	2,150	819	496	365
3	680	1,210	914	790	599	634	753	6,220	2,050	775	279	435
4	728	1,190	859	790	625	589	834	5,950	1,860	913	411	324
5	1,010	1,110	862	769	575	621	773	5,520	1,870	775	445	324
6	1,500	1,120	899	608	536	511	927	4,710	1,840	1,270	448	319
7	1,790	1,100	906	708	595	611	1,200	4,600	1,260	765	406	258
8	1,820	1,110	856	658	547	648	2,060	4,510	1,180	747	435	210
9	1,720	1,150	724	589	573	575	3,020	4,440	1,330	625	442	239
10	1,620	1,140	786	696	596	512	4,150	4,360	1,330	592	491	253
11	1,490	1,070	865	723	573	612	5,170	4,270	1,390	529	410	319
12	1,510	1,030	898	625	599	592	5,370	2,940	1,370	394	468	242
13	1,480	1,030	770	700	596	546	4,650	2,810	1,400	695	407	263
14	1,410	669	847	640	586	611	4,440	2,960	1,940	557	411	378
15	1,380	652	728	696	586	637	4,380	2,150	1,970	560	431	394
16	1,300	723	725	661	612	637	4,440	3,020	1,900	337	421	437
17	1,370	1,090	838	661	550	572	4,360	2,220	2,180	582	161	332
18	1,160	734	785	673	576	601	4,250	2,040	2,190	615	400	581
19	1,020	746	910	562	655	623	4,330	2,090	1,790	520	302	309
20	1,140	733	771	661	583	672	4,280	2,240	2,270	506	394	345
21	1,060	618	901	660	583	637	4,310	1,890	2,090	518	328	152
22	1,020	913	804	583	570	673	4,420	1,760	1,750	497	269	374
23	990	1,160	788	602	558	674	3,410	1,910	1,690	425	323	432
24	972	1,110	826	603	558	662	3,860	1,810	1,700	425	464	492
25	974	1,090	791	620	594	613	3,950	1,830	1,370	472	344	367
26	986	1,070	791	569	585	791	4,070	2,150	1,680	472	337	381
27	1,080	975	827	621	598	814	4,110	1,900	1,290	418	344	441
28	929	902	792	562	598	783	4,450	1,840	1,400	404	287	529
29	1,040	944	792	546	-----	845	5,740	2,030	1,370	381	338	315
30	978	895	792	635	-----	846	5,140	2,030	928	721	318	484
31	1,110	-----	758	599	-----	971	-----	2,030	-----	649	442	-----
TOTAL	36,673	29,635	25,591	20,320	16,429	20,710	104,959	100,870	50,558	19,178	11,983	10,596
MEAN	1,183	988	826	655	587	668	3,499	3,254	1,685	619	387	353
MAX	1,820	1,250	942	790	655	971	6,140	6,380	2,270	1,270	531	581
MIN	680	618	724	546	536	575	479	1,760	928	337	161	152
CAL YR 1969	TOTAL 581,063		MEAN 1,592		MAX 16,600		MIN 244					
4TR YR 1970	TOTAL 447,512		MEAN 1,226		MAX 6,380		MIN 152					

05247500 Crow Wing River near Pillager, Minn.

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	455	950	838	629	551	613	1,710	2,610	1,280	1,280	873	651
2	368	1,020	1,050	655	442	571	1,330	2,610	1,280	1,110	779	691
3	380	1,260	1,100	609	732	542	1,580	3,000	1,290	1,120	709	708
4	400	809	1,050	595	546	638	1,780	2,770	1,240	1,040	695	806
5	410	1,100	844	592	502	631	2,040	2,520	1,250	1,160	611	900
6	403	938	864	533	519	622	2,740	2,320	1,220	1,320	645	945
7	669	980	963	556	517	596	3,040	2,180	1,050	1,130	626	911
8	529	952	826	543	511	587	4,520	2,200	1,100	1,210	664	926
9	510	1,220	844	556	539	692	5,490	2,200	1,080	1,080	550	981
10	969	1,280	835	556	552	711	7,500	2,040	1,030	1,080	543	945
11	950	1,680	753	501	566	683	6,590	1,350	889	1,040	558	961
12	303	1,610	786	550	534	667	6,940	1,520	947	1,030	551	916
13	515	1,590	806	564	518	641	6,250	2,210	931	987	886	914
14	572	1,450	940	612	531	736	5,550	1,560	1,870	837	735	828
15	916	1,290	650	563	642	778	5,140	1,510	1,160	1,090	745	719
16	849	1,380	784	557	541	800	4,720	1,410	1,010	1,100	694	776
17	610	1,500	777	557	583	743	4,470	1,030	913	943	688	724
18	575	1,480	738	495	501	881	4,500	1,120	1,010	918	628	774
19	733	1,290	782	522	640	907	3,700	1,320	979	881	721	704
20	605	1,290	728	517	571	948	3,320	1,580	981	982	813	683
21	537	1,250	525	577	558	850	3,530	1,720	1,050	1,120	821	696
22	818	1,040	544	497	519	872	3,430	1,760	978	1,060	541	734
23	592	578	728	504	583	946	3,260	1,350	931	1,010	684	586
24	674	622	569	504	617	925	3,200	1,780	895	949	707	735
25	700	801	558	687	637	986	3,300	1,920	942	898	627	556
26	671	833	1,000	556	793	905	2,680	1,850	965	835	621	566
27	868	1,070	561	522	618	945	2,090	1,780	988	852	611	680
28	1,020	954	736	523	539	946	2,760	1,460	863	837	474	853
29	950	954	588	538	-----	957	2,860	1,400	912	845	586	729
30	950	1,230	662	544	-----	997	2,600	1,400	883	868	508	840
31	950	-----	587	518	-----	776	-----	1,400	-----	827	602	-----
TOTAL	20,562	34,401	24,116	17,232	15,942	24,093	112,660	56,880	31,917	31,439	20,596	23,708
MEAN	563	1,147	778	556	569	777	3,755	1,835	1,064	1,014	664	730
MAX	1,020	1,680	1,100	687	793	997	7,500	3,000	1,870	1,320	886	981
MIN	303	578	525	495	442	542	1,330	1,030	863	827	474	

05247500 Crow Wing River near Pillager, Minn.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	891	5,770	1,920	1,100	842	833	5,120	4,040	3,290	917	4,380	2,670
2	1,000	5,790	1,560	1,090	857	849	4,730	3,980	3,120	869	3,890	2,410
3	1,110	5,740	1,580	1,060	873	854	4,740	3,830	2,850	1,250	3,440	2,090
4	1,140	5,580	1,670	1,020	866	815	4,470	3,800	2,780	947	3,560	2,020
5	1,070	5,190	1,810	1,020	854	781	4,020	3,880	1,790	1,010	2,700	1,920
6	1,140	4,770	1,920	1,020	858	853	4,000	4,100	2,640	987	2,930	2,140
7	1,070	4,200	2,110	1,050	911	765	3,740	4,520	2,590	792	2,270	1,630
8	1,050	4,080	2,050	1,040	928	754	3,730	4,730	2,110	907	2,780	1,690
9	1,070	4,080	1,840	1,060	850	830	3,660	4,620	1,850	861	3,460	1,450
10	997	3,910	1,770	1,070	883	815	3,470	4,320	1,680	846	4,020	1,360
11	1,000	3,750	1,460	1,030	856	781	3,640	4,100	1,670	887	4,150	1,360
12	994	3,460	1,600	1,090	910	887	4,050	3,800	1,510	1,220	4,140	1,470
13	975	3,260	1,540	914	878	924	4,920	3,740	1,420	1,510	3,980	1,640
14	944	3,200	1,510	942	809	887	5,510	3,950	1,310	1,480	4,150	1,430
15	1,100	3,070	1,580	963	829	1,020	6,530	4,130	1,310	1,680	4,100	1,320
16	1,170	3,300	1,530	899	850	1,130	7,080	4,030	1,240	1,880	3,690	1,500
17	1,400	3,250	1,400	865	912	1,480	7,540	3,920	1,180	1,690	3,600	1,030
18	1,410	3,940	1,420	882	898	1,440	7,930	3,660	1,180	1,780	3,470	1,360
19	1,720	3,790	1,460	854	819	1,780	7,860	3,420	1,920	1,700	3,750	1,390
20	1,840	3,500	1,490	854	925	2,370	7,280	2,960	1,500	1,660	3,530	1,700
21	1,770	3,210	1,520	857	824	3,720	6,660	2,810	1,540	2,150	3,510	1,560
22	1,770	2,700	1,430	880	908	5,380	6,150	2,900	1,330	2,990	3,700	1,510
23	1,660	2,970	1,410	868	837	6,680	5,750	3,300	1,290	6,930	3,690	1,450
24	1,630	3,200	1,420	871	680	8,270	5,810	3,170	1,140	11,700	3,560	1,480
25	1,670	2,710	1,410	871	840	8,650	5,500	2,960	1,040	11,600	3,570	1,480
26	1,600	2,750	1,400	828	899	9,080	5,480	2,780	1,020	10,100	3,460	1,360
27	2,450	2,230	1,310	825	880	8,510	5,350	2,740	982	7,760	3,420	1,530
28	3,070	2,560	1,310	842	925	6,320	5,270	2,680	1,210	7,770	3,350	1,470
29	3,680	2,460	1,150	835	922	5,210	4,640	2,860	1,020	5,750	3,120	1,380
30	4,000	1,800	1,130	842	-----	4,870	4,350	3,380	966	5,480	2,920	1,460
31	5,220	-----	1,160	849	-----	5,350	-----	3,400	-----	5,040	2,820	-----
TOTAL	51,611	110,220	47,870	29,191	25,123	92,890	158,930	112,510	50,478	102,143	109,110	48,310
MEAN	1,665	3,674	1,544	942	866	2,996	5,298	3,629	1,683	3,295	3,520	1,610
MAX	5,220	5,790	2,110	1,100	928	9,080	7,930	4,730	3,290	11,700	4,380	2,670
MIN	891	1,800	1,130	825	680	754	3,470	2,680	966	792	2,270	1,030

CAL YR 1971 TOTAL 544,168 MEAN 1,491 MAX 7,500 MIN 442
WTR YR 1972 TOTAL 938,386 MEAN 2,564 MAX 11,700 MIN 680

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.

PERIOD OF RECORD.--March 1924 to current year.

AVERAGE DISCHARGE.--48 years, 4,281 cfs (5.01 inches per year).

EXTREMES.--Current year: Maximum daily discharge, 30,100 cfs July 25; minimum daily, 1,760 cfs Oct. 1.
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. 98, 100, 102, 106, 114, 110).

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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1,760	17,200	7,140	5,210	3,810	3,630	10,600	19,100	12,200	3,770	16,900	12,200
2	2,340	18,400	7,860	5,210	3,700	3,530	11,600	18,600	11,600	3,600	15,500	11,600
3	2,760	18,500	6,920	5,210	3,760	3,630	11,400	18,000	11,400	3,310	14,800	10,900
4	2,920	18,500	7,790	5,210	3,780	3,530	11,300	18,000	11,300	3,350	12,600	9,910
5	2,600	18,700	7,780	4,830	3,550	3,470	11,100	17,800	11,000	2,970	11,400	9,160
6	2,500	18,200	8,370	4,700	3,630	3,380	10,400	18,300	10,900	2,800	11,700	9,600
7	3,720	17,800	8,610	5,210	3,710	3,390	10,300	18,600	8,900	3,040	11,900	7,590
8	3,460	16,000	8,710	5,210	3,710	3,440	9,970	18,600	8,920	3,000	13,800	7,230
9	3,680	16,600	7,620	4,770	3,660	3,470	9,970	18,600	8,170	2,880	14,000	7,000
10	3,400	15,900	7,330	4,710	3,880	3,400	9,740	18,900	7,510	2,910	14,900	7,170
11	3,610	15,500	6,590	4,660	3,500	3,430	9,160	18,700	5,860	2,500	15,300	6,520
12	3,550	14,800	5,150	4,710	3,580	3,460	9,540	18,600	5,940	2,820	15,700	6,110
13	3,370	13,900	5,400	4,510	3,610	3,450	10,500	18,100	6,340	3,300	15,900	6,110
14	3,680	13,400	5,660	4,210	3,640	3,860	12,300	18,300	5,850	3,510	13,500	5,830
15	3,340	13,100	6,080	4,380	3,630	3,870	13,700	18,100	5,680	3,560	12,900	5,680
16	4,110	12,800	6,000	4,250	3,630	4,030	16,000	18,100	5,680	3,930	12,400	5,350
17	4,160	13,900	3,870	3,990	3,630	4,440	18,100	17,900	5,680	4,250	12,000	5,210
18	4,200	14,800	3,950	4,240	3,700	4,970	19,300	17,400	5,270	4,710	11,700	5,210
19	4,680	13,900	4,700	4,080	3,670	5,480	20,800	16,400	5,670	4,380	11,100	5,210
20	4,890	14,600	5,580	3,970	3,500	7,480	21,900	15,100	5,780	4,550	10,800	5,870
21	5,000	14,700	5,480	4,070	3,660	9,620	21,700	14,300	5,250	4,860	10,600	6,460
22	4,590	14,200	5,740	4,110	3,490	12,300	21,500	13,200	5,210	18,100	10,500	6,180
23	4,910	13,300	5,680	3,900	3,450	14,400	21,200	13,000	5,210	27,800	11,100	6,680
24	4,680	13,400	5,680	4,230	3,720	15,100	20,900	13,400	5,210	28,800	11,600	6,560
25	4,810	13,400	5,550	3,930	3,590	17,400	20,900	13,200	4,860	30,100	12,100	6,610
26	4,710	12,400	5,640	3,900	3,650	17,900	20,800	12,900	4,250	28,200	12,200	6,670
27	5,960	10,800	5,450	3,850	3,630	17,300	20,500	12,400	3,980	24,900	12,500	6,540
28	8,610	10,900	5,210	3,830	3,600	15,600	20,000	11,700	3,900	22,200	12,800	7,290
29	8,990	10,700	5,400	3,660	3,580	13,900	19,900	11,500	4,360	20,500	12,600	7,000
30	11,800	8,970	5,400	3,750	-----	13,000	18,600	11,300	4,060	19,200	12,600	7,000
TOTAL	15,900	-----	5,210	3,810	-----	11,600	-----	11,700	-----	18,200	12,000	-----
MEAN	4,861	14,640	6,179	4,397	3,643	7,660	15,460	16,120	6,865	10,060	12,880	7,215
MAX	15,900	18,700	8,710	5,210	3,880	17,900	21,900	19,100	12,200	30,100	16,900	12,200
MIN	1,760	8,970	3,870	3,660	3,450	3,380	9,160	11,300	3,900	2,500	10,500	5,210
CFSM	.42	1.26	.53	.38	.31	.66	1.33	1.39	.59	.87	1.11	.62
IN.	.48	1.41	.61	.44	.34	.76	1.49	1.60	.66	1.00	1.28	.69
CAL YR 1971	TOTAL 2,213,190			MEAN 6,064	MAX 20,500			MIN 1,460	CFSM .52	IN 7.10		
WTR YR 1972	TOTAL 3,358,200			MEAN 9,175	MAX 30,100			MIN 1,760	CFSM .79	IN 10.77		

SAUK RIVER BASIN

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05270500 Sauk River near St. Cloud, Minn.

LOCATION.--Lat $45^{\circ}33'35''$, Long $94^{\circ}14'00''$, in SE $\frac{1}{4}$ 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.--42 years (1909-12, 1930-31, 1934-72), 266 cfs (3.91 inches per year).

EXTREMES.--Current year: Maximum discharge, 1,800 cfs Mar. 21 (gage height, 5.44 ft, backwater from ice); maximum gage height, 7.33 ft Mar. 22 (backwater from ice); minimum discharge, 90 cfs Oct. 11 (gage height, 1.21 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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	136	988	780	355	190	180	1,500	1,290	907	386	1,400	1,050
2	133	1,150	760	350	185	180	1,500	1,330	856	375	1,410	993
3	128	1,280	740	340	185	180	1,480	1,320	868	386	1,420	952
4	133	1,410	720	330	185	180	1,470	1,300	864	368	1,410	948
5	118	1,360	700	325	180	185	1,470	1,260	872	361	1,390	889
6	113	1,390	670	320	180	185	1,460	1,240	966	326	1,410	844
7	105	1,240	650	315	175	190	1,450	1,200	948	221	1,380	812
8	108	1,140	630	310	170	190	1,440	1,160	921	249	1,430	780
9	103	1,100	610	300	170	195	1,420	1,130	876	274	1,400	760
10	98	991	590	290	165	200	1,400	1,100	836	305	1,370	744
11	96	949	580	280	165	205	1,380	1,060	820	386	1,350	728
12	101	935	560	275	165	210	1,350	1,020	792	386	1,320	704
13	99	928	540	275	165	215	1,350	997	760	375	1,280	676
14	101	911	520	270	170	220	1,260	970	740	431	1,250	652
15	103	940	510	265	170	270	1,280	948	720	516	1,210	616
16	168	964	490	265	170	370	1,340	925	656	588	1,190	584
17	218	1,160	480	260	170	470	1,370	903	520	668	1,160	552
18	265	1,210	470	260	170	600	1,370	880	520	700	1,120	520
19	340	1,250	460	260	170	800	1,380	856	572	720	1,090	500
20	352	1,270	440	255	170	1,000	1,390	836	449	752	1,060	524
21	363	1,250	440	245	170	1,800	1,390	816	368	784	1,060	524
22	368	1,210	435	240	170	1,750	1,450	816	368	840	1,120	473
23	365	1,140	425	235	170	1,700	1,500	808	396	1,050	1,140	445
24	361	1,070	420	235	170	1,700	1,490	820	407	1,100	1,210	438
25	365	1,020	410	230	170	1,680	1,480	820	403	1,180	1,200	424
26	359	980	405	225	170	1,670	1,450	808	403	1,310	1,220	442
27	457	940	400	220	175	1,620	1,410	816	407	1,350	1,220	449
28	523	880	400	210	175	1,600	1,360	816	421	1,340	1,170	466
29	516	840	390	200	175	1,580	1,320	840	414	1,380	1,140	470
30	666	820	380	195	-----	1,550	1,300	868	403	1,420	1,110	456
31	1,020	-----	370	190	-----	1,520	-----	898	-----	1,410	1,110	-----
TOTAL	8,381	32,716	16,375	8,325	5,015	24,395	42,210	30,851	19,453	21,937	38,750	19,415
MEAN	270	1,091	528	269	173	787	1,407	995	648	708	1,250	647
MAX	1,020	1,410	780	355	190	1,800	1,500	1,330	966	1,420	1,430	1,050
MIN	96	820	370	190	165	180	1,260	808	368	221	1,060	424
CFSM	.29	1.18	.57	.29	.19	.85	1.52	1.08	.70	.77	1.35	.70
IN.	.34	1.32	.66	.33	.20	.98	1.70	1.24	.78	.88	1.56	.78

CAL YR 1971 TOTAL 150,228 MEAN 412 MAX 1,910 MIN 65 CFSM .45 IN 6.04
WTR YR 1972 TOTAL 267,823 MEAN 732 MAX 1,800 MIN 96 CFSM .79 IN 10.77

ELK RIVER BASIN

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.--44 years (1911-17, 1934-72), 255 cfs (5.63 inches per year).

EXTREMES.--Current year: Maximum discharge, 2,140 cfs Mar. 26 (gage height, 6.10 ft, backwater from ice); minimum daily, 109 cfs Feb. 3-11, 15-17; minimum gage height, 0.96 ft Oct. 11, 12.
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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	123	591	683	165	110	120	1,020	765	323	216	1,650	460
2	127	659	660	155	110	120	925	766	350	205	1,560	430
3	130	739	628	150	109	120	853	739	370	207	1,460	415
4	128	875	588	150	109	120	781	708	359	203	1,360	396
5	124	953	519	155	109	125	722	687	329	194	1,260	382
6	120	965	486	155	109	125	691	680	305	184	1,180	366
7	119	975	469	155	109	130	664	658	296	181	1,140	366
8	118	1,030	441	150	109	130	633	637	277	183	1,140	375
9	117	1,000	384	150	109	135	605	617	259	196	1,060	358
10	118	926	354	145	109	140	582	591	244	193	1,010	340
11	117	848	340	145	109	145	564	562	226	209	993	322
12	116	773	350	140	110	150	553	528	212	239	1,010	312
13	125	701	360	140	110	160	555	501	208	227	1,040	308
14	130	639	370	140	110	190	568	486	251	246	1,050	305
15	127	585	370	140	109	240	594	454	244	245	1,040	291
16	138	571	355	135	109	280	658	410	232	242	1,000	280
17	175	623	335	135	109	350	732	377	220	261	941	266
18	193	651	320	135	109	440	761	362	210	268	873	260
19	233	656	310	130	110	520	766	348	220	271	808	252
20	271	690	290	130	110	620	781	331	308	276	739	294
21	301	770	285	125	110	666	822	316	357	352	669	322
22	318	839	275	125	111	900	873	303	328	388	638	308
23	313	846	265	125	112	1,090	867	292	294	465	592	294
24	297	863	250	120	115	1,290	837	293	269	528	602	280
25	282	866	240	120	117	1,550	812	307	254	598	600	277
26	273	894	230	120	118	1,900	825	306	233	769	600	298
27	303	886	215	115	120	1,880	838	311	231	1,020	600	288
28	372	873	205	115	120	1,840	822	316	234	1,190	560	280
29	387	805	190	115	120	1,610	797	327	239	1,340	540	277
30	416	731	180	115	-----	1,300	774	334	230	1,560	520	266
31	502	-----	175	110	-----	1,140	-----	320	-----	1,680	480	-----
TOTAL	6,613	23,823	11,122	4,205	3,230	19,526	22,275	14,632	8,112	14,336	28,715	9,708
MEAN	213	794	359	136	111	630	743	472	270	462	926	324
MAX	502	1,030	683	165	120	1,900	1,020	766	370	1,680	1,650	460
MIN	116	571	175	110	109	120	553	292	208	181	480	252
CFSM	.35	1.29	.58	.22	.18	1.02	1.21	.77	.44	.75	1.51	.53
IN.	.40	1.44	.67	.25	.20	1.18	1.35	.89	.49	.87	1.74	.59

CAL YR 1971 TOTAL 120,374 MEAN 330 MAX 1,610 MIN 73 CFSM .54 IN 7.28
WTR YR 1972 TOTAL 166,297 MEAN 454 MAX 1,900 MIN 109 CFSM .74 IN 10.06

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, approximately.

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.--23 years, 52.6 cfs (3.99 inches per year).

EXTREMES.--Current year: Maximum discharge, 289 cfs May 29 (gage height, 4.93 ft); minimum, 25 cfs Oct. 16 (gage height, 2.52 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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	37	74	156	122	90	65	148	231	258	112	153	133
2	37	73	158	124	90	64	148	241	252	105	151	130
3	37	74	160	129	90	64	153	220	247	102	150	128
4	37	74	161	130	90	64	154	212	238	95	149	128
5	36	74	162	130	90	64	153	205	231	90	150	126
6	33	74	172	130	90	64	152	210	226	85	157	128
7	31	72	192	132	90	64	156	207	220	79	162	129
8	31	65	187	133	90	64	160	202	212	83	165	123
9	30	64	182	134	90	63	164	205	199	81	162	118
10	29	65	179	135	90	63	169	210	181	77	160	113
11	28	66	176	135	90	64	170	212	174	76	161	112
12	27	68	174	136	90	65	176	212	173	79	161	109
13	28	71	168	136	91	67	186	220	169	76	158	108
14	28	75	164	135	92	70	185	226	167	79	155	106
15	28	77	162	132	90	78	184	226	161	78	150	107
16	33	88	160	125	91	111	180	224	152	75	147	104
17	33	105	157	120	96	132	174	217	144	76	145	100
18	34	117	154	112	102	120	171	207	140	74	137	95
19	39	108	151	104	104	119	175	185	157	70	131	91
20	40	126	150	98	106	118	180	171	209	71	127	96
21	39	126	146	96	108	140	198	175	189	82	125	99
22	39	130	142	94	108	135	231	176	168	91	126	94
23	37	133	140	92	106	129	242	183	151	127	122	89
24	37	138	138	91	101	124	237	207	138	132	124	89
25	37	138	136	90	74	125	228	231	129	127	122	86
26	37	143	134	90	71	122	213	238	124	161	137	84
27	55	145	132	90	68	125	203	262	119	173	141	79
28	57	151	132	90	66	136	197	272	125	171	138	81
29	50	155	126	90	66	140	209	284	125	166	134	80
30	60	156	125	90	-----	144	224	281	118	156	131	76
31	81	-----	124	90	-----	146	-----	269	-----	156	134	-----
TOTAL	1,185	3,025	4,800	3,535	2,620	3,049	5,520	6,821	5,296	3,205	4,465	3,141
MEAN	38.2	101	155	114	90.3	98.4	184	220	177	103	144	105
MAX	81	156	192	136	108	146	242	284	258	173	165	133
MIN	27	64	124	90	66	63	148	171	118	70	122	76
CFSM	.21	.56	.87	.64	.50	.55	1.03	1.23	.99	.58	.80	.59
IN.	.25	.63	1.00	.73	.54	.63	1.15	1.42	1.10	.67	.93	.65

CAL YR 1971 TOTAL 30,141.0 MEAN 82.6 MAX 262 MIN 9.0 CFSM .46 IN 6.26
WTR YR 1972 TOTAL 46,662.0 MEAN 127 MAX 284 MIN 27 CFSM .71 IN 9.70

05279000 South Fork Crow River near Mayer, Minn.

LOCATION.--Lat 44°54'20", long 93°53'05", in SW $\frac{1}{4}$ SW $\frac{1}{4}$ 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.--38 years, 253 cfs (2.93 inches per year).

EXTREMES.--Current year: Maximum discharge, 5,360 cfs Mar. 21 (gage height, 13.16 ft, from floodmark); minimum discharge, 34 cfs Oct. 14 (G.H. 1.18 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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	55	981	648	195	81	70	1,980	1,820	3,000	398	1,400	330
2	66	1,260	610	187	80	70	1,800	1,760	3,140	354	1,500	316
3	65	1,170	567	180	79	70	1,700	1,750	2,890	340	1,520	307
4	62	1,060	560	172	78	70	1,560	1,740	2,520	312	1,500	278
5	61	981	554	167	78	71	1,420	1,720	2,210	278	1,450	283
6	53	886	530	160	77	72	1,330	1,720	1,860	258	1,330	283
7	46	760	510	155	76	76	1,270	1,740	1,600	250	1,200	303
8	43	653	500	149	76	77	1,220	1,760	1,430	231	1,050	305
9	36	596	484	142	75	77	1,170	1,700	1,250	243	912	294
10	37	541	461	138	75	77	1,050	1,360	1,160	233	767	280
11	36	486	455	131	74	78	1,020	1,290	1,040	223	702	269
12	35	441	430	127	74	82	989	1,240	956	238	617	250
13	35	406	412	122	73	84	978	1,160	886	285	560	240
14	34	381	395	117	73	88	1,060	1,120	842	307	491	240
15	35	362	380	112	72	92	1,070	1,010	767	307	450	233
16	35	394	366	108	72	140	1,130	942	680	272	358	226
17	35	670	351	104	71	240	1,240	891	620	236	362	206
18	35	1,070	338	100	71	450	1,290	847	562	240	318	189
19	76	1,280	324	98	71	900	1,310	818	511	219	258	168
20	84	1,380	310	96	71	1,070	1,300	780	537	223	271	162
21	90	1,420	300	94	70	4,320	1,210	734	627	252	238	177
22	114	1,380	289	93	70	5,200	1,250	692	646	320	262	170
23	102	1,330	278	91	70	4,800	1,410	658	634	455	252	158
24	90	1,250	267	90	70	4,360	1,610	684	612	608	240	155
25	83	1,160	256	89	70	4,160	1,740	826	581	668	257	151
26	79	1,070	248	88	70	3,960	1,960	915	562	852	250	226
27	165	967	236	86	70	3,500	2,320	909	534	1,060	316	276
28	448	889	228	85	70	3,010	2,360	981	484	1,200	360	271
29	470	790	218	84	70	2,630	2,250	1,120	452	1,260	368	253
30	482	710	210	83	-----	2,370	2,030	1,500	426	1,310	370	242
31	821	-----	202	82	-----	2,160	-----	2,280	-----	1,360	340	-----
TOTAL	3,508	26,724	11,917	3,725	2,127	44,424	44,027	38,467	34,019	14,792	20,389	7,245
MEAN	126	891	384	120	73.3	1,433	1,468	1,241	1,134	477	658	242
MAX	821	1,420	648	195	81	5,200	2,360	2,280	3,140	1,360	1,520	330
MIN	34	362	202	82	70	70	978	658	426	219	238	151
CFSM	.11	.76	.33	.10	.06	1.22	1.25	1.06	.97	.41	.56	.21
IN.	.12	.85	.38	.12	.07	1.41	1.40	1.22	1.08	.47	.65	.23

CAL YR 1971 TOTAL 175,433 MEAN 481 MAX 2,500 MIN 28 CFSM .41 IN 5.58
WTR YR 1972 TOTAL 251,764 MEAN 688 MAX 5,200 MIN 34 CFSM .59 IN 8.00

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.--47 years (1909-17, 1930-31, 1934-72), 619 cfs (3.34 inches per year).

EXTREMES.--Current year: Maximum discharge, ~~4,300 cfs Apr. 1~~ ^{7,440} (gage height, ~~8.00~~ ^{Mar. 25} ft); maximum gage height, ~~9.72 ft Mar. 30 (backwater from ice)~~ ^{11.89}; minimum, ~~1.5 cfs Oct. 16~~ ^{2.29} (gage height, ~~1.05~~ 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 SECCND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	226	1,800	1,800	730	330	243	5,180	3,990	3,120	1,320	3,490	1,480
2	226	2,030	1,800	690	330	243	4,830	3,900	3,680	1,240	3,560	1,450
3	229	2,120	1,760	650	325	243	4,570	3,800	4,010	1,180	3,610	1,410
4	223	2,130	1,730	610	325	243	4,310	3,730	4,080	1,120	3,620	1,390
5	220	2,090	1,700	570	325	243	4,060	3,670	4,020	1,050	3,640	1,380
6	218	1,990	1,660	550	320	243	3,850	3,650	3,850	980	3,660	1,370
7	209	1,800	1,620	520	320	243	3,680	3,650	3,600	931	3,610	1,370
8	197	1,650	1,590	490	315	243	3,530	3,650	3,340	882	3,520	1,370
9	189	1,590	1,560	470	300	243	3,420	3,600	3,080	854	3,360	1,350
10	183	1,480	1,530	450	285	244	3,280	3,480	2,830	826	3,200	1,310
11	181	1,430	1,490	430	270	245	3,200	3,310	2,600	819	3,010	1,270
12	175	1,350	1,400	410	260	246	3,120	3,160	2,420	833	2,850	1,240
13	172	1,290	1,300	400	255	248	3,000	3,010	2,250	882	2,700	1,230
14	172	1,250	1,200	385	250	253	2,930	2,920	2,110	924	2,560	1,190
15	170	1,200	1,140	375	248	270	2,920	2,810	2,000	924	2,420	1,170
16	167	1,240	1,090	370	247	300	2,910	2,690	1,890	910	2,280	1,130
17	189	1,450	1,060	360	247	450	2,900	2,580	1,760	903	2,140	1,080
18	195	1,840	1,030	360	247	700	2,920	2,460	1,660	875	2,010	1,020
19	254	2,150	1,000	355	246	1,100	2,950	2,370	1,580	840	1,890	980
20	279	2,360	970	350	245	1,700	2,950	2,290	1,640	840	1,760	945
21	306	2,460	950	350	245	2,600	2,950	2,210	1,640	896	1,640	952
22	326	2,510	930	345	245	4,090	2,980	2,130	1,670	1,020	1,570	952
23	346	2,520	910	345	245	6,110	3,040	2,040	1,680	1,640	1,510	917
24	334	2,500	890	340	244	7,220	3,160	2,000	1,680	1,700	1,460	868
25	326	2,380	870	340	244	7,360	3,280	2,050	1,670	1,920	1,420	847
26	320	2,280	860	340	243	7,300	3,390	2,130	1,650	2,390	1,440	910
27	425	2,200	850	340	243	7,010	3,560	2,160	1,610	2,760	1,470	980
28	724	2,120	837	335	243	6,740	3,840	2,160	1,560	3,050	1,490	1,000
29	903	2,060	820	335	243	6,450	4,030	2,230	1,490	3,230	1,490	966
30	1,060	2,000	800	335	-----	5,990	4,070	2,330	1,400	3,330	1,500	924
31	1,440	-----	770	335	-----	5,580	-----	2,620	-----	3,410	1,500	-----
TOTAL	10,584	57,270	37,917	13,265	7,885	74,393	104,810	88,780	71,570	44,479	75,380	34,451
MEAN	341	1,909	1,223	428	272	2,400	3,494	2,864	2,386	1,435	2,432	1,148
MAX	1,440	2,520	1,800	730	330	7,360	5,180	3,990	4,080	3,410	3,660	1,480
MIN	167	1,200	770	335	243	243	2,900	2,000	1,400	819	1,420	847
CFSM	.14	.76	.49	.17	.11	.95	1.39	1.14	.95	.57	.97	.46
IN:	.16	.85	.56	.20	.12	1.10	1.55	1.31	1.06	.66	1.11	.51

CAL YR 1971 TOTAL 412,414 MEAN 1,130 MAX 4,280 MIN 112 CFSM .45 IN 6.09
WTR YR 1972 TOTAL 620,784 MEAN 1,696 MAX 7,360 MIN 167 CFSM .67 IN 9.16

RUM RIVER BASIN

05284000 Mille Lacs Lake at Garrison, Minn.

LOCATION.--Lat 46°18'05", long 93°49'05", in SW¹/₄SE¹/₄ 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, 1,253.87 ft Aug. 14 (affected by wind action and seiche action); maximum daily, 1,253.43 ft Aug. 22; minimum, 1,251.02 ft Oct. 1 (affected by wind action).
Period of record: Maximum elevation, 1,253.87 ft Aug. 14, 1972 (affected by wind action and seiche action); maximum daily, 1,253.43 ft Aug. 22, 1972; minimum observed, 1,245.74 ft Oct. 16-19, 1936.

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 1971 TO SEPTEMBER 1972

Oct. 31	1,251.53	Feb. 29	1,251.68	June 30	1,252.29
Nov. 30	1,251.73	Mar. 31	1,251.81	July 31	1,253.28
Dec. 31	1,251.73	Apr. 30	1,252.17	Aug. 31	1,253.33
Jan. 31	1,251.73	May 31	1,252.37	Sept. 30	1,252.87

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

RUM RIVER BASIN

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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.--40 years (1930-31, 1933-72, 576 cfs (5.75 inches per year)).

EXTREMES.--Current year: Maximum discharge, 9,540 cfs July 29 (gage height, 11.20 ft); minimum, 254 cfs Oct. 11 (gage height, 2.65 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. 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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	271	1,480	1,040	510	360	357	3,110	1,820	960	648	7,210	977
2	267	1,730	960	500	360	359	2,680	1,720	1,020	631	6,200	930
3	266	1,920	920	495	360	360	2,310	1,610	1,070	612	5,170	892
4	268	2,120	890	470	355	362	2,030	1,540	1,060	588	4,270	860
5	269	2,360	850	440	350	366	1,830	1,510	1,010	566	3,600	836
6	269	2,560	830	430	340	368	1,680	1,520	928	551	3,100	838
7	268	2,610	800	420	330	370	1,580	1,520	849	535	2,690	851
8	281	2,500	760	415	330	375	1,500	1,470	785	543	2,380	844
9	277	2,270	750	410	330	380	1,440	1,410	736	543	2,160	835
10	266	1,940	740	410	330	385	1,380	1,360	686	531	2,050	819
11	258	1,580	730	405	332	390	1,330	1,340	653	525	2,040	805
12	259	1,320	700	400	335	395	1,300	1,310	638	519	2,130	790
13	267	1,140	710	390	337	400	1,290	1,270	620	506	2,270	782
14	271	1,010	720	380	338	415	1,330	1,210	610	538	2,360	773
15	276	926	710	370	340	430	1,410	1,150	594	605	2,330	761
16	293	893	700	370	340	455	1,570	1,090	585	612	2,170	742
17	312	941	680	380	340	485	1,800	1,040	596	637	1,930	729
18	339	1,040	660	385	341	525	2,040	1,010	600	650	1,650	715
19	457	1,170	650	385	343	570	2,230	975	615	638	1,410	704
20	602	1,350	640	385	346	670	2,360	945	706	608	1,250	719
21	681	1,590	650	380	348	900	2,410	905	846	627	1,140	756
22	718	1,870	660	375	350	1,300	2,420	866	889	731	1,070	790
23	732	2,140	640	370	350	1,620	2,360	832	890	1,440	999	839
24	719	2,330	630	365	350	1,900	2,280	805	882	1,940	973	868
25	701	2,360	620	360	352	2,200	2,170	793	853	2,310	968	887
26	676	2,200	600	360	352	3,000	2,070	782	798	3,360	1,030	880
27	717	1,920	580	360	354	4,000	2,030	777	740	6,290	1,050	859
28	797	1,650	570	360	355	4,600	2,020	786	702	8,760	1,060	841
29	841	1,350	550	360	355	4,400	2,000	817	679	9,470	1,050	828
30	963	1,180	540	360	-----	3,990	1,920	873	662	9,140	1,040	813
31	1,210	-----	520	365	-----	3,500	-----	919	-----	8,270	1,020	-----
TOTAL	14,791	51,450	22,000	12,365	10,003	39,827	57,880	35,975	23,262	63,924	69,770	24,563
MEAN	477	1,715	710	399	345	1,285	1,929	1,160	775	2,062	2,251	819
MAX	1,210	2,610	1,040	510	360	4,600	3,110	1,820	1,070	9,470	7,210	977
MIN	258	893	520	360	330	357	1,290	777	585	506	968	704
CFSM	.35	1.26	.52	.29	.25	.94	1.42	.85	.57	1.52	1.66	.60
IN.	.40	1.41	.60	.34	.27	1.09	1.58	.98	.64	1.75	1.91	.67
CAL YR 1971	TOTAL 277,886	MEAN 761	MAX 4,580	MIN 180	CFSM .56	IN 7.60						
WTR YR 1972	TOTAL 425,810	MEAN 1,163	MAX 9,470	MIN 258	CFSM .86	IN 11.65						

MISSISSIPPI RIVER MAIN STEM

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 Coon Rapids Dam 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 804.53 ft above mean sea level, datum of 1929. Prior to June 14, 1932, at site 1.2 miles upstream at different datum.

AVERAGE DISCHARGE.--41 years, 7,366 cfs (5.24 inches per year).

EXTREMES.--Current year: Maximum discharge, 44,800 cfs July 27 (gage height, 12.21 ft); minimum, 3,010 cfs Oct. 4 (gage height, 1.96 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); minimum gage height, 0.13 ft Nov. 28, 1967.

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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	
1	3,570	23,700	15,000	9,700	7,200	6,400	27,400	28,700	18,400	8,320	36,000	17,700	
2	3,570	25,600	14,000	9,700	7,300	6,300	25,600	28,200	18,900	7,800	33,100	17,500	
3	3,450	27,100	14,200	9,500	7,300	6,300	24,300	27,600	19,000	8,030	30,300	16,500	
4	3,650	28,100	13,500	9,200	7,300	6,200	23,100	27,000	19,000	6,840	27,900	15,800	
5	4,080	28,600	14,100	8,700	7,300	6,300	22,300	26,500	18,400	6,910	25,300	15,100	
6	4,940	28,600	13,900	8,600	7,300	6,400	21,700	26,700	18,100	7,140	24,100	14,200	
7	5,320	27,500	13,900	8,500	7,300	6,400	20,700	26,700	17,600	6,370	23,900	14,500	
8	5,050	26,300	14,600	8,600	7,200	6,500	20,000	27,200	15,100	5,690	24,500	12,800	
9	4,710	24,500	13,800	8,700	7,200	6,600	19,200	27,200	15,000	5,820	26,300	12,200	
10	4,630	24,100	12,000	8,800	7,200	6,700	18,800	27,000	13,800	6,120	26,300	11,800	
11	4,940	22,800	11,500	8,800	7,200	7,000	18,200	26,500	12,900	6,140	26,500	11,800	
12	5,010	21,800	10,000	8,700	7,100	7,300	17,900	25,700	11,500	6,030	25,000	11,700	
13	5,010	20,700	9,600	8,700	7,100	7,500	18,600	25,200	11,400	5,800	24,100	10,600	
14	4,920	19,800	9,200	8,500	7,100	7,700	19,900	24,500	11,500	6,310	23,000	10,500	
15	5,060	19,200	9,000	8,200	7,100	8,100	21,200	24,400	10,400	8,340	22,800	10,300	
16	5,050	18,700	8,800	8,100	7,100	8,600	22,900	23,900	10,600	7,790	21,900	10,000	
17	5,780	19,500	8,700	8,000	7,000	9,100	24,900	23,600	9,700	7,700	20,900	9,460	
18	6,530	21,300	8,600	8,000	6,900	10,100	27,400	22,800	9,770	8,240	19,700	9,220	
19	7,510	22,700	8,700	8,100	6,800	11,800	29,100	22,100	9,590	8,380	18,600	9,720	
20	7,570	22,500	8,700	7,900	6,700	14,600	30,600	21,200	10,700	8,480	17,900	9,740	
21	8,040	23,400	8,800	7,800	6,600	18,100	31,600	20,200	11,000	8,890	17,500	9,900	
22	8,290	23,300	9,000	7,700	6,600	22,700	31,800	19,400	10,500	9,320	17,500	10,100	
23	8,130	22,900	9,200	7,600	6,600	27,800	31,700	18,400	10,200	22,400	17,100	10,000	
24	7,740	22,700	9,300	7,600	6,500	34,100	31,800	18,600	10,200	33,000	16,100	10,200	
25	7,960	22,400	9,400	7,700	6,500	36,200	31,700	18,600	10,000	37,800	17,700	10,500	
26	8,620	22,300	9,400	7,600	6,500	38,300	31,300	18,200	9,540	42,300	19,100	10,900	
27	8,830	20,400	9,500	7,500	6,500	38,300	31,000	17,900	9,230	44,500	19,200	10,400	
28	10,600	19,400	9,600	7,400	6,400	37,500	30,900	17,300	8,620	44,200	18,900	10,500	
29	13,500	17,800	9,600	7,400	6,400	35,700	30,100	17,000	8,360	42,800	18,900	11,400	
30	14,500	16,200	9,600	7,300	-----	32,800	29,800	17,700	8,510	41,200	18,600	10,700	
31	18,300	-----	9,700	7,200	-----	30,200	-----	17,300	-----	38,500	18,400	-----	
TOTAL	214,860	683,900	334,900	255,800	201,300	507,600	765,500	713,300	377,520	507,160	697,100	355,740	
MEAN	6,931	22,800	10,800	8,252	6,941	16,370	25,520	23,010	12,580	16,360	22,490	11,860	
MAX	18,300	28,600	15,000	9,700	7,300	38,300	31,800	28,700	19,000	44,500	36,000	17,700	
MIN	3,450	16,200	8,600	7,200	6,400	6,200	17,900	17,000	8,360	5,690	16,100	9,220	
CFSM	.36	1.19	.57	.43	.36	.86	1.34	1.20	.66	.86	1.18	.62	
IN.	.42	1.33	.65	.50	.39	.99	1.49	1.39	.74	.99	1.36	.69	
CAL YR 1971	TOTAL 3,717,860			MEAN 10,190		MAX 34,800		MIN 2,600		CFSM .53		IN 7.24	
WTR YR 1972	TOTAL 5,614,680			MEAN 15,340		MAX 44,500		MIN 3,450		CFSM .80		IN 10.94	

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.--33 years, 46.4 cfs (1.41 inches per year, 33,620 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 2,180 cfs March 16 (gage height, 9.05 ft); minimum, 0.54 cfs Sept. 22, 23, 24 (gage height, 2.12 ft).
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 good except those for winter periods, which are fair.

REVISIONS (WATER YEARS).--WSP 1308: 1943(M).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.86	19	13	2.5	.73	2.7	136	102	268	19	21	3.8
2	1.1	16	13	2.4	.72	3.1	133	174	215	16	20	3.5
3	.94	12	12	2.2	.72	3.7	139	195	174	14	19	3.3
4	.92	9.5	12	2.1	.72	4.3	135	153	144	12	17	3.0
5	.83	9.0	11	2.0	.72	5.2	117	143	121	11	16	2.6
6	1.0	10	11	1.9	.72	6.0	114	136	105	12	15	2.6
7	1.3	6.8	10	1.8	.72	7.1	120	131	93	12	14	2.5
8	1.3	6.0	10	1.7	.72	8.0	119	120	84	10	14	2.0
9	1.8	6.6	9.4	1.6	.72	8.6	107	110	76	10	13	1.8
10	1.9	6.6	9.0	1.5	.72	28	109	100	69	8.7	12	1.6
11	2.0	6.5	9.8	1.5	.72	95	112	93	61	8.0	11	1.4
12	2.2	6.9	8.4	1.4	.72	250	129	94	56	8.0	10	1.3
13	2.5	7.5	8.0	1.3	.73	450	229	184	51	7.6	10	1.4
14	2.1	8.2	7.6	1.3	.74	550	204	861	48	11	9.3	1.2
15	2.7	8.3	7.2	1.2	.74	1,000	166	706	43	8.7	8.4	1.3
16	3.5	11	6.9	1.2	.76	1,910	146	591	39	7.5	7.4	1.2
17	2.0	15	6.4	1.2	.78	1,170	138	465	37	7.4	6.7	1.3
18	2.5	33	6.0	1.1	.79	800	126	354	36	6.9	6.0	.95
19	4.9	30	5.6	1.0	.83	559	119	270	42	7.1	5.5	.83
20	4.6	26	5.2	1.0	.89	450	108	218	63	15	5.2	.73
21	3.4	21	5.0	.98	.92	407	107	184	55	11	5.5	.62
22	2.6	19	4.6	.93	.99	422	122	249	46	13	6.1	.59
23	2.3	19	4.4	.90	1.1	318	138	249	40	21	6.0	.57
24	1.9	13	4.1	.88	1.2	273	129	319	36	29	8.2	.60
25	1.9	17	3.9	.84	1.4	234	121	426	32	39	8.2	.76
26	1.8	16	3.6	.81	1.6	213	111	354	31	50	7.0	.84
27	3.7	16	3.4	.78	1.9	182	102	319	29	45	6.3	.92
28	4.0	15	3.7	.78	2.3	160	99	290	27	37	5.4	.92
29	6.0	14	3.0	.76	2.5	165	97	411	24	30	5.0	.98
30	7.0	14	2.8	.74	-----	157	99	439	21	25	4.5	.86
31	9.7	-----	2.6	.74	-----	147	-----	349	-----	22	4.4	-----
TOTAL	96.15	422.8	221.0	41.04	28.82	9,988.7	3,831	8,789	2,166	533.9	307.1	45.97
MEAN	2.78	14.1	7.13	1.32	.89	322	128	284	72.2	17.2	9.91	1.53
MAX	9.7	33	13	2.5	2.5	1,910	229	861	268	50	21	3.8
MIN	.83	6.5	2.6	.74	.72	2.7	97	93	21	6.9	4.4	.57
CFSM	.006	.03	.02	.003	.002	.72	.29	.64	.16	.04	.02	.003
IN.	.007	.04	.02	.003	.002	.83	.32	.73	.18	.04	.03	.003
AC-FT	171	939	438	81	57	19,810	7,600	17,430	4,300	1,060	609	91

CAL YR 1971 TOTAL 9,062.40 MEAN 24.9 MAX 410 MIN .05 CFSM .06 IN .75 AC-FT 17,980
WTR YR 1972 TOTAL 26,461.49 MEAN 72.3 MAX 1,910 MIN .57 CFSM .16 IN 2.20 AC-FT 52,490

PEAK DISCHARGE (BASE, 450 CFS)

DATE	TIME	G.HT.	DISCHARGE	DATE	TIME	G.HT.	DISCHARGE
3-16	1400	9.05	2,180	5-25	0545	4.81	467
5-14	1500	6.63	1,100	5-29	1845	4.90	490

05291000 Whetstone River near Big Stone City, S. Dak.

LOCATION.--Lat 45°17'32", long 96°29'14", in SE 1/4 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.--41 years (1931-72), 47.8 cfs (1.67 inches per year, 34,630 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 2,930 cfs Mar. 16 (gage height, 10.24 ft, backwater from ice), minimum, 0.90 cfs Oct. 1 (gage height, 1.30 ft).

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 period of no gage-height record and those for winter period, 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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.4	109	59	32	12	9.4	132	201	432	47	120	16
2	2.4	90	57	22	12	8.0	115	546	303	43	100	15
3	6.3	75	56	31	12	8.0	120	714	236	40	85	15
4	4.3	60	54	30	12	7.5	128	378	192	37	70	15
5	2.8	51	52	29	12	7.1	119	264	164	34	64	14
6	1.9	34	51	25	12	8.4	108	212	146	32	56	14
7	1.4	56	49	23	11	12	108	185	134	32	49	13
8	1.4	35	48	23	10	14	115	167	122	53	46	12
9	1.6	30	48	22	9.8	15	107	151	115	225	44	12
10	1.8	26	47	22	8.4	55	95	137	104	258	42	12
11	1.5	24	46	22	8.4	320	106	125	98	145	38	12
12	1.9	23	45	21	8.9	630	219	122	93	103	36	11
13	1.6	23	44	21	12	940	1,670	172	85	83	35	16
14	2.1	23	44	20	12	1,080	812	1,530	77	70	33	12
15	2.0	24	43	18	13	1,590	380	1,600	68	60	30	11
16	28	35	43	15	13	2,600	259	669	62	52	28	9.9
17	28	87	42	14	12	1,420	211	402	58	44	26	9.0
18	17	257	41	14	11	702	185	292	59	44	24	8.4
19	12	209	40	14	13	430	164	221	97	45	22	8.9
20	12	170	39	14	13	342	148	176	489	45	21	9.2
21	11	168	39	13	13	639	149	152	359	50	20	8.1
22	10	120	38	13	13	1,440	222	145	211	46	21	7.5
23	9.0	151	37	13	12	549	305	184	160	47	21	7.1
24	7.4	75	37	13	11	299	236	538	129	47	22	7.1
25	5.6	72	36	13	11	236	185	726	106	50	22	7.1
26	5.6	70	36	13	10	198	156	711	89	530	22	7.4
27	170	68	35	14	10	172	142	438	79	400	24	7.3
28	110	62	35	14	10	146	134	561	72	290	21	7.8
29	140	67	34	13	10	142	139	1,460	61	230	20	8.4
30	125	60	33	12	-----	146	168	1,240	53	180	19	10
31	115	-----	33	12	-----	144	-----	794	-----	139	17	-----
TOTAL	840.0	2,348	1,341	585	327.5	14,309.4	7,136	15,213	4,453	3,501	1,198	323.2
MEAN	27.1	78.3	43.3	18.9	11.3	462	238	491	148	113	38.6	10.8
MAX	170	257	59	32	13	2,600	1,670	1,600	489	530	120	16
MIN	1.4	23	33	12	8.4	7.1	95	122	53	32	17	7.1
CFSM	.07	.20	.11	.05	.03	1.19	.61	1.26	.38	.29	.10	.03
IN.	.08	.22	.13	.06	.03	1.37	.68	1.45	.43	.33	.11	.03
AC-FT	1,670	4,660	2,660	1,160	650	28,380	14,150	30,170	8,830	6,940	2,380	641

CAL YR 1971 TOTAL 20,648.0 MEAN 56.6 MAX 1,600 MIN 1.4 CFSM .15 IN 1.97 AC-FT 40,960
WTR YR 1972 TOTAL 51,575.1 MEAN 141 MAX 2,600 MIN 1.4 CFSM .36 IN 4.93 AC-FT 102,300

PEAK DISCHARGE (BASE, 200 CFS)

DATE	TIME	G. H.	DISCHARGE	DATE	TIME	G. H.	DISCHARGE
11-18	1030	4.13	290	5-14	2130	9.26	2,520
3-16	1430	10.24	2,930	5-26	0145	6.11	818
3-22	0400	8.43	1,960	5-29	1630	8.36	1,890
4-13	1200	8.96	2,330	6-20	1315	5.84	732
4-23	0800	4.21	319	7-9	1515	4.56	380
5-2	2245	6.65	1,040	7-26	Unknown	5.16	530

NOTE.--No gage-height record July 14 to Aug. 14.

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, 9.72 ft Mar. 23; minimum observed, 6.10 ft Nov. 4. 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).

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 1971 TO SEPTEMBER 1972

Oct. 31	6.87	Feb. 29	7.41	June 30	7.62
Nov. 30	7.45	Mar. 31	9.15	July 31	7.91
Dec. 31	7.52	Apr. 30	7.95	Aug. 31	7.48
Jan. 30	7.54	May 31	8.90	Sept. 30	6.90

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

MINNESOTA RIVER BASIN

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.--34 years, 116 cfs (84,040 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 1,210 cfs May 29 (gage height, 9.41 ft); minimum, 1.3 cfs Sept. 30 (gage height, 1.15 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. Some regulation by 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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	37	11	45	52	37	30	834	582	1,090	148	493	13
2	33	17	43	51	37	28	797	682	1,050	67	528	13
3	42	17	42	50	36	26	774	750	1,010	85	456	12
4	34	8.7	50	50	36	24	739	688	919	48	404	12
5	40	42	59	49	36	21	712	646	898	38	372	12
6	30	57	60	49	36	19	682	720	828	35	464	14
7	29	8.2	60	48	36	17	660	608	745	40	368	11
8	46	7.2	60	47	35	14	632	539	722	45	430	11
9	35	7.2	60	47	35	12	612	315	670	54	305	10
10	27	7.1	61	47	35	11	630	133	558	59	276	10
11	28	6.6	61	47	35	20	675	107	533	78	245	8.8
12	21	6.6	61	47	35	50	690	158	507	117	120	8.3
13	22	6.8	61	46	35	200	772	207	485	76	115	8.3
14	33	6.9	61	45	35	350	748	353	501	100	57	8.1
15	34	6.9	60	45	35	380	755	487	391	83	17	7.9
16	55	10	60	42	35	710	740	518	323	75	17	8.2
17	41	11	60	40	35	1,040	775	594	270	84	16	7.3
18	21	24	60	39	35	1,050	732	675	280	63	17	7.3
19	38	11	59	38	35	1,030	675	822	444	43	15	6.9
20	30	42	59	38	34	974	742	820	477	95	15	8.8
21	33	26	58	39	34	995	900	798	311	67	45	13
22	34	6.5	58	38	34	1,040	939	822	301	83	31	10
23	31	12	57	37	34	1,040	891	897	285	92	17	2.3
24	25	15	57	37	34	1,000	815	966	282	86	17	2.4
25	28	18	56	37	33	968	715	1,000	283	58	16	2.5
26	27	34	56	37	33	941	700	1,000	234	126	16	2.4
27	59	34	55	37	32	906	680	990	172	171	15	2.1
28	19	43	54	37	31	915	658	1,060	184	221	15	2.4
29	16	46	54	37	31	946	632	1,150	168	307	14	2.2
30	19	44	53	37	-----	905	612	1,160	164	554	13	1.6
31	16	-----	52	37	-----	873	-----	1,130	-----	562	23	-----
TOTAL	983	592.7	1,752	1,326	1,004	16,535	21,918	21,377	15,085	3,760	4,952	238.8
MEAN	31.7	19.8	56.5	42.8	34.6	533	731	690	503	121	160	7.96
MAX	59	57	61	52	37	1,050	939	1,160	1,090	562	528	14
MIN	16	6.5	42	37	31	11	612	107	164	35	13	1.6
AC-FT	1,950	1,180	3,480	2,630	1,990	32,900	43,470	42,400	29,920	7,460	9,820	474
CAL YR 1971	TOTAL 28,341.7		MEAN 77.6		MAX 414		MIN 6.5		AC-FT 56,220			
WTR YR 1972	TOTAL 89,523.5		MEAN 245		MAX 1,160		MIN 1.6		AC-FT 177,600			

05293000 Yellow Bank River near Odessa, Minn.

LOCATION.--Lat 45°13'35", long 96°21'12", in SE $\frac{1}{4}$ SE $\frac{1}{4}$ 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.--33 years, 60.2 cfs (2.05 inches per year, 43,610 acre-ft per year).

EXTREMES. Current year: Maximum discharge, 2,530 cfs Apr. 13 (gage height, 10.88 ft); minimum, 2.7 cfs Oct. 1, 2, (gage height, 1.75 ft).

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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.2	338	135	30	15	14	175	284	1,210	74	216	20
2	3.4	356	128	28	15	14	156	474	813	67	184	19
3	3.7	278	120	27	15	14	146	1,080	640	63	159	17
4	4.3	210	113	26	15	15	139	698	513	59	136	16
5	4.9	161	108	25	15	15	134	548	416	56	118	16
6	4.3	113	101	24	15	16	131	438	343	53	104	15
7	5.6	112	95	23	15	19	136	354	303	52	94	13
8	5.6	110	90	22	15	22	134	303	285	81	89	13
9	5.2	103	84	22	15	36	131	266	250	115	79	13
10	4.9	81	80	21	15	79	125	238	225	128	73	12
11	4.9	69	75	21	15	135	125	214	200	136	68	12
12	4.6	64	71	20	15	250	186	201	161	140	63	11
13	4.3	61	67	19	15	460	1,350	222	150	100	58	11
14	4.0	61	63	19	15	820	1,730	450	130	80	55	11
15	4.9	60	59	18	15	1,300	793	1,070	112	73	51	9.7
16	29	67	57	18	15	1,820	545	770	106	69	44	10
17	54	113	55	18	15	1,520	418	538	98	64	39	11
18	67	535	53	18	14	835	330	430	94	58	37	9.5
19	77	538	50	17	14	570	280	321	106	54	35	9.8
20	67	428	48	17	14	512	244	254	113	52	32	8.0
21	52	370	46	17	14	531	244	226	150	68	29	9.0
22	45	310	45	16	14	1,280	327	206	145	86	31	9.0
23	37	265	43	16	14	865	535	236	136	172	29	8.0
24	30	230	41	16	14	489	445	390	124	113	32	7.4
25	25	200	39	16	14	375	345	628	109	94	31	6.8
26	22	180	39	16	14	302	286	1,100	97	347	32	7.7
27	35	170	36	16	14	255	246	1,040	95	495	31	8.6
28	58	160	35	16	14	224	224	1,370	97	810	29	7.9
29	73	150	33	15	14	212	228	1,760	86	580	27	6.4
30	124	145	32	15	-----	210	250	2,010	80	375	26	7.0
31	178	-----	31	15	-----	191	-----	2,090	-----	274	22	-----
TOTAL	1,040.8	6,038	2,071	607	423	13,400	10,538	20,209	7,387	4,938	2,053	334.8
MEAN	33.6	201	66.8	19.6	14.6	432	351	652	246	159	66.2	11.2
MAX	178	538	135	30	15	1,820	1,730	2,090	1,210	810	216	20
MIN	3.2	60	31	15	14	14	125	201	80	52	22	6.4
CFSM	.08	.51	.17	.05	.04	1.09	.88	1.64	.62	.40	.17	.03
IN.	.10	.56	.19	.05	.04	1.25	.98	1.89	.65	.46	.19	.03
AC-FT	2,060	11,980	4,110	1,200	839	26,580	20,900	40,080	14,650	9,790	4,070	664

CAL YR 1971 TOTAL 23,358.1 MEAN 64.1 MAX 957 MIN 1.7 CFSM .16 IN 2.19 AC-FT 46,410
WTR YR 1972 TOTAL 69,039.6 MEAN 180 MAX 2,090 MIN 3.2 CFSM .47 IN 6.45 AC-FT 136,900

PEAK DISCHARGE (BASE, 300 CFS)

DATE	TIME	G. H.	DISCHARGE	DATE	TIME	G. H.	DISCHARGE
11-1	1815	4.58	411	4-23	1230	5.11	578
11-18	2200	5.22	580	5-3	0815	7.33	1,220
3-16	2230	9.78	2,060	5-15	1145	7.32	1,190
3-22	1330	8.52	1,580	5-31	0245	10.73	2,440
4-13	2400	10.88	2,530	7-28	1115	6.29	858

MINNESOTA RIVER BASIN

05294000 Pomme de Terre River at Appleton, Minn.

LOCATION.--Lat 45°12'10", long 96°01'20", in SW 1/4 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.--37 years (1935-72), 105 cfs (1.58 inches per year, 76,070 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 1,290 cfs Mar. 22 (gage height, 7.65 ft); minimum discharge, 20 cfs Mar. 2 (gage height, 4.40 ft).

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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	40	369	164	88	42	28	603	461	718	233	462	153
2	37	328	165	82	42	26	555	448	717	217	410	151
3	35	278	162	75	39	30	530	443	699	206	377	145
4	35	255	162	84	41	28	501	424	676	193	351	141
5	35	231	155	85	42	30	465	405	646	181	329	136
6	35	158	146	79	38	38	445	391	608	172	322	136
7	35	72	137	73	32	38	421	382	571	167	326	129
8	34	121	118	73	33	36	398	366	529	232	326	125
9	35	199	102	72	31	38	385	352	490	246	329	122
10	34	184	122	71	32	39	374	345	449	191	307	118
11	34	199	132	69	37	44	371	330	414	166	292	116
12	34	176	127	70	39	58	404	321	385	206	277	114
13	33	157	115	67	40	62	562	338	361	241	267	116
14	32	151	110	61	40	82	780	392	333	210	259	116
15	35	152	113	61	36	189	762	441	312	212	245	112
16	68	167	104	63	31	400	727	401	296	192	234	110
17	86	194	100	64	31	901	682	355	278	186	226	106
18	94	252	97	64	29	1,110	629	330	276	176	214	104
19	92	276	98	62	25	1,170	580	309	292	171	208	100
20	88	266	103	60	23	1,100	535	293	311	166	197	102
21	80	239	97	56	23	1,060	533	358	310	219	189	100
22	79	107	99	63	23	1,210	567	461	302	312	210	97
23	77	109	95	58	26	1,240	670	564	291	290	221	95
24	75	110	89	60	26	1,130	689	649	274	241	216	91
25	72	111	93	43	28	1,020	648	683	258	214	206	87
26	69	108	90	43	27	974	598	689	244	511	200	88
27	81	102	99	49	27	909	551	681	247	730	195	90
28	105	133	93	41	29	812	516	669	371	742	186	88
29	155	170	96	32	30	747	495	677	295	572	177	86
30	165	158	96	41	-----	710	476	715	256	473	166	84
31	236	-----	88	46	-----	653	-----	721	-----	531	157	-----
TOTAL	2,145	5,532	3,567	1,955	942	15,912	16,452	14,394	12,209	8,799	8,080	3,358
MEAN	69.2	184	115	63.1	32.5	513	548	464	407	284	261	112
MAX	236	369	165	88	42	1,240	780	721	718	742	462	153
MIN	32	72	88	32	23	26	371	293	244	166	157	84
CFSM	.08	.20	.13	.07	.04	.57	.61	.51	.45	.31	.29	.12
IN.	.09	.23	.15	.08	.04	.65	.68	.59	.50	.36	.33	.14
AC-FT	4,250	10,970	7,080	3,880	1,870	31,560	32,630	28,550	24,220	17,450	16,030	6,660
CAL YR 1971	TOTAL 37,395	MEAN 102	MAX 567	MIN 14	CFSM .11	IN 1.54	AC-FT 74,170					
WTR YR 1972	TOTAL 93,345	MEAN 255	MAX 1,240	MIN 23	CFSM .28	IN 3.84	AC-FT 185,100					

PEAK DISCHARGE (BASE, 200 CFS)

DATE	TIME	G. H.	DISCHARGE	DATE	TIME	G. H.	DISCHARGE
11- 1	1315	5.94	384	5-31	0515	6.63	732
11- 9	1715	5.49	226	6-28	0530	6.03	422
11-21	0830	5.73	313	7- 8	1915	5.62	271
3-22	2245	7.65	1,290	7-14	0130	5.62	271
4-14	1500	6.78	814	7-22	1815	5.94	388
4-24	0400	6.59	710	7-27	2400	6.71	786
5-15	0545	6.11	450				

05300000 Lac qui Parle River near Lac qui Parle, Minn.

LOCATION.--Lat^o44 59'42", long 95°55'09", in SW¹/₄SW¹/₄ 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.--41 years (1912-13, 1931-32, 1933-72), 125 cfs (1.73 inches per year, 90,560 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 4,090 cfs June 1 (gage height, 11.08 ft); minimum discharge 6.2 cfs Oct. 8 (gage height, 0.48 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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP		
1	6.7	176	243	41	12	13	317	564	4,030	156	220	50		
2	8.5	210	235	38	12	14	294	666	3,600	146	200	44		
3	7.9	180	225	35	12	14	278	1,060	3,040	136	200	41		
4	7.3	169	212	34	12	14	260	1,410	2,410	125	200	37		
5	7.1	160	200	33	12	14	251	1,350	1,900	115	184	36		
6	7.1	150	190	32	12	14	241	1,100	1,580	107	178	35		
7	7.1	129	170	31	12	15	241	977	1,320	105	168	34		
8	6.4	144	160	30	12	15	234	861	1,100	113	160	30		
9	7.9	125	140	27	12	16	227	764	901	121	157	30		
10	8.2	120	130	25	12	18	226	671	742	131	148	29		
11	7.9	109	115	21	12	35	226	593	617	146	136	30		
12	11	102	110	19	12	93	305	533	523	150	134	30		
13	8.7	98	100	16	12	320	589	518	457	129	128	28		
14	7.5	95	93	14	12	580	1,000	572	444	118	122	28		
15	6.9	91	86	12	12	829	1,200	768	365	112	114	25		
16	10	104	81	11	12	950	987	953	328	107	103	24		
17	21	138	78	11	12	1,160	817	897	305	107	90	23		
18	18	198	76	11	13	1,200	695	739	282	104	79	22		
19	18	308	75	11	13	1,150	616	638	277	98	67	20		
20	17	340	74	11	13	1,050	544	560	275	96	60	20		
21	14	318	72	11	13	980	530	494	282	120	56	18		
22	20	270	71	11	13	928	639	466	286	158	67	17		
23	20	228	70	11	13	885	748	524	278	204	68	16		
24	18	235	67	11	13	774	851	586	253	239	70	15		
25	14	243	66	11	13	641	818	704	232	206	70	15		
26	13	248	60	11	13	565	714	764	215	216	75	15		
27	14	250	57	11	13	489	607	1,200	206	259	74	14		
28	34	250	56	11	13	430	534	1,650	192	248	68	14		
29	61	250	54	12	13	400	509	2,410	175	250	67	12		
30	131	248	50	12	-----	366	513	3,090	165	221	62	10		
31	154	-----	45	12	-----	344	-----	3,650	-----	217	56	-----		
TOTAL	693.2	5,686	3,461	587	360	14,316	16,011	31,732	26,780	4,760	3,581	762		
MEAN	22.4	190	112	18.9	12.4	462	534	1,024	893	154	116	25.4		
MAX	154	340	243	41	13	1,200	1,200	3,650	4,030	259	220	50		
MIN	6.4	91	45	11	12	13	226	466	165	96	56	10		
CFSM	.02	.19	.11	.02	.01	.47	.54	1.04	.91	.16	.12	.03		
IN.	.03	.22	.13	.02	.01	.54	.61	1.20	1.01	.18	.14	.03		
AC-FT	1,370	11,280	6,860	1,160	714	28,400	31,760	62,940	53,120	9,440	7,100	1,510		
CAL YR 1971	TOTAL	53,690.1	MEAN	147	MAX	1,520	MIN	6.4	CFSM	.15	IN	2.03	AC-FT	106,500
WTR YR 1972	TOTAL	108,729.2	MEAN	297	MAX	4,030	MIN	6.4	CFSM	.30	IN	4.11	AC-FT	215,700

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 Outlet, 2.4 miles northeast of village of Lac qui Parle, and 3.5 miles west of Watson.

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 since January 1938, and Marsh Lake since Nov. 1, 1939.

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	114	766	1,030	197	251	116	3,680	3,500	7,050	1,600	1,410	792
2	115	1,020	1,110	196	229	118	3,540	3,520	7,840	1,550	1,410	762
3	122	1,510	1,040	196	199	118	3,430	3,520	8,390	1,500	1,220	737
4	119	1,510	883	196	187	118	3,330	3,560	8,100	1,440	1,430	719
5	127	1,480	880	196	184	119	3,250	3,590	7,850	1,380	1,480	624
6	122	1,470	840	196	182	134	3,170	3,680	7,500	1,340	1,560	454
7	264	1,330	800	195	189	187	3,100	3,600	7,020	1,310	1,400	395
8	307	792	770	195	184	198	3,020	3,560	6,570	1,290	1,320	341
9	123	718	740	195	189	206	2,950	3,490	6,110	1,270	1,300	339
10	118	660	710	195	187	205	2,870	3,400	5,600	1,250	1,290	338
11	119	495	690	196	164	200	2,800	3,300	5,180	1,220	1,330	335
12	116	492	660	200	122	201	2,750	3,250	4,650	1,230	1,320	286
13	117	490	640	230	122	356	2,780	3,200	3,820	1,210	1,300	231
14	118	488	610	260	121	858	2,860	3,160	3,340	1,150	1,410	230
15	117	467	590	260	125	1,370	2,990	3,100	3,210	1,020	1,480	228
16	129	490	572	260	122	1,580	3,110	3,090	2,780	1,000	1,440	228
17	139	550	540	263	120	1,670	3,220	3,080	1,690	935	1,390	228
18	138	756	530	264	121	1,940	3,300	3,050	1,770	831	1,320	228
19	161	876	530	256	120	2,400	3,330	3,010	2,180	795	1,260	228
20	281	930	520	247	119	3,210	3,330	2,670	2,220	720	1,200	195
21	495	938	490	249	117	3,760	3,360	2,310	2,120	725	1,160	139
22	598	938	329	240	121	4,020	3,440	2,180	2,070	729	1,140	137
23	805	992	320	246	119	4,220	3,550	1,710	2,010	737	1,080	137
24	788	1,160	320	250	120	4,320	3,690	1,380	1,960	747	1,040	135
25	768	1,250	315	255	119	4,420	3,770	1,560	1,910	756	1,000	135
26	759	1,250	315	255	119	4,470	3,810	1,760	1,840	849	976	132
27	802	1,250	310	255	118	4,410	3,820	2,200	1,800	1,080	936	133
28	778	1,240	280	255	118	4,300	3,770	2,950	1,780	1,150	904	130
29	759	1,220	210	255	118	4,140	3,690	3,970	1,710	1,260	867	131
30	759	1,160	200	255	-----	3,980	3,600	4,930	1,660	1,300	825	129
31	771	-----	198	254	-----	3,830	-----	6,180	-----	1,310	823	-----
TOTAL	11,048	28,710	17,972	7,162	4,306	61,174	99,310	97,460	121,730	34,684	38,021	9,256
MEAN	306	957	580	231	148	1,973	3,310	3,144	4,058	1,119	1,226	309
MAX	805	1,510	1,110	264	251	4,470	3,820	6,180	8,390	1,600	1,560	7

05304500 Chippewa River near Milan, Minn.

LOCATION.--Lat 45°06'39", long 95°47'57", in SE¹/₄SE¹/₄ 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.--35 years, 265 cfs (1.92 inches per year, 192,000 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 3,520 cfs Mar. 21 (gage height, 7.86 ft); minimum discharge, 74 cfs Oct. 8 (gage height, 1.59 ft); minimum gage height, 1.59 ft Oct. 8, 9, 10, 12, 14, and 15.
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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	85	853	556	300	95	78	1,320	1,620	2,310	704	2,150	611
2	91	783	550	292	94	78	1,290	1,760	2,150	654	1,820	598
3	85	722	550	282	93	78	1,280	1,760	2,010	624	1,590	585
4	83	682	548	278	91	79	1,230	1,640	1,900	592	1,430	574
5	83	651	547	269	89	80	1,220	1,550	1,790	565	1,290	562
6	80	556	546	262	88	81	1,210	1,500	1,700	533	1,220	556
7	77	396	542	260	87	85	1,190	1,460	1,610	502	1,180	541
8	75	1,000	541	258	86	90	1,180	1,400	1,550	547	1,150	525
9	78	954	540	252	85	98	1,180	1,350	1,470	606	1,110	515
10	78	797	540	250	84	110	1,170	1,300	1,390	568	1,020	510
11	78	516	539	240	83	128	1,170	1,250	1,320	520	952	505
12	78	472	538	229	82	148	1,300	1,210	1,260	581	896	489
13	83	459	528	210	81	181	2,010	1,280	1,210	650	846	484
14	79	454	522	200	81	240	1,890	1,490	1,160	610	809	479
15	82	443	513	190	80	320	1,700	1,520	1,090	577	766	465
16	126	477	493	180	79	450	1,630	1,400	1,030	541	728	446
17	189	663	480	172	79	590	1,610	1,320	979	526	690	441
18	225	887	460	165	78	820	1,570	1,250	950	512	663	428
19	236	952	442	157	78	1,290	1,530	1,190	958	495	638	416
20	236	888	428	149	78	1,460	1,480	1,150	1,070	476	608	409
21	221	791	412	141	78	2,970	1,590	1,370	1,110	606	595	395
22	215	650	399	132	78	2,720	2,440	1,940	1,100	801	609	386
23	209	560	383	126	78	1,930	2,430	2,560	996	1,120	611	374
24	208	560	370	120	78	1,760	2,180	2,730	952	1,420	631	362
25	209	562	358	113	78	1,720	2,010	2,400	921	1,160	650	357
26	212	568	349	109	78	1,660	1,890	2,090	883	1,070	667	352
27	242	580	340	104	78	1,580	1,780	1,990	850	3,040	679	343
28	315	577	330	102	78	1,500	1,710	2,250	821	2,680	674	332
29	346	570	320	100	78	1,490	1,670	2,410	852	2,160	654	323
30	410	562	310	98	-----	1,440	1,640	2,550	770	1,890	638	319
31	783	-----	305	97	-----	1,380	-----	2,490	-----	1,910	626	-----
TOTAL	5,597	19,585	14,279	5,337	2,393	26,654	47,500	53,180	38,362	30,140	28,589	13,682
MEAN	181	653	461	198	82.5	860	1,583	1,715	1,279	972	922	456
MAX	783	1,000	556	300	95	2,970	2,440	2,730	2,310	3,040	2,150	611
MIN	75	396	305	97	78	79	1,170	1,150	770	476	595	319
CFSM	110	135	125	112	104	146	185	192	158	152	149	124
IN ₄	1.11	1.39	1.28	1.12	1.05	1.52	1.94	2.06	1.76	1.60	1.57	1.27
AC-FT	11,100	38,850	28,220	11,580	4,750	52,890	94,220	105,500	76,090	59,780	56,710	27,140

CAL YR 1971 TOTAL 125,073 MEAN 343 MAX 1,490 MIN 34 CFSM .18 IN 2.49 AC-FT 248,100
WTR YR 1972 TOTAL 285,908 MEAN 781 MAX 3,040 MIN 75 CFSM .42 IN 5.69 AC-FT 566,900

PEAK DISCHARGE (BASE, 400 CFS)

DATE	TIME	G. H.	DISCHARGE	DATE	TIME	G. H.	DISCHARGE
11-1	0315	3.66	868	4-22	1900	6.70	2,610
11-8	1230	4.71	1,440	5-23	1945	7.05	2,870
11-19	0130	3.87	968	6-21	0415	4.64	1,370
3-21	2215	7.86	3,520	7-13	0430	3.35	663
4-13	1615	5.97	2,140	7-27	1315	7.43	3,120

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.--12 years, 23.9 cfs (2.92 inches per year, 17,320 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 741 cfs May 30 (gage height, 8.47 ft); minimum, 0.05 cfs Oct. 1 (gage heights, 3.00 ft).

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 SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.05	7.7	4.3	2.4	1.2	9.2	23	122	269	12	21	3.7
2	.08	6.7	4.0	2.3	1.2	11	21	380	121	11	17	3.5
3	.15	4.2	3.6	2.3	1.1	13	22	317	104	10	15	3.6
4	.24	3.0	3.3	2.2	.82	16	21	181	81	9.8	13	3.6
5	.35	3.3	3.0	2.2	1.1	20	21	122	68	9.0	11	3.5
6	.22	3.0	2.8	2.2	.72	26	21	98	57	9.5	12	3.5
7	.20	2.4	2.8	2.1	.67	36	21	84	47	12	13	4.1
8	.10	2.6	3.2	2.1	1.1	66	21	67	43	13	11	3.7
9	.15	2.8	2.7	2.0	.72	116	21	55	38	27	10	3.5
10	.17	2.7	2.7	2.0	.72	126	21	51	34	19	9.0	3.3
11	.32	3.3	2.7	2.0	.67	132	24	45	29	15	8.8	3.2
12	.47	2.7	2.7	1.9	.67	133	58	43	26	13	7.8	3.2
13	.52	2.4	2.7	1.9	.77	134	114	71	23	11	7.2	3.7
14	.52	2.3	2.7	1.8	.90	136	73	123	20	10	6.5	4.3
15	.52	2.0	2.7	1.8	1.2	160	59	113	18	9.3	5.6	3.8
16	.57	5.7	2.6	1.8	1.6	279	53	87	16	10	5.0	3.3
17	.62	12	2.6	1.7	1.6	177	43	66	15	10	4.4	2.9
18	1.1	15	2.6	1.7	1.8	142	37	53	14	9.3	4.1	2.7
19	1.5	16	2.6	1.7	1.6	72	36	41	18	8.0	4.0	2.6
20	1.6	16	2.6	1.6	1.6	48	33	34	35	9.8	3.6	2.7
21	1.5	14	2.6	1.6	1.7	63	34	31	30	18	3.3	2.6
22	1.7	12	2.6	1.6	1.9	58	57	29	31	35	3.8	2.8
23	1.8	9.0	2.6	1.6	2.3	54	75	32	26	25	7.6	2.6
24	1.7	4.9	2.5	1.5	3.0	37	78	38	21	19	6.5	2.4
25	1.6	5.1	2.5	1.5	3.7	33	60	40	19	15	5.8	2.2
26	2.0	5.2	2.5	1.5	4.5	33	51	76	16	32	6.0	3.0
27	8.5	5.2	2.5	1.4	5.8	32	45	291	16	40	5.8	3.4
28	17	5.1	2.5	1.4	6.9	25	44	395	16	28	5.1	3.3
29	5.9	5.0	2.4	1.4	7.8	22	50	485	15	23	4.7	3.0
30	16	4.8	2.4	1.4	-----	19	51	708	13	21	4.0	2.8
31	19	-----	2.4	1.3	-----	20	-----	518	-----	21	3.7	-----
TOTAL	86.15	186.1	86.4	55.9	59.36	2,248.2	1,288	4,796	1,279	514.7	245.3	96.5
MEAN	2.78	6.20	2.79	1.80	2.05	72.5	42.9	155	42.6	16.6	7.91	3.22
MAX	19	16	4.3	2.4	7.8	279	114	708	269	40	21	4.3
MIN	.05	2.0	2.4	1.3	.67	9.2	21	29	13	8.0	3.3	2.2
CFSM	.03	.06	.03	.02	.02	.65	.39	1.40	.38	.15	.07	.03
IN.	.03	.06	.03	.02	.02	.75	.43	1.61	.43	.17	.08	.03
AC-FT	171	369	171	111	118	4,460	2,550	9,510	2,540	1,020	487	191

CAL YR 1971 TOTAL 5,555.14 MEAN 15.2 MAX 340 MIN .01 CFSM .14 IN 1.86 AC-FT 11,020
 WTR YR 1972 TOTAL 10,941.61 MEAN 29.9 MAX 708 MIN .05 CFSM .27 IN 3.67 AC-FT 21,700

PEAK DISCHARGE (BASE, 82 CFS)

DATE	TIME	G. H.	DISCHARGE	DATE	TIME	G. H.	DISCHARGE
3-16	0730	7.88	279	5-14	0630	5.36	123
4-13	0730	5.45	132	5-30	0630	8.47	741
5- 2	unknown	7.13	412				

MINNESOTA RIVER BASIN

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.--36 years (1935-38, 1939-72), 108 cfs (2.25 inches per year, 78,250 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 1,880 cfs June 2 (gage height, 6.07 ft); minimum, 3.3 cfs Oct. 1 (gage height, 2.29 ft), minimum gage height, 2.27 ft Sept. 25.
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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.0	62	79	29	10	9.9	172	435	1,770	126	139	21
2	4.6	81	78	27	10	9.9	163	533	1,850	118	141	20
3	5.4	84	77	25	10	9.9	156	929	1,660	109	152	19
4	4.3	74	76	24	10	10	146	1,140	1,340	100	122	18
5	4.0	62	74	22	10	10	139	1,020	1,100	96	101	20
6	3.7	49	74	21	10	10	139	816	892	91	89	19
7	4.0	57	72	20	10	11	137	668	783	88	81	18
8	3.7	50	70	18	10	12	131	575	723	96	80	16
9	3.7	48	70	17	10	14	129	501	592	114	84	15
10	4.2	46	70	16	10	15	125	448	505	141	74	14
11	4.6	45	71	16	10	20	133	406	429	145	68	15
12	4.6	43	71	15	9.9	60	195	378	375	121	63	17
13	5.5	41	71	15	9.9	90	339	412	325	102	58	18
14	5.3	39	70	14	9.9	220	629	466	284	94	53	19
15	5.4	39	69	14	9.9	680	751	568	244	87	48	17
16	5.2	46	67	14	9.9	830	614	619	218	82	38	15
17	5.4	54	65	13	9.9	1,140	509	571	198	80	37	13
18	9.2	79	63	13	9.9	1,160	423	471	186	79	33	15
19	5.6	149	60	12	9.9	909	369	403	189	75	30	13
20	4.4	192	58	12	9.9	700	328	344	189	75	28	12
21	4.3	183	55	12	9.9	588	401	299	216	98	26	12
22	5.0	129	52	12	9.9	538	521	280	242	113	25	11
23	5.4	124	49	12	9.9	558	622	321	229	146	28	9.7
24	5.8	112	46	11	9.9	497	691	321	208	153	28	7.9
25	6.5	108	44	11	9.9	399	700	329	189	126	29	7.7
26	7.1	96	41	11	9.9	340	604	392	170	117	34	12
27	21	70	39	11	9.9	291	498	785	160	112	32	9.8
28	18	74	37	10	9.9	249	428	730	152	206	30	10
29	36	78	34	10	9.9	223	394	1,000	143	199	28	8.6
30	45	79	32	10	-----	205	390	1,410	136	158	26	9.3
31	55	-----	30	10	-----	191	-----	1,540	-----	142	24	-----
TOTAL	305.9	2,393	1,864	477	288.2	9,999.7	10,976	19,110	15,697	3,589	1,829	432.0
MEAN	9.87	79.8	60.1	15.4	9.94	323	366	616	523	116	59.0	14.4
MAX	55	192	79	29	10	1,160	751	1,540	1,850	206	152	21
MIN	3.7	39	30	10	9.9	9.9	125	280	136	75	24	7.7
CF5M	.02	.12	.09	.02	.02	.49	.56	.94	.80	.18	.09	.02
IN.	.02	.14	.11	.03	.02	.57	.63	1.09	.89	.20	.10	.02
AC-FT	607	4,750	3,700	946	572	19,830	21,770	37,900	31,130	7,120	3,630	857
CAL YR 1971	TOTAL 34,552.4	MEAN 94.7	MAX 980	MIN 2.8	CF5M .15	IN 1.97	AC-FT 68,530					
WTR YR 1972	TOTAL 66,960.8	MEAN 183	MAX 1,850	MIN 3.7	CF5M .28	IN 3.81	AC-FT 132,800					

PEAK DISCHARGE (BASE, 300 CFS)

DATE	TIME	G. H.	DISCHARGE	DATE	TIME	G. H.	DISCHARGE
3-18	1615	5.35	1,420	5- 4	0830	5.06	1,160
4-15	0245	4.47	796	5-16	0700	4.21	628
4-25	0230	4.36	718	6- 2	0545	6.07	1,880

05313521 Hawk Creek at Outlet of Eagle Lake near Willmar, Minn.

LOCATION.--Lat 45°10'18", long 95°00'42", SW 1/4 sec. 25, T.120 N., R.35 W., Kandiyohi County, at dam at Outlet of Eagle Lake, 1 mile upstream from Swan Lake and 4.1 miles northeast of Willmar.

PERIOD OF RECORD.--March to September 1972.

GAGE.--Nonrecording gage and concrete dam. Datum of gage is 1,123.19 ft above mean sea level, datum of 1912.

EXTREMES.--Maximum discharge observed during period, 54 cfs Mar. 22, 23 (gage height, 2.07 ft); no flow Mar. 1-10.

REMARKS.--Records good except those below 2 cfs, which are fair.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1						0	27	36	39	5.2	10	2.0
2						0	25	36	38	4.0	34	1.7
3						0	22	34	38	4.0	29	1.4
4						0	20	39	29	2.3	25	.4
5						0	20	27	20	1.7	22	2.3
6						0	14	26	22	1.7	25	3.1
7						0	18	25	20	1.4	18	2.3
8						0	16	21	18	1.7	16	2.0
9						0	14	19	18	3.1	14	2.3
10						0	14	18	9.7	2.3	9.7	1.7
11						2	14	18	6.5	1.7	12	.8
12						5	18	14	7.2	2.0	9.7	1.7
13						8	18	18	7.9	2.3	9.7	1.7
14						12	16	20	7.9	5.8	7.9	1.7
15						16	17	20	5.2	5.2	5.2	1.1
16						20	18	18	3.1	4.0	6.5	.6
17						25	17	18	3.5	6.5	6.5	.4
18						30	16	18	4.0	5.2	5.2	.4
19						35	16	12	11	3.5	5.2	.4
20						42	19	16	12	5.2	3.1	.4
21						52	28	18	12	17	2.3	.2
22						54	32	18	12	18	3.1	.4
23						54	36	17	12	29	2.3	.4
24						52	39	16	9.7	29	2.0	.4
25						48	37	14	5.8	29	4.0	1.4
26						48	33	16	5.2	48	4.0	.2
27						42	29	22	7.2	52	4.0	.2
28						39	27	22	8.8	48	4.0	.2
29						39	32	39	7.9	30	3.5	.2
30						32	37	38	7.2	9.0	2.7	.1
31						29	-----	39	-----	3.5	2.3	-----
TOTAL						684.0	689.0	712.0	407.8	381.3	307.9	32.1
MEAN						22.1	23.0	23.0	13.6	12.3	9.93	1.07
MAX						54	39	39	39	52	34	3.1
MIN						0	14	12	3.1	1.4	2.3	.1
AC-FT						360	1,360	1,410	809	756	611	63.7

MINNESOTA RIVER BASIN

05313560 Eagle Lake tributary No. 7 near Willmar, Minn.

LOCATION.--Lat 45°11'19", long 94°49'11", in NE¼SE¼ sec. 19, T.120 N., R.34 W., Kandihohi County, at culvert on County Highway 5.7 miles northeast of Willmar.

PERIOD OF RECORD.--March to September 1972.

GAGE.--Nonrecording gage and crest-stage gage. Datum of gage is 1,123.18 ft above sea level, datum of 1929.

EXTREMES.--Maximum daily discharge during period, 52 cfs July 26; maximum gage height, 3.98 ft Mar. 17 (back-water from ice); minimum daily discharge, 0.7 cfs Sept. 24, 25.

REMARKS.--Records fair.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1						.7	8.3	13	24	2.1	18	1.8
2						.7	8.3	20	20	1.8	14	1.8
3						.7	8.3	15	17	1.6	12	1.6
4						.8	7.7	13	13	1.4	9.8	1.6
5						.8	6.6	12	9.6	1.4	7.2	1.6
6						1.0	6.4	12	6.9	1.4	6.6	1.8
7						1.5	6.4	11	6.2	1.2	6.3	2.9
8						2.5	6.0	10	6.1	2.4	5.1	2.2
9						3.5	5.8	9.3	5.3	2.5	4.9	1.4
10						3.5	5.9	9.3	4.4	2.2	5.2	1.3
11						2.0	6.4	8.3	4.2	2.4	5.2	1.2
12						3.8	8.6	8.6	3.8	2.5	4.4	1.0
13						6.2	10	11	3.6	2.2	3.7	1.1
14						6.5	12	12	3.0	3.7	2.9	1.0
15						11	10	11	2.4	2.9	2.5	.8
16						27	10	7.0	2.0	2.4	2.5	.8
17						30	8.6	7.4	1.9	5.3	2.2	1.0
18						23	8.3	7.2	2.0	3.6	2.1	1.0
19						17	9.4	5.7	4.2	3.0	2.1	1.4
20						14	10	5.2	9.4	3.0	1.8	1.9
21						40	20	5.8	7.6	6.2	1.5	1.5
22						43	22	7.1	5.3	6.2	1.4	1.2
23						37	24	5.1	4.2	4.0	1.6	1.0
24						27	24	5.7	3.6	22	1.1	.7
25						24	22	8.0	2.9	15	1.2	.7
26						21	19	8.7	2.2	52	1.6	1.1
27						19	18	15	3.3	32	1.4	1.1
28						19	16	18	6.0	28	2.7	1.6
29						12	14	34	4.2	26	2.3	1.8
30						12	14	38	3.2	21	2.0	1.8
31						12	-----	30	-----	20	2.0	-----
TOTAL						422.2	356.0	383.4	191.5	317.4	137.3	41.7
MEAN						13.6	11.9	12.4	6.38	10.2	4.43	1.39
MAX						43	24	38	24	52	18	2.9
MIN						.7	5.8	5.1	1.9	1.2	1.1	.7

05313570 Eagle Lake Tributary No. 8 near Willmar, Minn.

LOCATION.--Lat 45°10'43", long 94°49'43" in NW¼ sec.30, T.120 N., R.34 W., Kandiyohi County, at culvert on County Highway 4.9 miles northeast of Willmar.

PERIOD OF RECORD.--March to September 1972.

GAGE.--Nonrecording gage. Altitude of gage is 1,125 ft (from topographic map).

EXTREMES.--Maximum discharge during period, 14 cfs Mar. 21, 22 (gage height, 9.04 ft); maximum gage height, 9.44 ft Sept. 6 (backwater from sewer construction); no flow for many days.

REMARKS.--Records fair.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1						0	1.9	4.3	6.2	.3	4.1	0
2						0	2.0	4.0	4.9	.3	3.4	0
3						0	2.3	3.9	3.6	.3	3.1	0
4						0	1.9	3.4	2.8	.3	2.6	0
5						0	1.8	3.1	2.3	.2	2.2	0
6						0	1.7	2.8	1.9	.2	2.2	.2
7						0	1.6	2.6	1.6	.1	1.9	.3
8						0	1.5	2.2	1.3	.3	1.8	.2
9						0	1.5	1.9	1.3	.3	1.5	.1
10						.1	1.5	1.6	1.0	.3	1.3	.1
11						.2	1.7	1.5	.8	.3	1.2	.1
12						.2	2.2	1.3	.8	.3	1.1	.1
13						.4	2.2	1.9	.6	.3	.9	.1
14						.6	2.3	2.3	.8	.3	.8	.1
15						1.1	2.1	2.2	.6	.3	.7	.1
16						2.0	1.9	1.9	.3	.3	.6	.1
17						4	1.7	1.6	.3	.5	.4	.1
18						8	1.7	1.4	.3	.3	.4	.1
19						13	1.7	1.2	1.3	.3	.2	.2
20						5.5	1.6	1.1	1.2	.3	0	.3
21						14	4.6	1.9	.8	1.0	0	.3
22						14	5.7	1.7	.7	.7	0	.2
23						9.1	6.6	3.1	.5	2.6	0	.2
24						6.6	7.0	2.3	.4	2.3	0	.1
25						4.9	6.2	1.7	.3	2.1	0	.1
26						4.6	5.5	1.8	.3	7.6	0	.1
27						3.6	4.3	2.6	.3	9.1	0	.1
28						3.3	3.8	4.5	.6	8.2	0	.1
29						3.0	3.5	6.6	.4	6.6	0	.1
30						2.6	3.2	7.9	.3	5.3	0	.1
31						1.9	-----	7.3	-----	5.0	0	-----
TOTAL						102.7	87.2	87.6	38.5	56.3	30.4	3.6
MEAN						3.31	2.91	2.83	1.28	1.82	.98	.12
MAX						14	7.0	7.9	6.2	9.1	4.1	.3
MIN						0	1.5	1.1	.3	.1	0	0

MINNESOTA RIVER BASIN

05315000 Redwood River at Marshall, Minn.

LOCATION.--Lat 44 27'05", long 95 47'13", in SE NW $\frac{1}{4}$ 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.--32 years, 48.1 cfs (2.13 inches per year, 34,850 acre-ft per year).

EXTREMES (Combined flow).--Current year: Maximum daily discharge, 668 cfs May 4; minimum daily, .04 cfs Oct. 21, 26.

Period of record: Maximum discharge, 5,590 cfs Apr. 10, 1969; no flow at times.

(River only).--Current year: Maximum discharge, 593 cfs May 4 (gage height, 3.87 ft from crest-stage gage); minimum daily, .04 cfs Oct. 21, 26 (gage height, 0.74 ft)

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, 117 cfs June 2; 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.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.0	12	11	7.6	5.3	4.7	60	137	444	42	51	13
2	1.2	11	11	7.5	5.2	5.0	54	362	213	40	48	12
3	1.6	11	11	7.4	5.1	5.4	52	513	236	38	46	12
4	2.2	11	11	7.4	5.0	6.4	51	668	216	36	46	11
5	2.9	9.1	11	7.3	4.9	7.4	48	463	193	35	39	11
6	2.2	8.9	10	7.2	4.8	9.0	47	350	157	42	44	10
7	1.2	8.5	10	7.2	4.7	11	47	246	135	36	41	8.4
8	.36	8.5	9.8	7.2	4.6	13	51	204	132	84	36	7.6
9	.28	7.9	9.6	7.1	4.5	15	41	166	125	58	34	7.6
10	.15	7.3	9.4	7.0	4.4	17	41	137	118	46	32	7.6
11	.21	7.3	9.2	7.0	4.3	25	43	111	72	41	29	7.6
12	.28	8.5	9.1	7.0	4.2	44	51	111	72	39	28	44
13	.28	9.1	9.0	7.0	4.1	64	60	127	76	36	24	20
14	.82	9.1	8.9	6.9	4.0	91	66	162	62	36	21	16
15	.64	9.8	8.8	6.8	4.0	85	60	164	58	36	19	15
16	.82	264	8.7	6.8	3.9	121	58	141	51	43	17	12
17	1.2	152	8.6	6.7	3.9	123	55	108	47	41	16	8.4
18	.82	35	8.5	6.7	3.9	140	54	88	43	39	14	8.4
19	.07	35	8.4	6.6	3.9	145	51	69	60	39	12	9.2
20	.06	35	8.3	6.6	3.9	163	49	52	59	50	11	8.4
21	.04	30	8.2	6.5	3.9	185	66	41	54	79	10	7.6
22	.05	13	8.1	6.4	3.9	170	98	30	50	82	19	6.9
23	.06	13	8.0	6.3	4.0	150	116	34	49	79	17	8.4
24	.06	13	8.0	6.2	4.0	125	106	44	46	66	19	6.9
25	.06	12	8.0	6.1	4.1	118	91	73	43	82	19	10
26	.04	12	7.9	6.0	4.2	106	81	66	42	65	21	7.6
27	3.2	12	7.8	5.8	4.3	99	72	197	44	65	16	7.6
28	6.7	11	7.8	5.7	4.4	82	75	103	44	65	16	7.6
29	6.2	11	7.8	5.6	4.5	79	81	132	43	64	15	7.6
30	9.5	11	7.6	5.5	-----	69	89	274	41	60	13	6.9
31	12	-----	7.6	5.4	-----	66	-----	331	-----	55	14	-----
TOTAL	56.20	798.0	278.1	206.5	125.9	2,343.9	1,914	5,704	3,025	1,619	787	326.3
MEAN	1.81	26.6	8.97	6.66	4.34	75.6	63.8	184	101	52.2	25.4	10.9
MAX	12	264	11	7.6	5.3	185	116	668	444	84	51	44
MIN	.04	7.3	7.6	5.4	3.9	4.7	41	30	41	35	10	6.9
CFSM	.006	.09	.03	.02	.01	.25	.21	.60	.33	.17	.08	.04
IN.	.007	.10	.03	.03	.02	.28	.23	.69	.37	.20	.10	.04
CAL YR 1971	TOTAL 12,786.90		MEAN 35.0		MAX 440		MIN .04		CFSM .11		IN 1.54	
WTR YR 1972	TOTAL 17,183.90		MEAN 47.0		MAX 668		MIN .04		CFSM .15		IN 2.10	

05316500 Redwood River near Redwood Falls, Minn.

LOCATION.--Lat 44°31'25", long 95°10'20", in SE 1/4 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.--38 years (1911-12, 1935-72), 104 cfs (2.03 inches per year, 75,350 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 1,700 cfs Mar. 18 (gage height, 7.55 ft, backwater from ice); minimum discharge, 3.8 cfs Oct. 12 (gage height, 1.50 ft; minimum gage height, 1.45 ft Nov. 7).
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 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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.8	52	35	14	4.7	4.2	126	470	780	87	78	24
2	6.2	43	34	14	4.6	4.2	118	550	720	83	76	22
3	6.2	38	33	14	4.5	4.2	118	660	660	82	73	21
4	5.9	28	33	13	4.5	4.2	113	720	420	82	70	20
5	5.2	25	32	13	4.4	4.4	112	690	390	83	68	19
6	6.3	28	31	12	4.4	4.7	111	620	400	85	64	20
7	5.7	17	30	12	4.3	5.2	111	540	410	127	54	20
8	5.3	18	29	12	4.2	6.2	107	480	438	109	53	20
9	5.4	18	29	11	4.2	8.6	104	410	201	86	50	18
10	6.2	20	28	11	4.2	10	103	370	140	123	49	16
11	9.7	41	27	10	4.2	12	105	330	125	88	46	16
12	4.4	35	26	10	4.2	14	111	295	110	85	44	16
13	4.6	29	25	9.6	4.2	16	144	300	98	84	42	19
14	5.6	25	25	9.2	4.1	146	184	320	98	86	40	27
15	7.5	24	24	8.6	4.1	265	194	370	100	88	37	30
16	6.2	29	23	8.4	4.1	610	191	385	94	86	34	32
17	6.3	35	22	8.0	4.1	1,240	177	375	83	80	32	26
18	7.4	57	22	7.7	4.1	1,640	162	350	80	75	29	21
19	12	63	21	7.4	4.1	1,290	148	305	80	76	27	18
20	13	65	21	7.1	4.1	580	138	245	83	82	25	18
21	8.9	57	20	6.8	4.1	462	181	200	86	96	23	18
22	8.6	44	20	6.6	4.1	443	378	190	86	180	22	24
23	9.6	34	19	6.3	4.1	355	389	210	87	230	23	21
24	10	36	18	6.0	4.1	316	360	230	87	210	33	17
25	9.8	37	18	5.8	4.1	296	356	240	88	180	34	20
26	12	38	17	5.6	4.2	262	316	270	88	130	36	23
27	14	38	17	5.4	4.2	218	294	340	92	115	36	23
28	19	37	16	5.2	4.2	184	373	295	101	110	35	26
29	43	36	16	5.1	4.2	170	410	360	101	100	30	23
30	33	36	15	4.9	-----	156	440	480	98	90	30	21
31	34	-----	15	4.8	-----	141	-----	640	-----	84	27	-----
TOTAL	335.8	1,083	741	274.5	122.6	8,871.9	6,174	12,240	6,424	3,302	1,320	639
MEAN	10.8	36.1	23.9	8.85	4.23	286	206	395	214	107	42.6	21.3
MAX	43	65	35	14	4.7	1,640	440	720	780	230	78	32
MIN	4.4	17	15	4.8	4.1	4.2	103	190	80	75	22	16
CFSM	.02	.05	.03	.01	.006	.41	.30	.57	.31	.15	.06	.03
IN.	.02	.06	.04	.01	.006	.47	.33	.65	.34	.18	.07	.03
AC-FT	666	2,150	1,470	544	243	17,600	12,250	24,280	12,740	6,550	2,620	1,270

CAL YR 1971 TOTAL 29,663.6 MEAN 81.3 MAX 400 MIN 1.9 CFSM .12 IN 1.58 AC-FT 58,840
WTR YR 1972 TOTAL 41,527.8 MEAN 113 MAX 1,640 MIN 4.1 CFSM .16 IN 2.22 AC-FT 82,370

PEAK DISCHARGE (BASE, 150 CFS)

DATE	TIME	G. H.	DISCHARGE	DATE	TIME	G. H.	DISCHARGE
3-18	0045	7.55	1,700	About 6-1	Unknown	3.70	780
4-22	1630	3.06	417	About 7-23	Unknown	Unknown	230
About 5-4	Unknown	Unknown	About 720				

NOTE.--No gage-height record
Apr. 29 to June 6,
June 11 to July 4,
July 11 to Aug. 20.

MINNESOTA RIVER BASIN

05316770 Minnesota River at New Ulm, Minn.

LOCATION.--Lat 44°19'20", long 94°27'09", in NE 1/4 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.

AVERAGE DISCHARGE.--5 years, 1,985 cfs (2.82 inches per year, 1,438,000 acre-ft).

EXTREMES.--Current year: Maximum discharge, 12,400 cfs June 9 (gage height, 20.56 ft); minimum discharge, 220 cfs Oct. 10; minimum gage heights, 7.20 ft on Oct. 9, 10.

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 period, and periods of no gage-height record, which are fair. Records of water temperatures, conductivity 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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	258	1,320	1,450	682	520	372	6,690	7,940	8,800	4,160	3,090	1,840
2	256	1,360	1,510	682	515	370	6,580	7,850	10,700	3,850	3,040	1,790
3	247	1,350	1,550	682	507	365	6,450	7,930	10,900	3,850	2,990	1,750
4	242	1,360	1,600	682	500	365	6,270	8,150	11,000	3,510	2,970	1,720
5	238	1,470	1,600	682	495	365	6,120	8,320	11,000	3,320	2,960	1,680
6	236	1,630	1,550	682	488	365	6,020	8,380	11,000	3,170	2,900	1,660
7	238	1,680	1,500	680	480	365	5,920	8,450	11,200	3,040	2,830	1,620
8	234	1,680	1,400	665	475	365	5,850	8,360	11,800	2,940	2,810	1,580
9	224	1,600	1,300	660	470	370	5,760	8,180	12,300	2,910	2,780	1,490
10	220	1,470	1,200	650	465	375	5,650	7,970	12,400	2,880	2,730	1,390
11	226	1,320	1,100	640	460	380	5,560	7,790	12,000	2,870	2,670	1,300
12	262	1,240	1,000	635	455	400	5,450	7,600	11,600	2,910	2,610	1,240
13	325	1,210	930	630	450	425	5,320	7,400	10,900	2,930	2,560	1,250
14	300	1,180	900	620	445	450	5,290	7,200	10,500	2,890	2,510	1,250
15	266	1,120	850	610	440	600	5,390	7,000	9,830	2,810	2,460	1,220
16	258	1,130	830	605	435	1,050	5,610	6,800	9,130	2,730	2,420	1,160
17	253	1,220	810	600	430	1,700	5,840	6,600	8,520	2,660	2,390	1,120
18	253	1,430	790	590	425	2,500	6,010	6,600	7,960	2,560	2,360	1,120
19	251	1,600	770	585	420	4,000	6,040	6,600	7,440	2,470	2,310	1,120
20	253	1,680	750	580	415	6,240	5,990	6,600	7,050	2,430	2,270	1,120
21	282	1,810	740	570	410	7,130	5,990	6,500	6,600	2,390	2,210	1,010
22	268	1,920	730	565	405	7,610	5,980	6,400	6,090	2,400	2,140	895
23	290	1,950	720	560	400	7,660	6,110	6,300	5,670	2,490	2,090	885
24	302	1,870	710	555	395	7,690	6,560	6,200	5,340	2,510	2,060	835
25	402	1,770	705	550	390	7,640	7,100	6,300	5,050	2,490	2,040	798
26	545	1,740	700	545	385	7,650	7,680	6,400	4,770	2,540	2,040	808
27	696	1,820	695	540	380	7,500	8,250	6,500	4,520	2,590	2,020	821
28	792	1,830	690	535	375	7,360	8,490	6,500	4,330	2,670	2,010	821
29	851	1,770	690	530	373	7,230	8,420	6,600	4,220	2,790	1,980	798
30	916	1,520	682	525	---	7,020	8,150	6,800	4,230	2,930	1,930	776
31	1,120	---	682	520	---	6,830	---	7,500	---	3,050	1,890	---
TOTAL	11,546	46,050	31,134	18,837	12,803	102,742	190,540	223,720	256,850	89,540	76,090	36,867
MEAN	372	1,535	1,004	608	441	3,314	6,351	7,217	8,562	2,888	2,455	1,229
MAX	1,120	1,950	1,600	682	520	7,690	8,490	8,450	12,400	4,160	3,090	1,840
MIN	220	1,120	682	520	373	365	5,290	6,200	4,220	2,390	1,890	776
CF8M	.04	.16	.11	.06	.05	.35	.67	.76	.90	.30	.26	.13
IN,	.05	.18	.12	.07	.05	.40	.74	.87	1.00	.35	.30	.14
AC-FT	22,900	91,340	61,750	37,360	25,390	203,800	377,900	443,700	509,500	177,600	150,900	73,130
CAL YR 1971 TOTAL	650,153			MEAN 1,781	MAX 8,400	MIN 220	CF8M .19	IN 2.54	AC-FT 1,290,000			
WTR YR 1972 TOTAL	1,096,719			MEAN 2,997	MAX 12,400	MIN 220	CF8M .31	IN 4.28	AC-FT 2,175,000			

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 796.83 ft above mean sea level, datum of 1929 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.--38 years (1911-13, 1935-37, 1938-72), 280 cfs (2.97 inches per year, 202,900 acre-ft per year).

EXTREMES.--Current year: Maximum discharge during year, 3,160 cfs Mar. 17 (gage height, 9.38 ft); minimum daily, 11 cfs, Jan. 22 to Feb. 13; minimum gage height, 1.19 ft Oct. 14-17.

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 period, 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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	24	143	80	34	11	18	362	536	1,270	510	230	64
2	25	127	88	32	11	18	340	760	1,270	400	215	59
3	24	114	96	30	11	18	334	1,230	1,140	338	197	57
4	23	107	100	29	11	19	323	1,560	1,000	284	183	56
5	24	95	98	27	11	19	310	1,470	846	247	174	53
6	22	73	96	26	11	20	312	1,280	707	235	167	58
7	20	67	90	26	11	20	321	1,090	634	220	158	53
8	20	85	86	25	11	20	306	932	1,250	224	149	51
9	20	74	78	25	11	21	292	806	1,140	215	143	49
10	20	72	72	25	11	21	291	721	913	218	139	49
11	19	67	72	23	11	21	290	654	754	277	135	47
12	20	64	72	21	11	40	294	597	667	310	132	53
13	19	62	71	18	11	150	296	574	593	294	125	75
14	18	58	71	16	12	800	293	568	681	288	117	63
15	19	55	70	14	12	1,710	286	650	528	265	108	58
16	19	85	67	14	12	2,160	285	688	445	236	99	54
17	20	105	63	13	12	2,990	284	674	395	227	91	57
18	24	137	59	12	13	2,560	276	632	369	214	83	56
19	22	137	56	12	13	1,900	263	567	362	205	77	57
20	24	163	53	12	14	1,340	259	508	392	226	71	61
21	36	158	52	12	14	1,170	299	482	390	229	69	57
22	35	137	51	11	15	1,080	353	472	369	258	70	53
23	29	128	50	11	15	998	541	436	356	339	66	52
24	29	112	49	11	16	866	750	446	338	338	67	48
25	35	136	47	11	16	722	752	456	314	311	71	65
26	39	137	45	11	16	646	677	475	286	322	79	79
27	60	118	43	11	17	559	588	526	272	260	76	86
28	59	101	41	11	17	487	523	494	262	256	78	85
29	61	92	39	11	17	473	487	510	642	279	76	89
30	96	82	37	11	-----	423	478	718	687	272	73	84
31	139	-----	35	11	-----	391	-----	1,010	-----	253	73	-----
TOTAL	1,044	3,117	2,027	556	374	21,680	11,465	22,522	19,272	8,550	3,591	1,828
MEAN	33.7	104	65.4	17.9	12.9	699	382	727	642	276	116	60.9
MAX	139	163	100	34	17	2,990	752	1,560	1,270	510	230	89
MIN	18	55	35	11	11	18	259	436	262	205	66	47
CF8M	.03	.08	.05	.01	.01	.55	.30	.57	.50	.22	.09	.05
IN.	.03	.09	.06	.02	.01	.63	.33	.65	.56	.25	.10	.05
AC=FT	2,070	6,180	4,020	1,100	742	43,000	22,740	44,670	38,230	16,960	7,120	3,630

CAL YR 1971 TOTAL 119,713 MEAN 328 MAX 5,940 MIN 18 CF8M .26 IN 3.48 AC=FT 237,500
 NTR YR 1972 TOTAL 96,026 MEAN 262 MAX 2,990 MIN 11 CF8M .20 IN 2.79 AC=FT 190,500

MINNESOTA RIVER BASIN

05320000 Blue Earth River near Rapidan, Minn.

LOCATION.--Lat 44°05'44", long 94°06'33", in SE $\frac{1}{4}$ SE $\frac{1}{4}$ 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.--29 years (1939-45, 1949-72), 832 cfs (4.65 inches per year, 602,800 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 9,200 cfs June 9 (gage height, 8.43 ft); minimum, 49 cfs Oct. 11 (gage height, 1.38 ft).

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.

REVISIONS (WATER YEARS).--WSP 895: Drainage area. WSP 1508: 1910.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	74	322	151	135	121	93	622	877	1,470	2,330	983	169
2	90	422	151	130	121	93	591	1,170	1,420	2,080	889	154
3	72	375	165	128	93	94	560	1,920	1,280	1,560	807	147
4	60	308	190	125	93	90	540	2,550	1,160	1,250	735	143
5	57	261	200	121	93	91	518	2,610	1,060	1,070	663	138
6	60	219	200	121	93	93	502	2,370	978	918	614	142
7	55	157	190	121	93	94	493	2,160	902	814	575	144
8	55	162	170	121	93	93	483	1,990	1,700	749	547	147
9	55	192	160	121	94	94	471	1,830	2,240	707	513	154
10	51	201	162	121	94	96	447	1,670	6,010	679	475	160
11	51	184	170	121	94	102	442	1,510	4,630	735	445	152
12	53	168	180	121	94	110	457	1,380	4,120	734	412	159
13	53	162	190	121	94	150	468	1,300	3,280	647	384	185
14	53	157	196	115	94	550	484	1,230	2,520	605	353	171
15	55	152	200	110	94	1,350	483	1,180	2,090	582	325	160
16	54	166	200	115	94	1,780	486	1,130	1,820	672	299	154
17	54	178	195	121	94	2,500	485	1,060	1,580	690	275	144
18	56	209	190	121	92	3,100	466	1,000	1,380	659	253	151
19	55	253	185	121	93	2,700	448	951	1,240	751	235	141
20	60	297	180	121	92	2,550	441	908	1,170	1,160	220	152
21	72	329	175	121	90	2,360	460	911	1,170	1,540	206	155
22	73	317	170	121	88	2,150	529	847	1,590	2,580	190	143
23	72	289	165	121	88	1,820	699	787	1,560	3,040	183	136
24	80	283	162	121	87	1,450	826	776	1,290	2,990	183	135
25	75	281	160	121	90	1,260	868	829	1,100	2,190	183	164
26	73	289	155	121	89	1,130	831	1,050	959	1,730	189	188
27	99	301	150	121	93	1,010	786	961	861	1,490	197	214
28	109	284	148	121	91	890	765	941	798	1,390	195	255
29	124	279	145	121	90	779	753	945	1,120	1,290	192	317
30	183	225	140	121	-----	699	775	1,090	2,050	1,200	183	348
31	240	-----	138	121	-----	654	-----	1,370	-----	1,090	177	-----
TOTAL	2,373	7,422	5,333	3,762	2,729	30,025	17,179	41,303	60,548	39,922	12,080	5,122
MEAN	76.5	247	172	121	94.1	969	573	1,332	2,018	1,288	390	171
MAX	240	422	200	135	121	3,100	868	2,610	2,240	3,040	983	348
MIN	51	152	138	110	87	90	441	776	798	582	177	135
CFSM	.03	.10	.07	.05	.04	.40	.24	.55	.83	.53	.16	.07
IN.	.04	.11	.08	.06	.04	.46	.26	.63	.93	.61	.18	.08
AC-FT	4,710	14,720	10,580	7,460	5,410	59,550	34,070	81,920	120,100	79,190	23,960	10,160

CAL YP 1971 TOTAL 367,070 MEAN 1,006 MAX 8,210 MIN 46 CFSM .41 IN 5.62 AC-FT 728,100
WTR YP 1972 TOTAL 227,798 MEAN 622 MAX 8,240 MIN 51 CFSM .26 IN 3.49 AC-FT 451,800

05320500 Le Sueur River near Rapidan, Minn.

LOCATION.--Lat 44 06'40", long 94 02'28", in SW $\frac{1}{4}$ 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.--29 years, 414 cfs (5.11 inches per year, 299,900 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 2,320 cfs Mar. 18 (gage height, 5.33 ft); maximum gage height, 6.40 ft Mar. 15 (backwater from ice); minimum daily, 16 cfs Jan. 19 to Feb. 11.
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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	46	376	110	48	16	32	481	513	441	148	434	42
2	47	338	143	46	16	34	453	600	390	138	379	40
3	41	298	157	43	16	36	434	761	350	126	334	38
4	38	251	165	40	16	38	411	871	316	108	298	35
5	35	216	166	38	16	41	396	910	286	93	258	35
6	32	186	161	35	16	43	404	852	272	93	230	42
7	29	118	159	33	16	46	407	773	263	97	214	46
8	27	138	129	31	16	49	393	698	260	128	201	42
9	24	143	130	29	16	54	372	635	292	266	188	39
10	22	127	130	27	16	61	370	580	289	310	167	39
11	21	120	130	25	16	70	365	525	280	325	150	39
12	20	114	130	23	17	80	366	477	289	331	136	46
13	19	110	130	21	17	100	372	457	266	304	119	86
14	19	99	130	19	17	350	370	437	260	280	106	93
15	19	91	125	18	17	1,030	362	418	201	252	95	104
16	19	106	118	18	18	1,550	356	400	184	219	84	104
17	19	112	113	17	19	2,000	340	379	169	211	74	91
18	20	154	108	17	19	2,200	331	356	157	224	63	76
19	21	163	100	16	20	2,090	325	334	148	232	56	69
20	20	201	95	16	21	2,000	313	331	145	331	53	71
21	28	213	90	16	22	1,900	343	325	145	625	49	65
22	25	186	86	16	23	1,790	473	298	133	910	45	54
23	26	175	83	16	24	1,560	635	286	111	1,070	43	51
24	26	179	80	16	25	1,280	737	280	108	1,060	43	49
25	25	170	75	16	26	1,020	708	272	119	975	45	72
26	24	179	70	16	27	904	640	272	115	878	49	136
27	49	198	66	16	29	797	580	272	106	731	54	221
28	106	198	62	16	30	686	538	266	106	655	54	350
29	116	201	59	16	31	595	517	272	100	620	56	376
30	152	154	55	16	-----	561	501	434	111	556	51	379
31	390	-----	52	16	-----	517	-----	489	-----	493	46	-----
31	390	-----	52	16	-----	517	-----	489	-----	493	46	-----
TOTAL	1,505	5,314	3,407	736	578	23,554	13,293	14,773	6,412	12,789	4,174	2,930
MEAN	48.5	177	110	23.7	19.9	760	443	477	214	413	135	97.7
MAX	390	376	166	48	31	2,200	737	910	441	1,070	434	379
MIN	19	91	52	16	16	32	313	266	100	93	43	35
CFSM	.04	.16	.10	.02	.02	.69	.40	.43	.19	.38	.12	.09
IN.	.05	.18	.12	.02	.02	.80	.45	.50	.22	.43	.14	.10
AC-FT	2,990	10,840	6,760	1,460	1,150	46,720	26,370	29,200	12,720	25,370	8,280	5,810

CAL YR 1971 TOTAL 180,886 MEAN 496 MAX 5,100 MIN 19 CFSM .45 IN 6.12 AC-FT 358,800
WTR YR 1972 TOTAL 89,465 MEAN 244 MAX 2,200 MIN 16 CFSM .22 IN 3.03 AC-FT 177,500

PEAK DISCHARGE (BASE, 1,300 CFS).--Mar. 18 (1100) 2,320 cfs (5.33 ft).

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: 1902-21.

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.--51 years (1905, 1910-17, 1929-72), 2,671 cfs (2.43 inches per year, 1,935,000 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 20,200 cfs June 9 (gage height, 17.07 ft); minimum, 349 cfs Oct. 1 (gage height, 2.33 ft).

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 1971 TO SEPTEMBER 1972

OAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	471	2,420	2,040	1,000	775	500	8,400	10,300	10,200	7,180	4,970	2,070
2	467	2,690	2,000	990	775	500	8,170	10,500	11,100	6,910	4,780	1,960
3	456	2,630	2,100	980	775	500	7,850	11,200	12,100	6,250	4,560	1,900
4	417	2,460	2,200	975	770	500	7,570	12,300	12,500	5,660	4,390	1,840
5	415	2,380	2,200	972	760	500	7,400	12,800	12,600	5,180	4,260	1,800
6	425	2,490	2,200	970	750	505	7,260	12,900	12,400	4,860	4,150	1,750
7	415	2,440	2,200	965	745	510	7,060	12,700	12,300	4,590	3,940	1,760
8	416	2,450	2,180	960	740	515	6,960	12,500	12,500	4,430	3,860	1,710
9	415	2,570	2,100	955	730	520	6,820	12,200	18,400	4,520	3,760	1,640
10	395	2,410	2,050	950	720	530	6,760	11,400	19,300	4,370	3,640	1,550
11	391	2,190	1,980	945	700	545	6,670	10,900	17,500	4,330	3,530	1,470
12	404	1,980	1,800	940	690	560	6,580	10,400	16,700	4,430	3,410	1,440
13	439	1,870	1,700	930	670	580	6,520	10,000	15,500	4,410	3,300	1,520
14	470	1,820	1,550	900	660	630	6,470	9,680	14,300	4,360	3,210	1,490
15	439	1,760	1,500	860	650	1,000	6,480	9,420	13,300	4,170	3,070	1,440
16	395	1,770	1,400	830	640	1,900	6,560	9,200	12,300	4,050	2,950	1,390
17	375	1,880	1,350	810	620	3,700	6,670	9,000	11,300	4,010	2,860	1,310
18	355	2,230	1,300	800	605	7,000	6,910	8,980	10,500	3,850	2,820	1,240
19	382	2,570	1,250	780	590	10,000	7,060	8,930	9,760	3,700	2,690	1,160
20	362	2,820	1,200	770	580	11,400	7,100	8,840	9,220	4,140	2,610	1,190
21	401	2,950	1,150	760	565	11,700	7,270	8,820	8,750	4,640	2,570	1,200
22	424	2,990	1,100	755	555	11,800	7,570	8,590	8,530	5,720	2,500	1,100
23	416	3,050	1,080	750	545	11,500	7,900	8,330	8,150	6,550	2,420	1,050
24	416	3,020	1,060	745	535	10,900	8,330	8,160	7,510	6,750	2,370	1,030
25	408	2,850	1,040	740	525	10,400	8,740	8,080	7,010	6,050	2,320	1,090
26	531	2,870	1,030	735	520	10,100	9,140	8,210	6,600	5,520	2,330	1,200
27	883	2,900	1,020	730	515	9,800	9,550	8,150	6,270	5,230	2,360	1,240
28	1,150	2,950	1,010	722	510	9,540	9,980	8,120	6,000	5,070	2,320	1,470
29	1,280	2,920	1,000	722	505	9,220	10,300	8,170	5,920	5,080	2,270	1,580
30	1,530	2,530	1,000	730	-----	8,910	10,300	8,540	6,900	5,050	2,190	1,600
31	2,080	-----	1,000	750	-----	8,410	-----	9,310	-----	5,070	2,130	-----
TOTAL	17,823	74,860	47,790	26,421	18,720	154,675	230,350	306,630	335,420	156,130	98,540	44,190
MEAN	575	2,495	1,542	852	646	4,990	7,678	9,891	11,180	5,036	3,179	1,473
MAX	2,080	3,050	2,200	1,000	775	11,800	10,300	12,900	19,300	7,180	4,970	2,070
MIN	355	1,760	1,000	722	505	500	6,470	8,080	5,920	3,700	2,130	1,030
CFSM	.04	.17	.10	.06	.04	.33	.52	.66	.75	.34	.21	.10
IN.	.04	.19	.12	.07	.05	.39	.58	.77	.84	.39	.25	.11
AC-FT	35,350	148,500	94,790	52,410	37,130	306,800	456,900	608,200	665,300	309,700	195,500	87,650
CAL YR 1971	TOTAL 1,317,724	MEAN 3,610	MAX 20,900	MIN 304	CFSM .24	IN 3.29	AC-FT 2,614,000					
WTR YR 1972	TOTAL 1,511,549	MEAN 4,130	MAX 19,300	MIN 355	CFSM .28	IN 3.77	AC-FT 2,998,000					

05330000 Minnesota River near Jordan, Minn.

LOCATION.--Lat 44°41'35", long 93°38'30", in NW 1/4 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.--38 years, 3,399 cfs (2.85 inches per year, 2,463,000 acre-ft).

EXTREMES.--Current year: Maximum daily discharge, 16,800 cfs June 14 (gage height, 21.48 ft); minimum, 545 cfs Oct. 12, 14 (gage height, 4.37 ft).

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

REVISIONS (WATER YEARS).--WSP 955: Drainage area. WSP 1508: 1935.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	626	3,720	3,510	1,390	850	610	11,300	11,800	10,100	7,020	6,330	2,610
2	626	3,870	3,000	1,380	840	610	10,600	12,100	10,600	7,430	6,130	2,540
3	677	3,840	2,890	1,370	830	610	10,100	12,500	11,200	7,340	5,850	2,480
4	669	3,770	3,170	1,360	820	610	9,820	12,600	11,600	6,780	5,500	2,430
5	641	3,600	3,430	1,350	810	615	9,470	12,800	12,100	6,150	5,180	2,390
6	604	3,420	3,570	1,340	800	615	9,270	13,100	12,400	5,670	4,960	2,350
7	589	3,310	3,620	1,330	780	620	9,100	13,400	12,800	5,360	4,780	2,350
8	583	3,300	3,610	1,320	770	620	8,890	13,500	13,000	5,090	4,620	2,310
9	577	3,300	3,280	1,310	760	620	8,690	13,600	13,100	5,090	4,470	2,240
10	566	3,320	2,710	1,300	750	620	8,470	13,400	13,200	5,150	4,360	2,170
11	560	3,240	2,400	1,280	740	625	8,380	13,200	13,900	4,960	4,250	2,100
12	548	3,030	2,200	1,190	730	630	8,320	12,800	15,000	4,870	4,110	2,010
13	553	2,890	2,100	1,120	730	650	8,260	12,300	16,200	4,890	3,960	2,000
14	554	2,740	2,000	1,070	720	700	8,240	11,800	16,800	4,860	3,830	2,060
15	601	2,600	1,900	1,050	710	760	8,240	11,200	16,800	4,780	3,700	2,060
16	646	2,590	1,850	1,030	700	1,100	8,220	10,800	16,300	4,640	3,570	1,980
17	637	2,730	1,800	1,020	690	2,100	8,260	10,300	15,700	4,570	3,440	1,920
18	609	3,500	1,750	1,000	680	4,000	8,390	10,000	14,900	4,530	3,330	1,840
19	611	4,230	1,700	990	670	7,200	8,520	9,780	13,900	4,370	3,240	1,750
20	598	4,350	1,680	980	660	14,000	8,630	9,650	12,900	4,300	3,200	1,710
21	647	4,270	1,640	970	650	16,200	8,740	9,510	11,700	4,540	3,140	1,690
22	660	4,170	1,610	960	640	16,600	9,420	9,430	10,600	4,950	3,090	1,680
23	678	4,180	1,580	950	640	16,400	10,300	9,240	9,780	5,770	2,970	1,620
24	696	4,170	1,560	940	630	16,200	10,600	9,090	9,220	6,690	2,900	1,550
25	694	4,140	1,530	930	620	15,700	10,700	9,370	8,520	7,130	2,860	1,530
26	691	4,060	1,500	920	620	15,200	10,700	9,410	7,860	7,490	2,860	1,500
27	771	3,980	1,480	910	620	14,500	10,900	9,320	7,300	7,760	2,850	1,760
28	1,000	3,960	1,460	900	610	13,700	11,000	9,190	6,940	7,490	2,830	1,800
29	1,510	3,950	1,440	890	610	13,000	11,300	9,120	6,620	7,100	2,780	1,810
30	1,780	3,760	1,420	880	-----	12,400	11,600	9,290	6,440	6,770	2,730	1,930
31	2,570	-----	1,400	870	-----	11,800	-----	9,640	-----	6,530	2,680	-----
TOTAL	23,772	107,990	68,790	34,300	20,680	199,615	284,430	343,240	357,480	180,070	120,500	60,170
MEAN	767	3,600	2,219	1,106	713	6,439	9,481	11,070	11,920	5,809	3,887	2,006
MAX	2,570	4,350	3,620	1,390	850	16,600	11,600	13,600	16,800	7,760	6,330	2,610
MIN	548	2,590	1,400	870	610	610	8,220	9,090	6,440	4,300	2,680	1,500
CFSM	.05	.22	.14	.07	.04	.40	.59	.68	.74	.36	.24	.12
IN.	.05	.25	.16	.08	.05	.46	.65	.79	.82	.41	.28	.14
AC-FT	47,150	214,200	136,400	68,030	41,020	395,900	564,200	680,800	709,100	357,200	239,000	119,300
CAL YR 1971	TOTAL 1,687,246	MEAN 4,623	MAX 24,100	MIN 508	CFSM .29	IN 3.87	AC-FT 3,347,000					
WTR YR 1972	TOTAL 1,801,037	MEAN 4,921	MAX 16,800	MIN 548	CFSM .30	IN 4.14	AC-FT 3,572,000					

MINNESOTA RIVER BASIN

152

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.--9 years, 18.4 cfs (13,300 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 204 cfs July 22 (gage height, 3.20 ft); minimum daily, 2.8 cfs Feb. 1; minimum gage height, 1.42 ft on June 7, 11.

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 period of no gage-height record, which are fair.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	26	99	20	17	2.8	13	52	30	50	7.3	18	20
2	29	94	21	17	3.4	13	49	33	49	6.4	14	18
3	27	80	21	15	3.9	13	45	33	36	7.3	10	17
4	28	66	20	17	4.2	13	43	31	24	6.4	7.3	16
5	23	53	20	14	4.6	13	40	28	17	5.8	6.4	15
6	20	44	20	12	4.6	13	37	22	8.8	7.3	8.8	20
7	17	30	19	13	4.6	13	35	16	8.8	7.3	12	16
8	17	25	19	15	4.6	14	32	14	5.8	10	15	18
9	15	26	16	15	4.6	14	31	11	5.3	7.9	15	16
10	14	24	19	16	4.6	14	29	10	4.5	12	11	14
11	12	22	15	16	4.7	15	28	8.8	4.7	12	8.1	14
12	13	19	17	16	4.8	16	27	7.3	4.4	13	7.0	14
13	13	17	14	15	5.0	17	25	9.6	8.8	7.9	6.0	14
14	12	16	15	11	5.6	18	25	7.9	6.4	6.8	5.8	14
15	11	15	16	7.7	6.4	35	24	7.3	4.9	5.5	5.1	16
16	10	25	16	5.0	7.4	94	23	7.3	4.7	7.9	5.1	15
17	10	42	14	7.0	9.0	105	22	8.8	4.4	17	4.7	12
18	17	47	13	8.2	11	112	21	8.8	4.2	6.8	4.8	11
19	19	47	15	8.0	12	115	22	8.1	5.5	7.3	5.3	9.4
20	16	47	15	8.0	13	117	20	5.3	17	23	4.8	11
21	28	41	15	8.0	13	115	34	4.9	13	22	16	8.9
22	24	33	14	8.0	13	110	37	4.7	16	34	8.5	11
23	25	29	15	8.0	13	106	40	5.1	15	50	8.1	11
24	22	27	16	8.2	13	96	42	26	9.6	44	7.3	9.3
25	19	26	16	8.8	13	90	38	28	8.8	40	14	16
26	17	27	15	8.2	13	83	33	47	6.8	69	13	13
27	71	26	15	8.0	13	78	28	57	7.3	56	11	14
28	62	24	15	6.0	13	72	25	60	7.3	49	10	16
29	66	24	15	6.2	13	66	24	72	7.9	41	14	13
30	93	21	16	5.2	-----	62	22	69	7.3	33	21	11
31	102	-----	17	3.6	-----	58	-----	58	-----	25	21	-----
TOTAL	878	1,116	514	331.1	237.8	1,713	953	734.9	367.2	649.9	318.1	423.6
MEAN	28.3	37.2	16.6	10.7	8.20	55.3	31.8	23.7	12.2	21.0	10.3	14.1
MAX	102	99	21	17	13	117	52	72	50	69	21	20
MIN	10	15	13	3.6	2.8	13	20	4.7	4.2	5.5	4.7	8.9
AC-FT	1,740	2,210	1,020	657	472	3,400	1,890	1,460	728	1,290	631	840

CAL YR 1971 TOTAL 8,354.9 MEAN 22.9 MAX 113 MIN 2.2 AC-FT 16,570
 4TR YR 1972 TOTAL 8,236.6 MEAN 22.5 MAX 117 MIN 2.8 AC-FT 16,340

05331000 Mississippi River at St. Paul, Minn.

LOCATION.--Lat 44 56'40", long 93 05'20", in SE 1/4 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, Park 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).--74 years (1894-95, 1896-97, 1900-1972), 10,420 cfs (3.85 inches per year).

EXTREMES.--Current year: Maximum discharge, 51,600 cfs Mar. 27 (gage height, 11.14 ft); minimum daily, 3,850 cfs Oct. 4.

Period of record (1867-70, 1872-1972): Maximum discharge, 171,000 cfs Apr. 16, 1965 (gage height, 26.01 ft, from floodmark).

Period of record (1897, 1917-72): 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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3,960	25,500	19,800	10,800	8,120	7,420	41,800	42,000	29,000	14,500	42,600	20,600
2	4,060	29,100	18,100	11,000	8,120	7,500	39,100	41,300	30,400	14,800	40,100	19,600
3	3,880	30,500	17,600	11,200	8,090	6,790	37,200	40,800	31,000	15,000	37,400	18,700
4	3,850	31,700	17,200	10,100	7,860	6,250	35,500	40,600	31,500	13,900	35,300	18,000
5	4,300	32,300	17,900	9,580	8,020	5,280	34,300	40,700	31,800	13,400	32,900	16,900
6	4,970	31,900	18,400	9,140	8,100	6,400	33,300	40,900	31,700	13,400	31,500	16,500
7	5,330	31,700	18,400	9,280	7,800	7,570	32,400	41,100	31,700	13,200	30,400	16,500
8	5,580	31,400	18,700	9,620	7,560	7,220	31,600	41,500	30,200	11,900	30,600	14,000
9	5,040	30,100	18,200	10,000	7,920	6,940	30,700	41,700	29,500	11,600	31,300	14,000
10	4,680	29,300	14,300	10,000	7,860	6,990	29,900	41,800	28,500	11,300	32,000	13,500
11	5,230	28,600	14,000	9,770	7,960	7,380	28,900	41,400	27,900	11,600	32,000	14,300
12	5,130	26,700	14,200	9,590	7,710	7,440	28,500	40,600	27,200	11,000	30,900	13,100
13	5,220	25,600	13,900	9,750	7,900	7,790	29,000	39,700	26,700	11,100	29,600	12,300
14	5,120	24,100	10,500	9,020	7,530	6,340	29,700	38,500	29,400	11,200	28,000	12,000
15	5,100	23,300	11,800	8,870	7,690	7,880	30,700	37,800	28,500	13,200	27,200	11,900
16	5,270	22,600	13,100	8,550	7,680	8,990	31,900	36,800	28,000	12,900	26,200	11,800
17	6,560	23,400	12,500	8,490	7,620	10,300	33,600	36,100	26,800	12,600	25,000	11,200
18	7,870	25,400	11,000	8,780	7,510	15,500	35,400	35,300	26,800	11,400	23,500	10,800
19	8,980	27,800	9,600	8,790	7,260	19,400	37,200	34,100	25,400	11,200	22,200	11,200
20	8,970	28,300	10,100	8,650	7,090	27,100	38,500	33,000	25,300	11,300	21,400	11,500
21	9,260	28,700	11,200	8,450	7,430	32,700	39,800	32,000	25,000	11,300	21,200	11,000
22	9,980	29,500	11,100	8,280	7,520	36,100	40,700	31,000	24,000	12,900	20,500	11,200
23	9,660	29,400	11,200	8,210	7,110	40,800	41,400	29,800	20,900	23,200	20,000	11,000
24	9,590	28,900	12,200	8,480	6,870	46,100	42,200	29,500	20,500	34,100	19,000	11,200
25	9,830	28,700	10,900	8,510	6,880	48,500	42,600	29,700	19,600	39,600	19,400	11,600
26	10,100	28,500	11,200	8,500	7,070	50,600	42,500	29,400	18,100	44,900	21,300	11,900
27	11,800	26,800	11,000	8,330	7,100	51,400	42,200	29,500	17,200	47,700	22,000	11,600
28	12,300	24,800	10,900	8,160	6,870	51,000	42,200	28,800	16,100	46,600	21,500	11,600
29	14,600	23,600	11,000	8,200	7,220	49,600	42,100	27,900	15,500	47,700	21,300	12,400
30	16,500	21,500	10,700	7,920	-----	47,600	41,900	28,300	14,900	46,700	21,200	11,900
31	19,400	-----	11,200	7,810	-----	44,900	-----	28,400	-----	40,800	20,900	-----
TOTAL	242,120	829,700	421,900	281,830	219,470	687,780	1,086,880	1,109,880	769,100	652,000	838,400	403,600
MEAN	7,810	27,660	13,610	9,091	7,568	22,190	36,230	35,800	25,640	21,030	27,050	13,450
MAX	19,400	32,300	19,800	11,200	8,120	51,400	42,600	42,000	31,800	48,600	42,600	20,600
MIN	3,850	21,500	9,600	7,810	6,870	5,280	28,500	27,900	14,900	11,000	19,000	10,800
(†)	344	335	292	290	312	359	333	355	365	378	377	335
MEAN †	8,154	28,000	13,900	9,381	7,880	22,550	36,560	36,160	26,000	21,410	27,420	13,780
CFSM †	0.22	0.76	0.38	0.25	0.21	0.61	0.99	0.98	0.71	0.58	0.75	0.37
IN. †	0.25	0.85	0.44	0.29	0.23	0.70	1.10	1.13	0.79	0.67	0.86	0.41

CAL YR 1971 TOTAL 5,529,440 MEAN 15,150 MAX 49,500 MIN 2,880 MEAN † 15,490 CFSM † 0.42 IN. † 5.71
WTR YR 1972 TOTAL 7,542,500 MEAN 20,610 MAX 51,400 MIN 3,850 MEAN † 20,950 CFSM † 0.57 IN. † 7.72

† Diversion equivalent in cubic feet per second, through sewage disposal plant.

‡ Adjusted for diversion.

M Expressed in thousands.

ST. CROIX RIVER BASIN

05336700 Kettle River below Sandstone, Minn.

LOCATION.--Lat 46°06'20", long 92°51'50", in NW¼ 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).

AVERAGE DISCHARGE.--5 years, 824 cfs.

EXTREMES.--Current year: Maximum discharge 17,200 cfs July 23 (gage height, 15.38 ft); minimum, 151 cfs Oct. 1, 2 (gage height, 4.07 ft).

Period of record: Maximum discharge, 17,200 cfs July 23, 1972 (gage height, 15.38 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, and periods of no gage-height record, which are poor.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	151	6,610	708	228	167	165	720	2,710	970	393	2,030	1,090
2	157	5,850	755	225	165	165	770	2,920	814	343	1,710	962
3	178	5,140	672	222	164	166	830	3,070	709	318	1,430	868
4	185	4,460	609	218	163	168	880	2,890	616	293	1,200	784
5	192	3,730	607	215	162	170	950	2,700	533	278	986	724
6	200	3,070	585	210	161	171	920	3,340	464	267	899	688
7	192	2,440	566	208	160	175	900	3,620	414	248	1,160	637
8	192	1,960	540	206	160	177	880	3,210	374	234	1,950	602
9	189	1,660	495	204	160	179	860	2,790	343	230	2,830	547
10	182	1,430	447	202	157	182	830	2,410	313	223	2,470	506
11	178	1,260	413	200	155	182	810	2,070	289	230	2,100	513
12	171	1,140	390	197	155	185	780	1,780	278	602	1,710	481
13	168	1,060	370	195	156	185	900	1,540	274	581	1,400	464
14	168	997	360	192	156	186	1,150	1,420	338	475	1,220	464
15	168	989	345	190	157	188	1,700	1,320	450	419	1,190	446
16	316	1,010	330	188	158	195	2,400	1,230	620	361	1,080	429
17	483	2,190	315	185	158	198	3,700	1,130	830	330	978	409
18	547	3,700	310	185	158	205	5,500	1,040	1,100	602	2,090	393
19	646	4,080	300	183	159	215	9,200	930	1,400	739	3,970	383
20	770	3,650	290	180	160	227	7,860	837	1,600	962	3,010	1,130
21	830	3,120	285	180	160	250	7,430	2,740	1,450	2,710	2,270	5,980
22	885	2,440	280	179	160	266	6,740	3,340	1,300	8,310	3,510	5,960
23	917	2,100	275	177	160	300	6,110	2,300	1,130	16,400	4,530	4,770
24	877	1,800	265	175	160	340	5,770	1,730	970	15,000	3,990	3,970
25	815	1,430	260	175	161	370	5,340	1,360	840	11,400	3,460	3,240
26	748	1,270	255	174	162	410	4,730	1,120	740	7,870	3,000	2,610
27	1,160	1,130	250	173	162	470	4,190	954	650	5,570	2,440	2,070
28	4,100	1,030	245	170	163	530	3,730	814	570	4,250	1,990	1,650
29	5,090	893	240	169	164	580	3,320	791	490	3,770	1,660	1,420
30	4,750	770	236	168	-----	620	2,960	1,040	440	3,090	1,420	1,180
31	5,630	-----	232	168	-----	680	-----	1,110	-----	2,450	1,220	-----
TOTAL	31,235	72,409	12,230	5,941	4,643	8,500	92,860	60,256	21,309	88,948	64,903	45,370
MEAN	1,008	2,414	395	192	160	274	3,095	1,944	710	2,869	2,094	1,512
MAX	5,630	6,610	755	228	167	680	9,200	3,620	1,600	16,400	4,530	5,980
MIN	151	770	232	168	155	165	720	791	274	223	899	383

CAL YR 1971 TOTAL 318,843 MEAN 874 MAX 11,400 MIN 62
WTR YR 1972 TOTAL 508,604 MEAN 1,390 MAX 16,400 MIN 151

NOTE.--No gage-height record Mar. 20 to Apr. 19, June 15-30.

ST. CROIX RIVER BASIN

155

05338500 Snake River near Pine City, Minn.

LOCATION.--Lat 45°50'30", long 92°56'00", in SE 1/4 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.--25 years, 594 cfs (8.42 inches per year).

EXTREMES.--Current year: Maximum discharge, 14,300 cfs July 27 (gage height, 10.38 ft); minimum, 88 cfs Oct. 12 (gage height, 3.00 ft).

Period of record: Maximum discharge 14,300 cfs July 27, 1972 (gage height, 10.38 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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	127	2,820	895	210	155	160	2,530	2,390	1,030	310	7,050	817
2	137	3,270	817	205	155	160	2,270	2,240	1,070	293	5,760	697
3	142	3,700	789	200	155	160	2,110	2,080	1,030	275	4,540	610
4	137	3,960	751	195	150	160	1,910	2,000	935	264	3,400	538
5	122	4,090	706	190	145	160	1,700	1,930	817	246	2,700	478
6	107	3,940	653	185	145	160	1,550	1,910	706	218	2,340	457
7	102	3,490	602	180	140	160	1,450	1,850	611	207	2,170	422
8	117	3,040	569	175	140	160	1,420	1,860	538	207	2,030	402
9	107	2,640	530	175	140	160	1,360	1,870	429	224	2,000	364
10	112	2,260	485	175	135	160	1,330	1,840	390	218	2,010	352
11	112	1,920	449	175	140	165	1,280	1,750	352	224	2,060	352
12	107	1,610	416	175	145	169	1,340	1,620	328	230	2,030	334
13	142	1,340	390	170	150	169	1,580	1,500	304	202	1,910	340
14	147	1,160	377	170	150	174	1,870	1,350	322	281	1,770	322
15	137	1,030	365	165	150	185	2,200	1,210	293	287	1,560	304
16	164	966	350	160	150	191	2,490	1,120	298	287	1,400	293
17	218	1,120	340	165	155	218	2,750	1,030	328	293	1,250	264
18	310	1,450	325	165	155	235	3,060	945	352	304	1,130	246
19	457	1,860	315	160	155	264	3,490	855	409	285	986	235
20	554	2,260	305	160	155	334	3,960	770	478	304	935	310
21	733	2,540	295	160	155	688	4,330	724	485	364	1,020	428
22	836	2,700	285	155	155	1,160	4,660	688	546	798	1,080	538
23	875	2,670	275	155	155	1,730	4,690	715	594	2,260	1,160	779
24	875	2,640	270	155	155	2,260	4,520	751	594	4,810	1,280	895
25	836	2,470	255	150	155	2,690	4,280	798	562	8,660	1,360	895
26	789	2,220	250	150	155	3,060	3,970	789	493	12,600	1,450	855
27	945	1,960	240	150	160	3,240	3,630	789	442	14,200	1,480	751
28	1,090	1,690	230	150	160	3,220	3,270	779	409	13,700	1,400	706
29	1,440	1,370	220	150	160	3,120	2,940	817	370	12,300	1,250	636
30	1,950	1,100	215	150	-----	3,010	2,640	846	346	10,300	1,090	562
31	2,500	-----	210	150	-----	2,810	-----	935	-----	8,370	955	-----
TOTAL	16,427	69,286	13,174	5,230	4,375	30,692	80,580	40,751	15,861	93,521	62,556	15,182
MEAN	530	2,310	425	169	151	990	2,686	1,315	529	3,017	2,018	506
MAX	2,500	4,090	895	210	160	3,240	4,690	2,390	1,070	14,200	7,050	895
MIN	102	966	210	150	135	160	1,280	688	293	202	935	235
CFSM	.55	2.41	.44	.18	.16	1.03	2.80	1.37	.55	3.15	2.11	.53
IN.	.64	2.69	.51	.20	.17	1.19	3.13	1.58	.62	3.63	2.43	.59

CAL YR 1971 TOTAL 276,270 MEAN 757 MAX 6,510 MIN 57 CFSM .79 IN 10.73
WTR YR 1972 TOTAL 447,635 MEAN 1,223 MAX 14,200 MIN 102 CFSM 1.28 IN 17.38

ST. CROIX RIVER BASIN

05340050 Sunrise River near Lindstrom, Minn.

LOCATION.--Lat 45°27'00", long 92°53'10", in SW 1/4 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.--7 years, 85.7 cfs (62,090 acre-ft per year).

EXTREMES.--Current year: Maximum discharge, 234 cfs Apr. 23 (gage height, 5.37 ft); maximum gage height exceeded 5.42 ft Dec. 17-20, 27-30; minimum daily, 9.0 cfs Oct. 7, 8, 9.

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 and periods of no gage-height record, which are poor. 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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	18	192	178	93	35	39	174	205	94	53	131	84
2	22	196	169	91	35	39	172	210	90	50	130	81
3	19	204	166	89	35	39	171	206	86	50	127	80
4	16	207	162	86	35	39	171	200	81	48	123	78
5	14	211	160	82	35	40	171	195	79	46	121	76
6	12	219	158	78	35	40	171	193	76	44	123	80
7	9.0	219	156	76	35	41	171	186	73	43	130	80
8	9.0	215	154	75	35	42	171	178	60	46	141	77
9	9.0	211	151	73	35	42	171	172	55	48	134	76
10	10	204	148	72	35	43	171	167	54	45	125	76
11	10	198	142	71	35	43	171	163	54	44	118	78
12	10	190	138	70	35	45	171	156	56	44	110	77
13	11	182	132	68	35	47	171	153	57	42	104	78
14	11	174	129	61	35	49	173	148	69	50	100	76
15	11	169	125	57	35	53	178	145	60	48	96	75
16	11	168	122	55	35	62	181	140	56	46	93	72
17	11	183	120	52	36	66	186	137	55	51	87	69
18	12	202	118	50	36	73	190	131	54	51	83	67
19	16	207	117	48	36	79	195	127	55	49	80	66
20	16	204	117	46	36	99	200	121	65	51	77	73
21	17	196	116	44	37	115	212	116	79	59	82	75
22	21	190	115	43	37	130	225	113	105	94	78	71
23	20	191	113	42	37	140	234	108	95	191	74	68
24	20	193	110	40	37	153	231	103	84	173	74	67
25	22	192	108	39	37	170	227	102	76	151	74	69
26	23	191	107	38	38	180	226	98	70	147	90	76
27	47	193	104	37	38	182	221	94	66	144	93	76
28	85	190	102	37	38	181	216	91	62	141	89	78
29	105	188	100	36	38	179	209	104	60	139	87	79
30	136	190	99	36	-----	178	203	103	56	138	86	78
31	184	-----	96	35	-----	177	-----	98	-----	135	85	-----
TOTAL	937.0	5,869	4,032	1,820	1,041	2,805	5,734	4,463	2,082	2,461	3,145	2,256
MEAN	30.2	196	130	58.7	35.9	90.5	191	144	69.4	79.4	101	75.2
MAX	184	219	178	93	38	182	234	210	105	191	141	84
MIN	9.0	168	96	35	25	39	171	91	54	42	74	66
AC-FT	1,860	11,640	8,000	3,610	2,060	5,560	11,370	8,850	4,130	4,880	6,240	4,470

CAL YR 1971 TOTAL 37,339.3 MEAN 102 MAX 361 MIN 8.1 AC-FT 74,060
WTR YR 1972 TOTAL 36,645.0 MEAN 100 MAX 234 MIN 9.0 AC-FT 72,690

NOTE.--No gage-height record Oct. 1-26, Dec. 17-20, 27-30, Mar. 21 to Apr. 20.

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 689.94 ft above mean sea level. 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.--70 years, 4,144 cfs (9.49 inches per year).

EXTREMES.--Current year: Maximum discharge, 43,700 cfs July 25 (gage height, 20.09 ft); minimum daily, 2,110 cfs Mar. 7.

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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2,520	20,700	4,920	3,030	2,540	2,690	8,770	12,800	7,650	4,110	19,400	6,020
2	2,450	22,300	3,940	3,130	2,490	2,320	8,420	12,500	7,410	3,570	16,200	6,200
3	3,110	22,100	4,850	2,900	2,740	2,560	8,460	13,100	6,900	3,420	13,900	5,040
4	4,010	20,300	5,020	2,740	2,590	2,480	8,340	13,600	5,140	2,430	11,700	4,760
5	3,440	18,000	4,730	3,190	2,660	2,430	7,820	13,400	5,210	3,190	9,870	4,300
6	3,510	15,900	5,000	2,820	2,190	2,520	7,500	13,000	4,360	2,850	9,320	4,520
7	3,390	13,500	5,530	2,980	2,890	2,110	7,490	13,500	3,650	2,920	8,150	3,690
8	3,360	11,600	5,340	2,950	2,700	2,530	7,450	14,400	3,680	2,600	7,880	4,360
9	3,170	10,200	4,720	2,990	2,400	2,350	6,760	13,900	3,420	2,620	9,530	4,040
10	2,820	10,300	3,790	3,000	2,610	2,380	7,080	12,800	2,520	3,330	9,910	3,920
11	2,820	8,890	3,990	3,060	2,240	2,380	6,980	12,400	2,490	2,600	9,710	3,910
12	3,250	6,160	2,730	2,870	2,720	2,460	7,220	9,570	3,250	2,310	9,100	3,730
13	2,740	6,630	2,620	2,830	2,480	2,500	8,000	7,680	2,660	2,440	8,170	3,650
14	2,680	6,430	2,420	2,800	2,510	2,550	11,300	8,030	2,850	3,910	7,660	3,750
15	2,950	6,120	2,630	2,660	2,820	2,590	12,400	7,800	3,570	2,740	7,460	3,350
16	2,300	6,150	2,950	2,610	2,430	2,860	13,900	7,600	2,780	3,230	6,850	3,580
17	3,080	7,200	2,850	2,930	2,620	3,040	17,000	7,320	3,500	3,340	6,740	3,160
18	4,700	10,700	3,320	2,460	2,510	3,200	21,400	6,110	3,050	2,750	6,510	3,130
19	5,640	14,100	3,290	2,630	2,590	3,840	25,300	5,340	3,330	2,840	8,140	3,300
20	5,710	15,500	3,160	2,650	2,320	3,860	26,500	5,460	4,510	3,340	12,400	2,960
21	6,300	15,500	3,390	2,860	2,600	6,800	26,300	5,240	5,610	3,700	12,500	4,420
22	7,320	13,900	3,290	2,760	2,730	7,940	25,400	4,270	7,120	8,790	9,950	9,990
23	7,380	12,400	3,500	2,510	2,520	9,030	24,700	7,680	7,380	24,600	9,390	12,200
24	7,290	11,800	3,430	2,820	2,510	9,750	23,500	6,970	5,530	36,900	9,460	10,900
25	6,730	10,700	3,590	2,700	2,450	10,800	22,200	6,230	4,990	42,500	10,500	9,500
26	6,170	9,390	3,270	2,640	2,550	11,200	20,800	5,590	4,210	42,400	9,950	8,240
27	6,870	8,870	3,380	2,630	2,430	10,900	19,100	4,910	3,860	38,800	9,630	7,170
28	7,390	8,190	3,020	2,670	2,530	10,800	17,100	4,810	4,180	34,400	8,530	6,530
29	13,100	7,440	2,980	2,650	2,580	10,600	15,400	4,540	4,000	30,000	7,960	5,740
30	16,800	6,300	3,110	2,560	-----	9,850	14,000	6,080	4,300	26,500	7,300	5,510
31	19,400	-----	3,210	2,650	-----	9,480	-----	6,830	-----	23,200	6,260	-----
TOTAL	172,400	357,270	113,970	86,680	73,950	160,800	436,590	273,460	133,110	372,330	299,830	161,570
MEAN	5,561	11,910	3,676	2,796	2,550	5,187	14,550	8,821	4,437	12,010	9,672	5,386
MAX	19,400	22,300	5,530	3,190	2,890	11,200	26,500	14,400	7,650	42,500	19,400	12,200
MIN	2,300	6,120	2,420	2,460	2,190	2,110	6,760	4,270	2,490	2,310	6,260	2,960
CFSM	.94	2.01	.62	.47	.43	.87	2.45	1.49	.75	2.03	1.63	.91
IN.	1.08	2.24	.71	.54	.46	1.01	2.74	1.72	.84	2.34	1.88	1.01
CAL YR 1971	TOTAL 1,970,750		MEAN 5,399		MAX 34,100		MIN 1,730		CFSM .91		IN 12.36	
WTR YR 1972	TOTAL 2,641,960		MEAN 7,218		MAX 42,500		MIN 2,110		CFSM 1.22		IN 16.57	

MISSISSIPPI RIVER MAIN STEM

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 650.00 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, 19.27 ft higher; Oct. 1, 1929, to Sept. 30, 1930, 17.68 ft higher; Oct. 1, 1930, to Aug. 1, 1932, 19.28 ft higher. Aug. 2, 1932, to Oct. 30, 1938, water-stage recorder at present site at datum 19.28 ft higher; Nov. 1, 1938, to Sept. 7, 1971, water-stage recorder at present site at datum 50.00 ft lower.

AVERAGE DISCHARGE.--44 years, 16,010 cfs (4.85 inches per year).

EXTREMES.--Current year: Maximum discharge, 95,500 cfs July 28 (gage height, 35.11 ft); minimum daily, 7,800 cfs Mar. 6; minimum gage height, 24.56 ft Mar. 7.

Period of record: Maximum discharge, 228,000 cfs Apr. 18, 1965 (gage height, 43.11 ft); minimum daily, 1,380 cfs July 13, 1940; minimum gage height, 15.08 ft Aug. 29, 1934, present datum.

REMARKS.--Records good except those 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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8,630	38,600	30,300	13,900	11,100	10,500	56,700	58,600	36,200	22,200	74,500	31,500
2	10,000	44,900	27,500	14,100	11,100	11,100	53,300	58,000	37,500	21,100	68,200	30,300
3	9,930	49,000	26,400	14,000	10,800	10,600	50,400	55,900	38,700	20,700	61,700	28,600
4	8,800	51,500	26,000	12,800	10,900	10,000	47,700	55,600	38,400	20,300	56,000	28,000
5	8,610	52,500	25,500	12,000	11,100	10,100	45,700	55,200	38,100	19,700	51,000	26,900
6	9,820	52,300	26,300	12,900	11,000	7,800	44,500	55,500	38,200	18,000	47,000	25,900
7	10,900	49,100	26,600	12,200	10,900	9,300	42,300	55,300	37,600	17,000	43,900	25,800
8	10,700	46,500	26,800	12,500	10,700	9,400	40,900	55,400	36,800	15,500	42,300	25,000
9	9,730	44,400	26,900	13,300	10,600	10,300	39,600	56,000	35,800	14,100	40,600	23,400
10	8,900	41,700	25,600	13,300	10,500	10,800	38,700	56,800	34,500	14,000	40,700	20,500
11	8,050	40,300	23,000	13,200	10,500	10,400	37,400	56,100	33,100	14,200	41,800	20,500
12	9,020	38,200	19,400	12,800	10,500	10,300	36,700	54,800	32,700	14,800	41,800	20,400
13	9,020	35,600	16,000	12,700	10,500	10,200	36,700	52,900	32,700	14,200	40,500	20,100
14	9,810	33,700	15,000	11,900	10,500	12,400	37,500	50,300	32,700	13,800	39,400	18,700
15	9,570	32,900	13,500	12,100	10,000	12,500	39,400	48,100	33,000	15,000	37,600	17,500
16	9,860	31,800	14,600	11,700	10,400	13,200	41,600	46,900	33,100	15,600	36,600	16,500
17	9,810	31,600	13,400	11,600	10,300	16,700	44,100	45,500	33,000	17,100	36,000	16,200
18	10,700	32,700	12,400	11,900	10,900	21,900	48,800	44,200	32,600	17,900	34,500	15,400
19	12,900	35,100	11,600	11,900	10,600	24,500	55,300	42,800	32,200	17,300	33,300	14,700
20	15,300	38,800	12,600	11,600	10,100	28,400	60,800	41,000	32,500	16,900	32,600	15,900
21	15,500	40,900	13,400	11,800	10,100	33,700	65,600	39,900	32,300	17,200	33,900	17,000
22	16,000	41,800	14,500	11,500	10,400	39,200	67,300	38,300	32,500	18,100	35,400	15,900
23	16,400	42,200	14,400	11,700	10,300	44,300	67,500	37,300	32,000	25,600	34,700	19,500
24	16,100	41,500	16,700	11,500	10,000	50,700	67,700	37,700	31,200	40,800	33,100	24,700
25	16,000	40,400	17,400	11,300	9,800	56,900	67,400	37,900	30,000	62,900	32,600	25,400
26	16,300	40,000	15,300	11,100	9,800	61,000	66,700	37,500	28,400	81,500	33,600	25,200
27	18,100	38,500	14,900	11,200	9,800	64,000	65,300	36,400	26,600	91,600	34,200	24,300
28	22,200	36,500	13,000	11,100	9,800	64,700	63,600	35,800	25,400	94,800	34,400	23,400
29	21,800	34,900	16,000	11,100	9,800	64,100	61,800	35,400	24,400	91,400	33,700	22,700
30	26,100	32,800	14,100	11,100	-----	62,300	60,100	34,900	23,400	85,200	33,000	20,700
31	31,900	-----	14,300	11,100	-----	60,200	-----	35,400	-----	80,500	32,300	-----
TOTAL	416,460	1,210.7M	583,400	376,900	302,800	861,500	1,551.1M	1,451.4M	985,600	1,029.0M	1,270.9M	660,600
MEAN	13,430	40,360	18,820	12,160	10,440	27,790	51,700	46,820	32,850	33,190	41,000	22,020
MAX	31,900	52,500	30,300	14,100	11,100	64,700	67,700	58,600	38,700	94,800	74,500	31,500
MTN	8,050	31,600	11,600	11,100	9,800	7,800	36,700	34,900	23,400	13,800	32,300	14,700
CFSM	.30	.90	.42	.27	.23	.62	1.15	1.05	.73	.74	.92	.49
IN.	.35	1.01	.48	.31	.25	.72	1.29	1.21	.82	.85	1.06	.55
CAL YR 1971	TOTAL 8,048,050 MEAN 22,050 MAX 82,500 MIN 5,180 CFSM .49 IN 6.68											
WTR YR 1972	TOTAL 10,700,360 MEAN 29,240 MAX 94,800 MIN 7,800 CFSM .65 IN 8.89											

M Expressed in thousands.

NOTE.--Indefinite stage-discharge relation Oct. 1-5, 16-28, Nov. 19 to Dec. 7, July 29 to Sept. 30.

05353800 Straight River near Faribault, Minn.

LOCATION.--Lat 44°15'29", long 93°13'51", in W 1/4 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.--7 years, 222 cfs.

EXTREMES.--Current year: Maximum discharge, 2,190 cfs Mar. 19 (gage height, 7.94 ft); minimum daily, 16 cfs Feb. 5 to Mar. 10; minimum gage height, 3.83 ft, Dec. 12.

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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	35	99	58	36	17	16	175	289	609	72	169	53
2	39	77	57	35	17	16	164	487	414	64	154	48
3	34	65	57	34	17	16	162	542	300	62	140	46
4	32	57	56	33	17	16	156	466	234	57	125	47
5	31	38	56	31	16	16	149	390	207	54	117	48
6	31	40	54	30	16	16	152	344	208	59	114	54
7	30	43	53	30	16	16	152	301	189	87	111	73
8	30	38	52	29	16	16	147	266	167	91	112	64
9	30	39	50	29	16	16	145	235	152	220	104	60
10	30	39	47	28	16	16	158	208	136	231	98	57
11	28	39	46	27	16	17	173	187	128	187	89	54
12	28	37	45	26	16	18	179	173	118	154	84	60
13	29	37	49	25	16	21	185	171	105	130	79	184
14	29	36	52	24	16	70	181	175	123	126	75	218
15	27	37	51	23	16	450	181	178	113	116	70	200
16	26	40	49	22	16	800	175	169	102	105	66	165
17	24	52	47	22	16	1,400	168	156	95	137	60	132
18	23	80	45	22	16	1,800	158	143	89	155	55	111
19	27	80	44	22	16	1,510	151	133	88	153	51	99
20	27	82	43	21	16	1,390	144	120	113	341	50	101
21	27	69	43	21	16	1,210	180	116	119	548	52	106
22	28	82	42	20	16	838	312	105	115	493	49	96
23	27	74	41	20	16	571	365	96	102	372	49	92
24	26	67	40	19	16	429	313	104	93	240	51	90
25	26	61	40	19	16	354	264	156	86	176	52	141
26	27	61	39	18	16	294	228	268	79	224	65	426
27	39	60	38	18	16	229	201	625	79	326	62	542
28	48	60	38	18	16	211	184	1,160	89	349	57	601
29	37	59	37	18	16	211	179	1,310	83	283	55	680
30	65	59	37	18	-----	196	200	1,040	81	221	50	626
31	118	-----	37	17	-----	190	-----	821	-----	184	52	-----
TOTAL	1,058	1,707	1,443	755	468	12,369	5,681	10,934	4,616	6,017	2,517	5,274
MEAN	34.1	56.9	46.5	24.4	16.1	399	189	353	154	194	81.2	176
MAX	118	99	58	36	17	1,800	365	1,310	609	548	169	680
MIN	23	36	37	17	16	16	144	96	79	54	49	46

CAL YR 1971 TOTAL 83,966 MEAN 230 MAX 2,400 MIN 23

WTR YR 1972 TOTAL 52,839 MEAN 144 MAX 1,800 MIN 16

PEAK DISCHARGE (BASE, 1,500 CFS).--Mar. 19 (1345) 2,190 cfs (7.94 ft); May 29 (0115) 1,520 cfs (6.99 ft).

ZUMBRO RIVER BASIN

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.--20 years, 127 cfs (5.67 inches per year).

EXTREMES.--Current year: Maximum discharge, 1,820 cfs Mar. 15 (gage height, 8.48 ft); minimum, 30 cfs Sept. 2 (gage height, 1.94 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.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	86	211	90	74	58	54	89	223	102	63	79	83
2	96	177	106	70	59	46	85	310	96	59	79	33
3	75	127	103	71	58	52	87	299	90	59	75	45
4	71	105	103	67	56	50	84	230	84	58	72	50
5	68	100	104	64	55	45	83	212	87	59	70	48
6	67	93	109	64	52	53	85	195	85	69	66	54
7	65	76	109	62	50	57	86	172	82	67	67	73
8	65	88	110	63	50	49	82	158	80	90	66	51
9	64	95	107	65	49	53	82	142	79	98	66	48
10	62	93	134	68	49	55	85	133	75	86	64	41
11	67	91	112	69	48	72	93	123	71	82	62	45
12	69	90	99	69	48	85	98	119	72	82	61	195
13	69	88	98	65	48	504	102	121	73	74	59	417
14	70	84	105	63	52	1,280	104	127	77	94	59	218
15	70	84	111	57	51	1,570	104	131	73	79	59	106
16	67	99	105	54	51	1,330	102	122	69	70	58	82
17	67	135	85	58	52	1,120	106	113	67	105	58	69
18	75	150	90	61	52	870	105	108	65	86	57	64
19	79	152	92	61	49	662	135	102	67	78	76	65
20	75	132	97	61	49	562	110	95	71	74	58	163
21	76	110	97	61	51	487	234	91	69	69	55	127
22	73	97	92	61	49	392	589	91	66	66	55	108
23	69	103	96	59	53	262	450	88	67	84	55	96
24	70	104	97	63	53	174	280	90	63	64	58	91
25	70	98	93	58	52	133	210	95	61	59	128	265
26	66	149	96	58	49	114	175	134	61	339	87	577
27	122	133	92	58	49	106	152	97	63	179	71	371
28	94	125	84	58	55	105	142	137	96	140	62	531
29	118	122	76	57	56	99	143	130	69	106	55	873
30	194	110	75	55	-----	94	137	141	64	89	55	531
31	262	-----	72	56	-----	93	-----	115	-----	81	58	-----
TOTAL	2,641	3,421	3,039	1,930	1,503	10,628	4,419	4,444	2,244	2,808	2,050	5,520
MEAN	85.2	114	98.0	62.3	51.8	343	147	143	74.8	90.6	66.1	184
MAX	262	211	134	74	59	1,570	589	310	102	339	128	873
MTN	62	76	72	54	48	45	82	88	61	58	55	33
CFSM	.28	.38	.32	.20	.17	1.13	.48	.47	.25	.30	.22	.61
IN.	.32	.42	.37	.24	.18	1.30	.54	.54	.27	.34	.25	.68

CAL YR 1971 TOTAL 74,032 MEAN 203 MAX 2,880 MIN 62 CFSM .67 IN 9.06
WTR YR 1972 TOTAL 44,647 MEAN 122 MAX 1,570 MIN 33 CFSM .40 IN 5.46

PEAK DISCHARGE (BASE, 1,000 CFS)

DATE	TIME	G. H.	DISCHARGE	DATE	TIME	G. H.	DISCHARGE
3-15	0600	8.48	1,820	9-12	2215	6.36	1,130
7-26	1030	5.95	1,150				

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.--50 years (1909-17, 1930-72), 488 cfs (5.86 inches per year).

EXTREMES.--Current year: Maximum discharge, 5,020 cfs Mar. 17 (gage height, 12.79 ft); minimum, 68 cfs Mar. 5 (gage height, 6.19 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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	296	838	426	195	275	320	711	605	580	232	519	232
2	373	673	490	175	250	275	505	850	501	326	424	260
3	360	616	428	410	265	475	590	650	505	270	368	216
4	312	748	369	510	330	135	532	640	330	253	408	256
5	324	488	327	205	325	110	537	630	444	176	400	298
6	304	449	511	330	140	395	585	630	344	223	323	263
7	295	441	501	335	200	485	610	590	376	392	340	198
8	380	370	227	370	305	500	487	281	400	288	326	204
9	221	550	303	250	285	555	424	532	323	291	326	267
10	186	414	588	290	280	331	528	428	291	323	323	220
11	318	351	288	385	305	275	645	514	356	360	274	164
12	263	396	220	335	270	350	667	523	372	356	260	204
13	216	366	405	290	270	796	683	344	319	352	242	323
14	218	324	402	360	315	820	796	428	408	348	344	615
15	286	382	415	285	385	880	766	469	384	309	270	333
16	245	509	367	160	215	1,610	465	496	400	323	277	316
17	198	512	385	130	240	3,930	546	465	360	326	256	416
18	425	400	325	175	270	4,130	650	510	170	380	246	505
19	416	432	262	265	240	3,870	862	537	372	444	340	420
20	187	277	285	245	155	3,840	862	388	380	396	277	253
21	301	490	303	265	175	3,350	784	309	368	460	298	263
22	237	531	409	255	250	2,630	971	478	309	420	173	295
23	349	529	433	220	260	1,850	893	444	309	528	302	333
24	199	512	222	195	250	1,320	919	352	249	523	270	326
25	178	440	173	365	320	1,060	887	412	260	416	270	469
26	218	437	251	285	385	1,000	868	400	323	585	312	1,020
27	507	408	330	250	235	971	667	404	356	772	309	722
28	407	352	395	260	160	932	844	501	368	667	267	1,020
29	377	457	360	250	315	913	700	738	323	820	260	1,910
30	515	532	395	190	-----	906	483	656	400	541	207	2,020
31	970	-----	340	265	-----	716	-----	610	-----	519	267	-----
TOTAL	10,081	14,224	11,135	8,500	7,670	39,730	20,467	15,814	10,880	12,619	9,478	14,341
MFAN	325	474	359	274	264	1,282	682	510	363	407	306	478
MAX	970	838	588	510	385	4,130	971	850	580	820	519	2,020
MIN	178	277	173	130	140	110	424	281	170	176	173	164
CFSM	.29	.42	.32	.24	.23	1.13	.60	.45	.32	.36	.27	.42
IN.	.33	.47	.37	.28	.25	1.31	.67	.52	.36	.42	.31	.47

CAL YR 1971 TOTAL 265,548 MEAN 728 MAX 10,400 MIN 150 CFSM .64 IN 8.74
WTR YR 1972 TOTAL 174,939 MEAN 478 MAX 4,130 MIN 110 CFSM .42 IN 5.76

WHITEWATER RIVER BASIN

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.--7 years (1939-41, 1967-72, 29.5 cfs (3.97 inches per year).

EXTREMES.--Current year: Maximum discharge, 1,410 cfs Mar. 17 (gage height, 7.12 ft, high-water mark in well); minimum, 16 cfs Mar. 2, 5 (2.41 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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	27	33	25	25	23	22	34	32	28	24	34	23
2	29	31	26	24	23	21	33	34	27	23	29	23
3	31	30	26	24	23	22	33	33	27	22	27	23
4	27	28	26	24	23	22	32	32	26	21	26	23
5	26	28	27	25	23	22	31	31	24	21	25	23
6	26	27	26	25	23	22	31	31	24	23	26	24
7	26	25	27	25	23	22	32	31	24	23	26	25
8	26	25	26	25	23	21	31	30	24	30	26	24
9	26	26	26	25	23	21	31	29	24	30	25	23
10	25	26	28	25	23	21	31	29	24	27	25	23
11	25	26	27	25	23	22	33	29	23	24	25	22
12	25	26	25	25	23	23	34	29	25	25	24	24
13	25	26	25	24	23	25	34	29	28	24	24	32
14	26	25	26	23	23	131	34	29	33	33	23	32
15	25	25	28	23	23	432	33	29	26	33	23	25
16	25	26	27	23	23	704	32	28	24	26	23	24
17	25	27	24	23	23	720	31	27	23	27	22	24
18	25	28	26	23	23	390	31	27	23	28	22	23
19	26	27	26	23	23	258	35	26	23	27	34	23
20	25	27	25	23	23	191	35	26	24	25	37	25
21	25	26	25	23	23	121	35	26	24	24	104	25
22	25	25	25	23	23	76	39	26	23	23	29	25
23	25	26	25	23	23	55	39	25	22	30	26	24
24	25	26	26	23	23	48	35	25	22	28	25	24
25	25	26	25	23	22	45	33	26	22	24	31	50
26	25	29	25	23	22	42	32	28	22	60	35	99
27	28	28	25	23	22	40	32	44	22	63	30	49
28	28	27	24	23	22	37	31	32	59	36	26	113
29	28	27	25	23	22	37	31	40	30	32	25	101
30	30	26	25	23	-----	35	31	32	25	29	24	58
31	34	-----	25	23	-----	34	-----	29	-----	28	24	-----
TOTAL	819	808	797	735	662	3,682	989	924	775	893	905	1,056
MEAN	26.4	26.9	25.7	23.7	22.8	119	33.0	29.8	25.8	28.8	29.2	35.2
MAX	34	33	28	25	23	720	39	44	59	63	104	113
MIN	25	25	24	23	22	21	31	25	22	21	22	22
CFSM	.26	.27	.25	.23	.23	1.18	.33	.30	.26	.29	.29	.35
IN.	.30	.30	.29	.27	.24	1.36	.36	.34	.29	.33	.33	.39
CAL YR 1971	TOTAL 14,609	MEAN 40.0	MAX 628	MIN 22	CFSM .40	IN 5.38						
WTR YR 1972	TOTAL 13,045	MEAN 35.6	MAX 720	MIN 21	CFSM .35	IN 4.80						

REMARKS.--Records fair.

[illegible]

MISSISSIPPI RIVER MAIN STEM

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 tail-water of navigation dam 5A.

AVERAGE DISCHARGE.--44 years, 25,740 cfs (5.90 inches per year).

EXTREMES.--Current year: Maximum discharge, 98,700 cfs Apr. 24 (gage height, 11.93 ft); minimum, 7,440 cfs Sept. 12, result of regulation; minimum gage height, 5.06 ft Sept. 21.
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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	15,200	34,700	46,700	22,900	17,100	17,800	75,300	79,700	43,200	32,700	93,100	49,100
2	18,700	37,300	44,800	22,900	17,100	18,100	74,300	76,700	43,000	32,000	91,600	48,000
3	20,000	44,500	40,600	20,700	17,600	18,000	73,000	74,200	43,000	30,700	87,000	44,900
4	21,900	48,900	38,400	20,400	17,600	18,100	69,900	73,200	43,700	29,000	80,900	42,700
5	23,600	52,100	36,700	20,000	17,500	18,100	68,000	71,300	44,800	28,100	75,200	41,200
6	23,600	56,000	35,600	18,900	17,400	17,900	65,600	70,800	44,500	26,200	70,100	38,000
7	21,000	58,300	34,000	19,100	17,400	17,800	63,400	70,000	44,300	25,200	65,500	37,500
8	19,500	58,300	33,000	19,300	17,400	16,600	60,900	68,600	44,500	23,900	61,100	37,800
9	19,900	58,300	33,700	19,700	17,200	16,300	58,600	67,100	44,400	24,200	59,200	34,800
10	20,900	58,100	34,500	22,300	16,500	16,300	56,600	65,800	43,800	23,400	55,800	33,500
11	18,100	57,000	31,900	22,300	16,000	16,700	56,000	65,000	41,700	21,300	52,600	33,700
12	15,300	54,700	28,500	21,100	16,000	16,900	56,100	64,600	40,200	21,100	52,900	31,400
13	14,200	52,200	16,200	19,200	16,000	19,400	55,900	63,900	41,300	23,200	53,000	32,000
14	15,500	50,800	13,500	16,000	16,000	20,900	55,800	63,900	41,200	24,800	52,900	31,300
15	15,900	48,900	17,800	15,600	16,000	22,700	55,900	62,900	40,000	23,000	51,400	30,600
16	16,600	44,800	25,600	16,200	16,700	25,800	56,700	60,800	39,500	22,700	48,500	28,700
17	16,500	44,900	22,600	19,200	16,700	33,800	58,200	59,500	38,500	23,300	48,400	26,100
18	16,400	44,800	19,000	18,900	17,300	38,100	60,400	58,000	38,200	23,300	47,100	26,100
19	14,100	43,800	24,300	19,400	17,400	43,300	64,700	57,000	38,100	25,000	49,000	24,900
20	21,900	42,600	27,100	19,500	17,400	48,000	71,700	54,600	39,900	26,500	48,700	23,700
21	24,300	44,600	29,600	19,400	17,400	47,800	78,300	53,400	41,100	28,400	49,100	23,000
22	24,100	49,800	28,700	19,300	17,700	50,000	87,200	52,800	40,500	26,500	49,700	24,000
23	23,300	51,700	25,500	19,100	17,700	62,500	95,300	50,000	39,400	28,500	50,400	26,300
24	22,800	51,800	26,400	17,900	17,600	61,500	98,200	47,800	39,300	34,200	51,500	27,700
25	21,900	52,300	27,800	16,100	17,600	61,200	98,400	48,000	39,400	40,100	51,900	34,100
26	23,400	53,200	27,900	15,600	17,600	63,700	96,900	48,500	39,500	47,800	52,500	37,000
27	24,500	53,600	25,000	17,000	17,600	67,300	94,700	47,500	37,400	57,200	53,500	37,700
28	26,300	52,700	21,300	17,200	17,600	71,200	91,100	46,300	35,600	66,100	52,100	41,500
29	27,000	51,200	22,500	17,200	17,700	74,000	86,600	45,400	35,300	76,600	52,200	45,300
30	29,200	49,400	23,000	17,100	-----	75,900	83,300	43,800	34,800	84,700	52,600	48,100
31	32,300	-----	22,900	17,100	-----	75,300	-----	43,700	-----	91,400	51,100	-----
TOTAL	651,900	1,501.3M	885,100	586,600	496,800	1,171.0M	2,167.0M	1,854.8M	1,220.1M	1,091.1M	1,810.6M	1,040.7M
MEAN	21,030	50,040	28,550	18,920	17,130	37,770	72,230	59,830	40,670	35,200	58,410	34,690
MAX	32,300	58,300	46,700	22,900	17,700	75,900	98,400	79,700	44,800	91,400	93,100	49,100
MIN	14,200	34,700	13,500	15,600	16,000	16,300	55,800	43,700	34,800	21,100	47,100	23,000
CFSM	.36	.85	.48	.32	.29	.64	1.22	1.01	.69	.59	.99	.59
IN.	.41	.94	.56	.37	.31	.74	1.36	1.17	.77	.69	1.14	.65

CAL YR 1971 TOTAL 12,120,170 MEAN 33,210 MAX 132,000 MIN 8,900 CFSM .56 IN 7.62
WTR YR 1972 TOTAL 14,477,000 MEAN 39,550 MAX 98,400 MIN 13,500 CFSM .67 IN 9.10

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 791.32 ft above mean sea level, datum of 1929. Prior to Oct. 1, 1917, nonrecording gage at site half a mile downstream at datum about 1.5 ft higher.

AVERAGE DISCHARGE.--37 years (1911-14, 1915-17, 1940-72), 315 cfs (6.96 inches per year).

EXTREMES.--Current year: Maximum discharge, 8,260 cfs Sept. 29 (gage height, 10.62 ft); minimum, 121 cfs July 6, (gage height, 1.14 ft), minimum gage height, 1.13 ft Dec. 13.
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.

REVISIONS (WATER YEARS).--WSP 355: 1912. WSP 1308: 1911(M).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	169	238	148	140	130	129	229	234	173	143	415	171
2	162	224	169	140	130	129	222	264	166	148	333	164
3	170	212	192	140	130	130	217	308	160	134	360	160
4	170	203	179	139	130	131	209	386	154	127	318	159
5	159	188	172	138	130	131	204	350	151	124	286	158
6	151	178	170	137	130	132	202	306	150	124	272	159
7	146	155	169	137	130	132	203	280	151	130	264	159
8	146	157	171	136	129	133	200	259	149	144	249	159
9	144	157	173	136	129	135	195	244	148	365	238	158
10	141	157	174	136	129	139	194	230	145	480	227	156
11	141	157	170	135	129	143	198	218	141	415	217	165
12	139	157	153	135	128	170	205	211	150	336	209	171
13	139	156	154	135	128	700	207	213	282	336	201	669
14	139	154	160	135	128	2,150	212	216	217	355	195	433
15	137	154	160	134	128	4,420	209	213	243	390	190	353
16	136	161	153	134	127	3,760	207	206	228	354	185	297
17	137	173	145	133	127	2,420	204	201	191	343	181	260
18	136	158	143	133	127	1,630	202	195	173	367	176	232
19	141	196	142	133	126	1,200	201	189	162	370	178	212
20	141	197	142	132	126	1,040	201	189	156	356	184	208
21	141	193	142	132	126	816	217	183	153	326	175	253
22	140	182	141	132	126	634	255	182	148	283	168	258
23	139	178	141	132	126	495	300	176	142	263	167	250
24	138	179	141	131	127	416	321	173	136	232	171	241
25	138	177	140	131	127	369	293	179	133	209	190	340
26	137	180	140	131	128	374	262	214	131	284	249	1,120
27	148	186	140	131	128	308	241	184	129	464	226	1,430
28	162	187	140	131	128	297	229	187	145	442	205	2,060
29	172	191	140	131	129	265	226	211	145	367	188	6,140
30	190	194	140	130	-----	252	221	157	140	313	179	2,280
31	223	-----	140	130	-----	237	-----	186	-----	689	174	-----
TOTAL	4,672	5,399	4,784	4,150	3,716	23,367	6,686	6,983	4,892	9,413	6,970	18,975
MEAN	151	180	154	134	128	754	223	225	163	304	225	633
MAX	223	238	192	140	130	4,420	321	386	282	689	415	6,140
MIN	136	154	140	130	126	129	194	173	129	124	167	156
CFSM	.25	.29	.25	.22	.21	1.23	.36	.37	.27	.49	.37	1.03
IN.	.28	.33	.29	.25	.22	1.41	.40	.42	.30	.57	.42	1.15

CAL YR 1971 TOTAL 124,784 MEAN 342 MAX 6,990 MIN 134 CFSM .56 IN 7.55
WTR YR 1972 TOTAL 100,017 MEAN 272 MAX 6,140 MIN 124 CFSM .44 IN 6.05

PEAK DISCHARGE (BASE, 3,500 CFS).--Mar. 15 (0045) 5550 cfs (8.94 ft); Sept. 29 (1415) 8,260 cfs (10.62 ft).

ROOT RIVER BASIN

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.--30 years, 52.7 cfs (5.55 inches per year).

EXTREMES.--Current year: Maximum discharge, 2,300 cfs Mar. 17 (gage height, 6.15 ft); minimum daily, 35 cfs Dec. 21, Jan. 20; minimum gage height, 0.95 ft Feb. 26.
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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	40	40	37	37	36	36	49	45	38	42	82	44
2	40	39	36	37	36	37	49	47	38	47	52	44
3	40	39	36	37	36	37	49	44	38	42	47	44
4	40	39	37	37	36	38	46	42	38	40	45	44
5	40	38	27	37	36	38	46	44	39	40	44	44
6	40	38	37	37	36	38	46	42	39	42	45	44
7	40	37	37	37	37	45	47	40	38	44	47	44
8	40	38	37	37	37	40	44	41	38	42	45	44
9	40	38	27	37	38	39	44	42	38	46	45	44
10	40	38	38	37	38	36	43	41	38	44	44	44
11	40	37	38	37	38	38	43	40	39	42	44	44
12	39	37	36	37	38	43	44	40	39	61	44	44
13	40	38	38	37	38	82	42	41	44	45	44	111
14	40	38	38	37	39	283	43	40	42	44	44	56
15	40	38	38	37	40	834	42	40	40	42	44	51
16	40	38	38	36	39	977	44	40	39	42	44	47
17	40	38	38	36	39	976	44	40	40	45	42	47
18	40	38	38	36	38	618	42	39	39	44	42	45
19	41	38	37	36	38	438	42	39	40	44	57	44
20	41	38	37	35	38	139	43	39	40	42	47	45
21	41	36	35	37	38	104	45	39	40	47	44	46
22	40	36	38	38	38	77	45	39	39	43	43	46
23	40	36	37	38	38	68	44	39	39	50	44	45
24	40	36	37	37	38	62	44	39	39	44	43	47
25	40	36	37	37	37	58	42	39	39	42	47	64
26	40	39	37	36	38	56	42	44	39	57	46	112
27	41	38	37	36	38	56	42	40	39	51	46	73
28	40	38	37	36	37	53	41	39	45	47	44	276
29	40	38	27	36	36	53	42	42	42	45	44	82
30	41	37	37	36	-----	49	42	39	40	44	44	66
31	43	-----	37	36	-----	49	-----	39	-----	110	44	-----
TOTAL	1,247	1,132	1,151	1,137	1,089	5,497	1,321	1,264	1,185	1,460	1,437	1,831
MEAN	40.2	37.7	37.1	36.7	37.6	177	44.0	40.8	39.5	47.1	46.4	61.0
MAX	43	40	38	38	40	977	49	47	45	110	82	276
MIN	39	36	35	35	36	36	41	39	38	40	42	44
CFSM	.31	.29	.29	.28	.29	1.37	.34	.32	.31	.37	.36	.47
IN.	.36	.33	.33	.33	.31	1.59	.38	.36	.34	.42	.41	.53
CAL YR 1971	TOTAL 16,775		MEAN 46.0	MAX 346	MIN 30	CFSM .36	IN 4.84					
WTR YR 1972	TOTAL 19,751		MEAN 54.0	MAX 977	MIN 35	CFSM .42	IN 5.70					

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.--50 years (1909-17, 1930-72), 637 cfs (6.81 inches per year).

EXTREMES.--Current year: Maximum discharge, 10,200 cfs Mar. 16 (gage height, about 10.00 ft); minimum, 239 cfs Dec. 18 (gage height, 1.03 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 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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	445	480	385	350	330	330	590	540	425	371	1,920	410
2	395	520	385	350	330	330	565	560	420	540	1,160	365
3	390	490	385	350	330	330	545	580	400	390	918	376
4	385	465	362	350	330	335	530	660	395	358	836	376
5	380	445	380	350	330	335	515	690	390	344	770	376
6	376	420	371	345	330	340	510	650	385	348	730	376
7	362	405	376	345	330	340	505	615	390	348	710	376
8	358	385	371	345	330	350	490	590	380	358	670	376
9	353	405	376	345	330	350	490	560	385	620	625	366
10	348	395	390	345	330	370	480	540	380	750	595	362
11	344	376	400	345	330	400	480	525	366	775	575	395
12	340	376	380	345	330	490	490	510	376	836	560	445
13	340	371	327	345	325	840	490	505	510	715	535	1,140
14	335	371	360	345	325	1,980	490	515	610	665	540	940
15	327	358	370	340	325	6,600	485	510	525	695	510	715
16	323	376	370	340	325	8,650	490	495	500	685	480	635
17	323	390	360	340	324	6,000	485	490	470	670	455	585
18	327	405	360	340	324	4,500	475	475	435	700	450	550
19	340	415	360	340	323	3,040	480	450	450	675	846	505
20	340	420	360	340	323	2,520	470	425	445	710	515	495
21	348	405	360	335	322	1,800	495	435	415	690	545	535
22	358	410	360	335	322	1,530	530	425	400	645	450	540
23	348	405	360	335	322	1,220	550	408	395	635	435	520
24	340	410	360	335	322	1,010	590	400	371	575	430	505
25	340	400	350	335	322	912	605	418	362	515	450	685
26	340	430	350	330	324	852	560	425	362	605	580	1,580
27	340	425	350	330	326	795	530	453	353	735	580	1,820
28	366	420	350	330	328	745	515	443	415	770	520	2,020
29	371	420	350	330	330	700	520	500	415	740	480	5,190
30	410	410	350	330	-----	660	515	472	385	780	445	5,580
31	455	-----	350	330	-----	630	-----	443	-----	942	430	-----
TOTAL	11,147	12,403	11,318	10,550	9,472	49,284	15,465	15,707	12,510	19,185	19,745	29,159
MEAN	360	413	365	340	327	1,590	516	507	417	619	637	972
MAX	455	520	400	350	330	8,650	605	690	610	942	1,920	5,580
MIN	323	358	327	330	322	330	470	400	353	344	430	362
CFSM	.28	.33	.29	.27	.26	1.25	.41	.40	.33	.49	.50	.77
IN.	.33	.36	.33	.31	.28	1.44	.45	.46	.37	.56	.58	.85

CAL YR 1971 TOTAL 238,176 MEAN 653 MAX 7,910 MIN 310 CFSM .51 IN 6.98
WTR YR 1972 TOTAL 215,945 MEAN 590 MAX 8,650 MIN 322 CFSM .46 IN 6.33

PEAK DISCH. (BASE, 5,000 CFS).--Mar. 16 (0830) 10,200 cfs (10.00 ft); Sept. 30 (0515) 7,810 cfs (8.92 ft, shift +0.08 ft).

ROOT RIVER BASIN

05385500 South Fork Root River near Houston, Minn.

LOCATION.--Lat 43 44'19", long 91 33'50", in NE1/4SW1/4 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.--19 years, 120 cfs (5.93 inches per year).

EXTREMES.--Current year: Maximum discharge, 3,320 cfs Mar. 16 (gage height, 11.91 ft); minimum daily, '86 cfs Jan. 16, 17; minimum gage height, 1.54 ft June 11.

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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	98	103	102	92	90	104	121	134	105	125	348	106
2	96	110	102	92	91	104	120	141	104	130	328	103
3	96	105	101	92	91	105	119	141	102	120	182	103
4	96	101	101	92	91	106	117	135	100	105	155	103
5	96	100	103	92	91	107	116	131	100	100	143	103
6	96	99	102	91	92	108	116	128	103	100	141	103
7	96	99	102	90	92	109	119	125	101	100	217	103
8	97	99	102	90	92	109	117	121	101	100	146	102
9	97	99	103	90	93	110	115	118	101	100	135	100
10	97	99	110	90	93	112	115	116	99	100	127	100
11	97	99	111	90	93	114	120	113	98	125	126	108
12	97	99	108	90	94	130	125	113	100	171	123	113
13	104	99	111	89	94	240	126	114	614	161	119	385
14	103	99	112	88	94	1,270	128	114	179	136	118	169
15	98	99	109	87	95	1,880	127	113	131	132	115	127
16	94	99	106	86	95	2,610	137	110	118	124	114	120
17	96	99	97	86	96	1,740	137	109	112	127	112	116
18	96	100	95	87	97	1,570	133	107	110	134	109	114
19	98	100	95	87	97	843	129	105	115	125	113	111
20	102	100	95	87	98	605	125	104	137	120	112	116
21	100	100	95	87	99	471	131	104	114	124	117	129
22	99	100	94	88	100	440	145	105	110	116	108	117
23	97	101	94	88	100	212	144	103	107	121	108	113
24	97	100	94	88	101	177	138	104	106	120	110	111
25	95	99	94	89	101	160	129	107	108	110	119	218
26	95	103	94	89	102	148	121	105	131	137	144	1,030
27	98	105	94	89	102	141	119	107	123	155	130	348
28	100	102	93	90	103	136	117	109	123	128	115	293
29	97	105	93	90	103	129	123	114	123	119	111	362
30	101	103	93	90	-----	125	121	113	123	117	108	248
31	103	-----	93	90	-----	122	-----	109	-----	119	107	-----
TOTAL	3,036	3,025	3,098	2,766	2,780	14,337	3,750	3,572	3,898	3,801	4,360	5,474
MEAN	97.9	101	99.9	89.2	95.9	462	125	115	130	123	141	182
MAX	104	110	112	92	103	2,610	145	141	614	171	348	1,030
MTN	95	99	93	86	90	104	115	103	98	100	107	100
CFSM	.46	.37	.36	.32	.35	1.68	.45	.42	.47	.45	.51	.66
IN.	.41	.41	.42	.37	.38	1.94	.51	.48	.53	.51	.59	.74

CAL YR 1971 TOTAL 45,626 MEAN 125 MAX 722 MIN 77 CFSM .45 IN 6.17
WTR YR 1972 TOTAL 53,847 MEAN 147 MAX 2,610 MIN 86 CFSM .53 IN 7.29

PEAK DISCHARGE (BASE, 900 CFS)

DATE	TIME	G. H.	DISCHARGE	DATE	TIME	G. H.	DISCHARGE
3-16	0500	11.91	3,320	9-26	0945	9.76	1,620
6-13	0730	9.26	1,500				

05457000 Cedar River near Austin, Minn.

LOCATION.--Lat 43°38'10", long 92°58'20", in NE 1/4 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.--33 years, 174 cfs (5.56 inches per year).

EXTREMES.--Current year: Maximum discharge, 2,110 cfs Sept. 29 (gage height, 7.38 ft); minimum, 25 cfs Mar. 8 (gage height, 2.23 ft); minimum gage height, 2.22 ft Feb. 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 except for winter periods, which are fair. 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 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	73	139	80	55	43	63	111	293	274	217	134	59
2	65	121	88	55	43	56	102	541	213	152	125	52
3	51	97	83	55	43	54	106	544	172	121	114	48
4	50	82	82	52	43	46	98	374	142	100	100	49
5	51	77	83	49	44	55	98	282	139	91	92	49
6	48	62	86	48	43	42	102	247	137	100	90	54
7	45	50	89	50	44	41	109	217	133	99	86	67
8	48	66	87	50	45	36	99	198	142	193	95	58
9	47	64	76	51	46	39	92	178	167	341	79	47
10	46	64	94	55	46	37	103	160	131	432	75	45
11	49	65	77	56	47	71	106	146	106	314	76	101
12	46	62	78	57	47	238	106	136	103	217	70	103
13	52	56	77	51	47	401	115	137	104	165	67	231
14	49	56	76	51	48	748	110	135	102	184	71	224
15	50	58	80	51	49	1,140	107	136	106	167	71	174
16	48	94	76	51	49	1,050	107	131	98	151	69	113
17	48	114	65	49	50	673	100	126	91	188	68	83
18	53	134	63	47	50	530	108	164	87	226	67	66
19	58	135	60	46	51	479	103	129	96	222	65	56
20	54	129	63	46	51	404	102	115	122	177	59	102
21	60	92	64	47	52	378	165	107	142	261	72	114
22	57	85	61	47	52	309	259	103	127	273	67	90
23	53	90	64	45	54	212	294	105	114	194	61	70
24	47	90	65	41	55	187	243	102	101	147	61	56
25	50	87	61	47	56	166	198	104	93	120	85	335
26	52	100	59	33	56	142	170	151	94	201	76	793
27	114	96	60	46	56	136	151	309	109	311	65	672
28	88	101	56	40	66	135	147	653	223	346	63	648
29	113	94	56	44	72	126	163	913	323	245	59	1,700
30	133	95	60	43	-----	117	187	597	258	183	57	1,310
31	147	-----	59	43	-----	118	-----	395	-----	156	60	-----
TOTAL	1,945	2,655	2,228	1,480	1,448	8,229	4,061	7,928	4,249	6,294	2,399	7,569
MEAN	62.7	88.5	71.9	47.7	49.9	265	135	254	142	203	77.4	252
MAX	147	139	94	57	72	1,140	294	913	323	432	134	1,700
MIN	45	50	56	33	43	36	92	102	87	91	57	45
CFSM	.15	.21	.17	.11	.12	.62	.32	.60	.33	.48	.18	.59
IN.	.17	.23	.20	.13	.13	.72	.36	.69	.37	.55	.21	.66

CAL YR 1971 TOTAL 70,413 MEAN 193 MAX 3,390 MIN 45 CFSM .45 IN 6.16
WTR YR 1972 TOTAL 50,485 MEAN 138 MAX 1,700 MIN 33 CFSM .32 IN 4.42

PEAK DISCHARGE (BASE, 1,400 CFS).--Sept. 29 (1900) 2,110 cfs (7.38 ft).

05476000 Des Moines River at Jackson, Minn.

LOCATION.--Lat 43°37'10", long 94°59'10", in SE 1/4 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 record 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.--37 years (1935-72), 283 cfs (3.15 inches per year).

EXTREMES.--Current year: Maximum discharge, 1,620 cfs Mar. 20 (gage height, 8.88 ft); minimum daily discharge, 8.7 cfs Feb. 14-17; minimum gage height, 3.20 ft Mar. 1.
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.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	15	52	64	26	11	11	394	652	961	286	296	37
2	17	45	70	25	11	12	356	993	859	257	279	38
3	14	40	73	25	11	16	357	1,220	850	236	255	36
4	15	34	72	25	11	17	343	1,170	844	221	236	35
5	14	35	71	24	10	18	325	1,170	838	206	206	33
6	15	52	70	24	10	19	319	1,250	920	206	195	36
7	17	43	59	23	9.8	20	306	1,340	789	197	187	36
8	16	47	62	22	9.4	115	291	1,360	777	206	182	35
9	17	42	59	22	9.2	120	284	1,290	765	226	172	34
10	20	41	54	22	9.1	125	276	1,200	708	214	159	35
11	19	40	50	22	9.0	135	279	1,120	657	204	153	33
12	19	38	47	21	8.9	350	269	1,050	627	225	148	30
13	18	37	45	20	8.8	500	272	1,010	576	222	139	25
14	19	37	43	19	8.7	600	265	1,060	542	225	126	25
15	22	38	42	17	8.7	560	263	1,050	496	223	113	24
16	20	44	40	16	8.7	730	275	994	444	218	98	22
17	21	59	38	14	8.7	800	268	942	412	260	93	21
18	25	74	37	13	8.8	900	264	892	398	228	85	21
19	21	80	36	12	8.9	1,270	249	838	395	214	79	20
20	22	90	35	13	9.0	1,320	239	792	390	354	76	22
21	24	72	34	15	9.2	1,070	294	747	374	384	70	24
22	24	45	33	13	9.3	958	384	705	361	462	60	26
23	22	53	32	12	9.4	810	435	692	359	466	63	23
24	22	66	31	12	9.5	697	452	705	346	444	64	21
25	22	79	30	12	9.6	675	477	690	323	422	59	26
26	22	92	30	12	9.8	617	486	647	304	463	60	28
27	32	92	29	12	10	554	491	623	341	478	55	27
28	35	99	28	12	10	503	475	647	349	435	52	28
29	34	83	28	11	10	463	484	651	327	397	48	37
30	53	62	27	11	-----	427	515	756	308	352	42	43
31	53	-----	27	11	-----	408	-----	852	-----	317	37	-----
TOTAL	715	1,693	1,405	540	276.5	14,990	10,387	29,108	16,440	9,248	3,887	881
MEAN	23.1	56.4	45.3	17.4	9.53	483	346	939	548	298	125	29.4
MAX	53	92	73	26	11	1,320	515	1,360	861	478	296	43
MIN	14	35	27	11	8.7	11	239	623	304	197	37	20
CFSM	.02	.05	.04	.02	.008	.40	.28	.77	.45	.24	.10	.02
IN.	.02	.05	.04	.02	.008	.46	.32	.89	.50	.28	.12	.03

CAL YR 1971 TOTAL 118,475.7 MEAN 325 MAX 3,250 MIN 7.0 CFSM .27 IN 3.61
WTR YR 1972 TOTAL 99,560.5 MEAN 245 MAX 1,360 MIN 8.7 CFSM .20 IN 2.73

PEAK DISCHARGE (BASE, 500 CFS)

DATE	TIME	G. H.	DISCHARGE	DATE	TIME	G. H.	DISCHARGE
3-20	0230	8.88	1,620	5-31	1215	6.62	871
5- 8	0645	8.06	1,370	6-27	1845	5.47	514

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 1972

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Measurements	
					Date	Discharge (cfs)
Red River of the North basin						
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, 1970-72	8-23-72	4.44
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, 1970-72	8-24-72	2.15
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.	-	1970-72	8-23-72	19.0
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.	-	1970-72	8-23-72	5.23
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, 1970-72	8-23-72	7.56
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, 1970-72	8-24-72	0
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, 1970-72	8-25-72	34.8
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, 1970-72	8-24-72	1.67
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, 1970-72	8-24-72	55.6
05062465	Marsh Creek near Mahnomen, Minn.	NE¼NW¼ sec.6, T.144 N., R.42 W., Mahnomen County, at bridge on State Highway 200, about 4.2 miles west of Mahnomen.		1964-67, 1970-72	*9-15-71 8-25-72	.03 7.09
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, 1970-72	8-24-72	2.33

* Not previously published.
a Approximately.

Discharge measurements made at low-flow partial-record stations during water year 1972--Continued

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Measurements	
					Date	Discharge (cfs)
Red River of the North basin--Continued						
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, 1970-72	8-24-72	.97
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, 1970-72	8-25-72	15.6
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, 1970-72	9-22-72	4.64
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, 1970-72	9-22-72	3.79
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, 1970-72	9-22-72	9.92
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, 1970-72	9-22-72	.30
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, 1970-72	9-22-72	12.9
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, 1970-72	9-22-72	.27
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, 1970-72	9-21-72	.8.52
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, 1970-72	9-21-72	10.3
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.	-	1970-72	9-21-72	<.01
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, 1970-72	9-22-72	0
05082610	Grand Marais River near East Grand Forks, Minn.	SE¼SE¼ sec.36, T.153 N., R.50 W., Polk County, at State Highway 220, 6 miles above mouth, and 6 miles north of East Grand Forks.	-	1970 * 1972	*8-19-70 9-22-72	0 0
05085500	Snake River at Warren, Minn.	Lat 48°11'50", long 96°46'45", in SE¼ sec.36, T.155 N., R.48 W., Marshall County, at Minnesota Street bridge in Warren.	a260	1945, 1946, 1948-51, 1972	8-22-72	0

* Not previously published.

* Operated as a continuous-record gaging station.

< Less than.

a Approximately.

Discharge measurements made at low-flow partial-record stations during water year 1972--Continued

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Measurements	
					Date	Discharge (cfs)
Red River of the North basin--Continued						
05102900	Roseau River near Skime, Minn.	SE $\frac{1}{2}$ SW $\frac{1}{4}$ 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.	-	1971-72	8-24-72	4.71
05105200	Hay Creek near Salol, Minn.	SE $\frac{1}{2}$ SE $\frac{1}{4}$ 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.	-	1971-72	8-25-72	.32
Lake of the Woods basin						
05124497	Little Isabella River near Isabella, Minn.	SE $\frac{1}{2}$ NW $\frac{1}{4}$ 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.	-	1970-72	6-15-72	35.8
05129105	Pelican River near Orr, Minn.	NE $\frac{1}{2}$ NE $\frac{1}{4}$ 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.	-	1970-72	6-8-72	95.3
05129150	Little Indian Sioux River near Buyck, Minn.	SW $\frac{1}{2}$ NW $\frac{1}{4}$ 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.	-	1970-72	6-15-72	46.5
05129280	Ash River near Ray, Minn.	SW $\frac{1}{2}$ NW $\frac{1}{4}$ 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.	-	1970-72	6-8-72	6.86
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.	-	1970-72	6-8-72	9.12
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.	-	1970-72	6-22-72	6.22
05129650	Little Fork River at Cook, Minn.	SE $\frac{1}{2}$ NE $\frac{1}{4}$ 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, 1958-72	6-6-72 9-12-72	19.6 22.4
05129920	Little Fork River near Gheen, Minn.	NE $\frac{1}{2}$ NW $\frac{1}{4}$ 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.	-	1970-72	6-6-72	112
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.	-	1970-72	6-6-72 9-12-72	71.5 66.3
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.	-	1970-72	6-6-72	278
05131325	Valley River near Rauch, Minn.	SE $\frac{1}{2}$ NE $\frac{1}{4}$ 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.	-	1970-72	6-7-72 9-12-72	11.0 10.5
05131470	Nett Lake River near Littlefork, Minn.	SE $\frac{1}{2}$ SE $\frac{1}{4}$ 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.	-	1970-72	6-7-72 9-12-72	200 55.0

Discharge measurements made at low-flow partial-record stations during water year 1972--Continued

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Measurements	
					Date	Discharge (cfs)
Lake of the Woods basin--Continued						
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.	-	1970-72	6-7-72 9-13-72	29.6 4.54
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.	-	1969-72	6-6-72 8-30-72	37.6 49.1
05131750	Big Fork River near Bigfork, Minn.	SE½NE¼ 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.	-	1970-72	6-6-72 8-30-72	284 240
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.	-	1969-72	6-6-72 8-30-72	47.7 56.0
05131770	Gale Brook near Bigfork, Minn.	NE½NW¼ sec.4, T.60 N., R.26 W., Itasca County, at culvert on County Highway 7, 1.5 miles south of Bigfork.	-	1969-72	6-6-72 9-1-72	5.46 10.4
05131870	Big Fork River near Effie, Minn.	NE½SW¼ 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.	-	1970-72	6-6-72 8-30-72	445 472
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.	-	1970-72	6-7-72 9-1-72	1.33 .79
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.	-	1969-72	6-7-72 8-31-72	5.13 2.34
05132200	Sturgeon River near Big Falls, Minn.	NE½SE¼ sec.26, T.155 N., R.26 W., Koochiching County, at bridge on County Highway 30, 6.2 miles northwest of Big Falls.	-	1970-72	6-7-72 8-31-72	101 33.0
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.	-	1969-72	6-7-72 8-31-72	17.1 18.4
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.	-	1970-72	6-14-72 8-29-72	61.0 9.00
05133200	West Branch Black River near Loman, Minn.	SE½SW¼ sec.3, T.158 N., R.25 W., Koochiching County, at bridge on County Highway 82, 1.6 miles northwest of Loman.	a288	1969-72	6-14-72 8-28-72	35.0 7.96
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.	-	1969-72	6-15-72 8-30-72	158 1.66
05135000	East Fork Rapid River near Clementson, Minn.	NE½NE¼ 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.	-	1970-72	6-14-72 8-30-72	69.5 7.54
05135100	Rapid River at Clementson, Minn.	NE½SE¼ sec.12, T.160 N., R.30 W., Lake of the Woods County, at bridge on State Highway 11, at Clementson.	-	1969-72	6-14-72 8-30-72	223 67.0

a Approximately.

Discharge measurements made at low-flow partial-record stations during water year 1972--Continued

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Measurements	
					Date	Discharge (cfs)
Lake of the Woods basin--Continued						
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.	-	1969-72	6-15-72	4.86
05137000	Winter Road River near Baudette, Minn.	SE½SE¼ 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.	-	1969-72	6-15-72	48.9
05138000	County ditch No. 1 near Williams, Minn.	NE½NE¼ 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.	-	1969-72	6-15-72	3.48
Crow Wing River basin						
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, 1968-72	10-26-71	223
Minnesota River basin						
*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	1959-71	10-19-71 11-23-71 5-4-72 6-19-72 7-18-72 8-18-72	1.88 4.56 9.73 6.20 2.90 1.53
*05320480	Maple River near Rapidan, Minn.	Lat 44°03'54", long 94°01'32", on line between secs.13 and 24, T.107 N., R.27 W., Blue Earth County, at bridge on County Highway 35, 3 miles southeast of Rapidan.	a310	1968-70, 1972	3-30-72 5-9-72	114 220
Cannon River basin						
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	1969-72	5-23-72	9.03
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, 1969-72	5-23-72	11.2
05355040	Chub Creek at Randolph, Minn.	Lat 44°31'25", long 93°01'48", in N¼ sec.7, T.112 N., R.18 W., Dakota County, at bridge on County Highway 94, at west boundary of Randolph.	a86	1969-72	5-23-72	18.6
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.	all	1969-70, 1972	5-23-72	.81
Des Moines River basin						
05474770	Beaver Creek near Currie, Minn.	W½ sec.24, T.107 N., R.41 W., Murray County, at bridge on county road, 2.8 miles southwest of Currie.	-	1969-70, 1972	9-19-72	.86
05474800	Lime Creek near Avoca, Minn.	Near intersection of secs.27, 28, 33 and 34, T.106 N., R.39 W., Murray County, at bridge on County Highway 6, 0.6 mile upstream from mouth and 6.2 miles east of Avoca.	-	1969-70, 1972	9-19-72	.39
Big Sioux River basin						
*06483000	Rock River at Luverne, Minn.	Lat 43°39'15", long 96°12'03", in SW¼NE¼ sec.11, T.102 N., R.45 W., Rock County, at dam at Main Street in Luverne.	440	1911-14, 1968-72	10-5-71 11-10-71 1-11-72 2-15-72	7.09 15.3 10.4 4.89

* Also a crest-stage partial-record station.

* Operated as a continuous-record gaging station.

a Approximately.

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 1972

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	1961-72	5- 2-72	17.39	138
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	1966-72	10-27-71	14.42	15
04012500	Poplar River at Lutsen, Minn.	Lat 47°38'23", long 90°42'31", in SW¼NE¼ sec.33, T.60 N., R.3 W., Cook County, 350 feet upstream from bridge on U.S. Highway 61 at Lutsen, and 0.3 mile upstream from mouth.	114	1912-17, 1928-47, 1952-61, 1972	5- 2-72	5.51	1,260
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	1964-72	8-21-72	14.05	600
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	1961-72	8-16-72	16.28	1,230
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	1960-72	9-20-72	11.34	196
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	1960-72	9-20-72	11.49	225
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	1965-72	9-20-72	17.08	1,880
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	1960-72	9-20-72	15.18	598
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	1964-72	9-20-72	31.58	748
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	1964-72	9-20-72	20.54	1,020
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	1960-72	9-20-72	19.24	481
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.	.37	1960-72	4-18-72	7.64	6.5
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	1959-72	4-16-72	6.65	64

* Operated as a continuous-record gaging station.

Annual maximum discharge at crest-stage partial-record stations during water year 1972--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							
04021205	Floodwood River near Floodwood, Minn.	Lat 46°17'15", long 92°53'40", in NE¼NW¼ sec.32, T.52 N., R.20 W., St. Louis County, at bridge on County Highway 835, 500 feet west of State Highway 73, and 2 miles north of Floodwood.	-	1972	4-19-72	19.78	1,590
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, 1967-72	9-20-72	27.20	1,210
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	1961-72	9-20-72	14.36	30
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	1961-72	9-20-72	17.79	2,030
Red River of the North basin							
05047600	West Branch Mus-tinka 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	1964-72	5-21-72	8.63	(#)
05047700	West Branch Mus-tinka 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	1964-72	7-12-72	8.59	74
05049200	Eighteenmile 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, 1970-72	5-21-72	6.74	(#)
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.	94.5	1960-72	4-15-72	12.02	251
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, 1967-72	3-17-72	a6.41	170
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	1961-72	3-17-72	7.38	84
05062280	Mosquito Creek near Bagley, Minn.	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	1961-72	4-15-72	b8.50	32
05062470	Marsh Creek tributary near Mahnomon, 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 Mahnomon.	11.9	1961-72	4-13-72	10.35	110
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.	2.16	1961-72	4-12-72	12.85	154
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.	50.8	1962-72	10-2-71	11.55	722
05063200	Spring Creek tributary near Ogema, Minn.	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.	4.99	1963-72	4-13-72	5.85	33

Discharge not determined.

Operated as a continuous-record gaging station.

a Backwater from ice.

b Affected by shifting control.

Annual maximum discharge at crest-stage partial-record stations during water year 1972--Continued

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Annual maximum		
					Date	Gage height (feet)	Dis-charge (cfs)
Red River of the North basin--Continued							
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	1960-72	7-22-72	b13.97	46
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 ¾ miles north of Blackduck.	4.45	1960-72	4-16-72	14.30	99
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	1960-72	4-16-72	b7.35	49
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	1962-72	3-20-72	a9.94	45
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.	53.6	1960-72	4-13-72	a10.84	260
05078180	Silver Creek near Clearbrook, Minn.	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.	4.96	1960-72	4-15-72	10.06	67
05078200	Silver Creek tributary at Clearbrook, Minn.	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.	6.02	1960-72	4-15-72	b10.92	59
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.	7.75	1961-72	3-20-72	a8.38	45
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	1966-72	4-27-72	8.24	37
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	1961-72	4-16-72	b6.79	30
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, 1966-72	4-21-72	7.79	23
05130300	Borlin 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	1959-72	4-17-72	a12.66	165
Smith Creek basin							
05210200	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.	c8.00	1961-72	8-22-72	5.96	220
Swan River basin							
05216700	O'Brien Creek near Nashauk, 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 Nashauk, and 3.0 miles upstream from Welcome Creek.	8.26	1959-72	4-18-72	a8.76	66

a Backwater from ice.

b Affected by shifting control.

c Revised.

Annual maximum discharge at crest-stage partial-record stations during water year 1972--Continued

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Annual maximum		
					Date	Gage height (feet)	Dis-charge (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.	c3.95	1961-72	8-22-72	5.81	37
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.	c1.50	1961-72	8-22-72	b7.43	38
Willow River basin							
*05221020	Willow River below Palisade, Minn.	Lat 46°42'38", long 93°33'21", in NW¼NE¼ sec.30, T.49 N., R.25 W., Aitkin County, at bridge on County Highway 3, 3.2 miles west of Palisade.	-	1972	4-24-72	14.69	2,340
Crow Wing River basin							
05244100	Kitten Creek near Sebek, 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 Sebek, and 3.3 miles upstream from mouth.	14.7	1961-72	3-23-72	10.06	91
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.	49.2	1961-72	4-17-72	6.98	255
*05244440	Leaf River near Aldrich, Minn.	Lat 46°27'25", long 94°50'29", in SW¼SW¼ sec.34, T.135 N., R.33 W., Wadena County, at bridge on County Highway 29, 2.3 miles upstream from mouth, and 7 miles northeast of Aldrich.	-	1972	4-25-72	14.96	3,250
Mississippi River main stem							
05261000	Mississippi River near Fort Ripley, Minn.	Lat 46°10'50", long 94°21'56", in SE¼NW¼ sec.27, T.43 N., R.32 W., Crow Wing County, on left bank 600 ft upstream from Nokasippi River, and 1.0 mile north of Fort Ripley.	11,010	1929 ^a , 1972	7-25-72	1145.70	22,200
Platte River basin							
05267800	Big Mink Creek tributary near Lastrup, Minn.	Lat 46°01'58", long 94°06'13", in NW¼SE¼ 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	1961-72	7-22-72	12.56	86
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.	46.7	1964-72	7-22-72	15.25	2,490
05268000	Platte River above Royalton, Minn.	Lat 45°50'43", long 94°17'40", in SE¼NW¼ sec.26, T.39 N., R.31 W., Morrison County, at bridge on County Highway 27, 0.6 mile north of Royalton, and 6.6 miles upstream from mouth.	335	1929-36 ^a , 1972	7-26-72	7.84	6,850
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.	7.06	1960-72	7- 8-72	12.22	280
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.	.24	1960, 1962-72	3-21-72	a8.44	21

* Also a low-flow partial-record station.

^a Operated as a continuous-record gaging station.

a Backwater from ice.

b Affected by shifting control.

c Revised.

Annual maximum discharge at crest-stage partial-record stations during water year 1972--Continued

Annual maximum discharge at cross-stage partial-record stations during water year 1972 continued							
Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Annual maximum		
					Date	Gage height (feet)	Dis-charge (cfs)
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.	3.82	1964-72	3-21-72	a7.67	26
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	1964-72	3-21-72	6.84	56
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	1964-72	7-22-72	b12.46	191
Mississippi River main stem							
05273510	Mississippi River at Clearwater, Minn.	Lat 45°25'15", long 94°02'37", in NW¼SW¼ sec.23, T.34 N., R.30 W., Sherburne County, on left bank 700 feet upstream from bridge, on State Highway 24 at Clearwater.	-	1972	7-26-72	18.66	33,500
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	1964-72	3-21-72	a5.32	63
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.	2.26	1960-72	7-22-72	14.29	204
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.	.55	1960-72	7-26-72	18.52	46
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	1962-72	7-23-72	6.79	81
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	1961-72	3-24-72	8.52	244
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	1962-72	7-23-72	8.27	29
05278850	Buffalo Creek tributary near Brownnton, 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 Brownnton.	9.45	1961-72	5-27-72	14.27	53
05278930	Buffalo Creek near Glencoe, Minn.	Lat 44°45'50", long 94°05'27", in SW¼SW¼ sec.16, T.115 N., R.27 W., McLeod County, at bridge on County Highway 1, 2.6 miles east of Glencoe.	-	1972	5-28-72	10.01	2,370
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	1964-72	3-21-72	a10.05	33

a Backwater from ice.

b Affected by shifting control.

Annual maximum discharge at crest-stage partial-record stations during water year 1972--Continued

Annual maximum discharge at crest-stage partial-record stations during water year 1972--Continued							
Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Annual maximum		
					Date	Gage height (feet)	Dis-charge (cfs)
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	1961-72	7-22-72	12.34	53
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.	4.79	1960-72	7-22-72	19.32	458
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.	2.37	1960-72	7-22-72	13.87	280
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	1961-72	7-22-72	10.22	203
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	1960-72	5-30-72	12.03	228
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.	.40	1960-72	5-23-72	8.39	16
05302970	Outlet Creek tributary near Starbuck, Minn.	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.	.33	1962-72	5-27-72	8.15	19
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.	7.53	1962-72	7-26-72	10.26	99
*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	1959-72	5-23-72	14.02	108
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	1960-72	5-30-72	13.87	96
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	1960-72	5- 1-72	8.18	11
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	1960-72	5- 1-72	14.49	55
05313800	County ditch No. 16 near Blomkest, Minn.	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.	.83	1959-72	5-27-72	7.69	13
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.	5.46	1959-72	5- 1-72	14.21	82
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 ^a , 1965-72 ^d	3-16-72	17.84	55

* Also a low-flow partial-record station.

* Operated as a continuous-record gaging station.

a Backwater from ice.

d Backwater from debris.

Annual maximum discharge at crest-stage partial-record stations during water year 1972--Continued

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Annual maximum		
					Date	Gage height (feet)	Dis-charge (cfs)
Minnesota River basin--Continued							
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.	12.2	1959-72	5-27-72	6.32	87
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	1966-72	3-20-72	4.71	40
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.	31.3	1959-72	3-20-72	10.35	116
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.	.91	1959-72	3-16-72	a8.09	44
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	1961-72	3-16-72	a16.59	29
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	1961-72	5- 2-72	4.90	41
05316920	Cottonwood River tributary No. 2 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	1966-72	3-13-72	a8.59	6.7
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	1959-72	7-20-72	5.92	46
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	1960-72	6-28-72	6.35	218
05318300	Watonwan River near Delft, Minn.	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.	13.0	1960-72	5- 2-72	14.77	34
05319490	Watonwan River above Garden City, Minn.	Lat 44°01'32", long 94°13'45", in NE¼SE¼ sec.31, T.107 N., R.28 W., Blue Earth County, at bridge on County Highway 20, 3.5 miles southeast of Garden City.	-	1972	6- 8-72	18.74	6,950
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	1959-72	7- 9-72	19.56	9.7
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	1959-72	3-14-72	a14.57	38
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	1959-72	10-30-71	14.71	23
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	1959-72	6- 8-72	b13.19	84
05320480	Maple River near Rapidan, Minn.	Lat 44°03'54", long 94°01'32", in SW¼ sec.13, T.107 N., R.27 W., Blue Earth County, at bridge on County Highway 35, 3.0 miles southeast of Rapidan, and 3.3 miles upstream from mouth.	-	1972	1972	(e)	<1,400

< Less than.

a Backwater from ice.

b Affected by shifting control.

(e) Peak stage did not reach bottom of gage.

Annual maximum discharge at crest-stage partial-record stations during water year 1972--Continued

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Annual maximum		
					Date	Gage height (feet)	Dis-charge (cfs)
Minnesota River basin--Continued							
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	1961-72	3-18-72	a9.69	10
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	1960-72	7-26-72	7.37	57
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	1960-72	3-21-72	a10.94	247
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	1960-72	3-18-72	a13.09	192
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	1960-72	3-18-72	a13.19	34
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, 1971-72	7-22-72	10.18	1,370
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	1960-72	7-22-72	13.26	479
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	1960-72	7-22-72	19.68	224
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	1960-72	7-22-72	8.22	32
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	1960-72	7-22-72	15.39	217
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	1960-72	3-18-72	16.66	65
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.	1.26	1960-72	9-25-72	15.56	26
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	1960-72	9-25-72	5.75	59
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.	2.20	1960-72	6-14-72	13.63	190

* Operated as a continuous-record gaging station.
a Backwater from ice.

Annual maximum discharge at crest-stage partial-record stations during water year 1972--Continued

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Annual maximum		
					Date	Gage height (feet)	Discharge (cfs)
Cannon River basin--Continued							
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	1960-72	3-18-72	3.58	228
05355200	Cannon River at Welch, Minn.	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.	1,320	1909-14, 1930-71, 1972	3-20-72	6.63	3,490
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	1960-72	7-23-72	9.91	43
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	1962-72	3-17-72	a9.08	24
05373700	Spring Creek near Wanamingo, Minn.	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.	9.93	1960-72	9-26-72	9.67	186
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.	.40	1960-72	9-26-72	6.70	72
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	1966-72	3-18-72	a15.27	78
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	1962-72	3-17-72	a8.92	4.0
Whitewater River basin							
05376500	South Fork Whitewater River near Altura, Minn.	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, 2 miles west of Altura, and 2.4 miles upstream from Kiefer Creek.	76.8	1939-71, 1972	3-17-72	5.23	1,010
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, 1965-72	9-28-72	6.05	28
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	1959-72	9-28-72	12.71	(#)
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	1962-72	9-28-72	12.85	1,170

* Discharge not determined.

* Operated as a continuous-record gaging station.

a Backwater from ice.

Annual maximum discharge at crest-stage partial-record stations during water year 1972--Continued

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Annual maximum		
					Date	Gage height (feet)	Discharge (cfs)
Root River basin--Continued							
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.	14.0	1962-72	9-28-72	17.33	618
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	1959-72	7-31-72	17.03	480
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	1959-72	7- 9-72	8.87	35
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	1959-72	7-31-72	15.66	360
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	1959-72	3-17-72	a9.43	12
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	1959-72	3-17-72	a13.44	974
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.	1.17	1962-72	9-29-72	8.04	73
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	1961-72	7- 8-72	16.56	44
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	1961-72	5- 2-72	16.57	15
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.	1.39	1960-72	6- 7-72	6.31	79
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.	1.52	1960-72	3-12-72	a14.47	15
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.	5.18	1960-72	3-12-72	a7.48	42
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.	6.19	1959, 1964-72	7-20-72	13.43	228
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.	25.8	1960-72	7-20-72	7.90	203

a Backwater from ice.

Annual maximum discharge at crest-stage partial-record stations during water year 1972--Continued

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Annual maximum		
					Date	Gage height (feet)	Dis-charge (cfs)
Des Moines River basin--Continued							
05476900	Fourmile Creek near Dunnell, Minn.	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.	14.0	1960-72	3-11-72	111.81	111
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	1959-72	5- 1-72	8.12	37
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	1959-72	5- 1-72	6.59	31
06483000	Rock River at Luverne, Minn.	Lat 43°39'15", long 96°12'03", in SW¼NE¼ sec.11, T.102 N., R.45 W., Rock County, at bridge on Main Street (County Highway 4) in Luverne.	440	1911-14, 1972	3-15-72	9.23	3,000
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	1959-72	3-11-72	14.50	19
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	1959-72	2-12-72	18.35	93
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	1966-72	5- 1-72	4.74	133
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	1959-72	3-11-72	17.29	40
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	1962-72	3-11-72	18.80	134

* Operated as a continuous-record gaging 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 1972

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
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.	-	1969-71	1-10-72 4-18-72	*.15 35.5
Floyd Lake Outlet	Pelican River	Lat 46°52'42", long 95°50'23", in SE¼ 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.	-	1969-71	1-10-72 4-18-72	*6.84 29.1
Oxidation Pond Outlet	St. Clair Lake	SE¼ sec.32, T.139 N., R.41 W., Becker County, at outlet of Oxidation Pond, 1.8 miles west of Detroit Lakes, Minn.	-	1968-71	10-27-71 12- 1-71 1-11-72 2- 9-72 3-13-72 4-18-72 5-23-72 6-28-72 8-15-72 9-14-72	1.51 1.27 .89 1.13 .94 1.20 1.62 1.31 1.28 1.37
Pelican River tributary	Pelican River	Lat 46°47'02", long 95°53'07", in NE¼ 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.	-	1968-71	10-27-71 11-30-71 1-10-72 2- 9-72 3-13-72 4-18-72 5-23-72 6-28-72 8-15-72 9-14-72	.23 *.45 *.35 *.34 *.35 .56 .70 .34 .29 .27
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.	-	1968-71	10-27-71 11-30-71 1-10-72 2- 9-72 3-13-72 4-18-72 5-23-72 6-28-72 8-15-72 9-14-72	.07 *.17 *.17 *.24 *.28 1.00 .90 .19 .12 .02
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.	-	1968-71	10-27-71 11-30-71 1-10-72 2- 9-72 3-13-72 4-18-72 5-23-72 6-28-72 8-15-72 9-14-72	1.11 *1.15 *.95 *1.01 *1.04 2.14 2.10 .53 .81 .41
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, 1965-71	3-21-72	2,780
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	1959-71	3-22-72	316
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	1959-71	3-23-72 4-14-72	16.2 41.1

* Base flow.

a Approximately.

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Discharge measurements made at miscellaneous sites during water year 1972

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
Red River of the North basin--Continued						
Marsh River ditch	Red River of the North	NE¼NE¼ sec.13, T.144 N., R.46 W., Norman County, at bridge on County Highway 24, 3.5 miles east of Ada, Minn.	-	1945-51, 1967	3-21-72 4-13-72	56.4 92.3
Snake River	Red River of the North	SE¼SE¼ sec.30, T.155 N., R.46 W., Marshall County, at bridge on County Highway 36, 1 mile south of Radium, Minn.	-	-	8-22-72	0
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, 1970-71	8-22-72	0
Middle River	Snake River	SW¼SW¼ sec.25, T.157 N., R.46 W., Marshall County, at County Highway 114, 5.8 miles southeast of Florian and 10 miles west of Newfolden, Minn.	-	1971	10-14-71 4-18-72 5-11-72 6-16-72 7-18-72 8-22-72 9-20-72	0 591 *18.5 *.34 0 .01 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.	-	1971	10-14-71 4-18-72 5-11-72 6-16-72 7-18-72 8-22-72 9-20-72	*.36 553 *27.6 *.80 *.27 *.48 *.02
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.	-	1971	10-14-71 4-18-72 5-11-72 6-16-72 7-18-72 8-22-72 9-20-72	*.01 576 *25.5 *.81 *.15 0 0
Middle River	Snake River	NE¼NE¼ sec.28, T.156 N., R.47 W., Marshall County, 5.6 miles east of Argyle, Minn.	-	1954	8-18-72 9-15-72	*.07 <.01
Middle River	Snake River	On line between sec.19, T.156 N., R.47 W., and sec.24, T.156 N., R.48 W., at bridge on county road 2 miles southeast of Argyle, Minn.	-	-	8-18-72 9-15-72	*.08 *.06
Lake of the Woods basin						
Stony River	South Kawishiwi River	NW¼NW¼ sec.17, T.60 N., R.10 W., on left bank 275 ft downstream from Slate Lake and bridge on State Highway 1, 11 miles upstream from Birch Lake, and 12.8 miles northwest of Isabella, Minn.	180	1953-65, 1967-68	6-15-72	113
Dunka River	South Kawishiwi River	NW¼NE¼ sec.9, T.60 N., R.12 W., on left bank 1.8 miles upstream from Birch Lake, and 2.5 miles northeast of Babbitt, Minn.	53	1951-62	6-15-72	27.9
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.	1.36	1969-71	11-11-71 5-1-72 7-17-72 8-24-72 9-20-72	1.38 13.7 .15 .83 .14
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, 1958-71	4-21-72 4-24-72 4-28-72	376 344 462

* Base flow.

* Operated as a continuous-record gaging station.

< Less than.

a Approximately.

Discharge measurements made at miscellaneous sites during water year 1972

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
Crow Wing River basin						
Willow Creek	Leaf River	On line between secs.26 and 35, T.134 N., R.38 W., Otter Tail County, at bridge on County Highway 50, about 1.2 miles upstream from mouth, 4.4 miles north of Henning, and 5.8 miles west of Deer Creek, Minn.	-	-	10-13-71 12- 2-71 3-21-72 4-17-72 5-22-72 6-27-72 8-14-72 9-13-72	6.03 *11.4 130 62.2 28.0 12.4 *47.5 30.8
South Bluff Creek	Leaf River	NW¼NW¼ sec.27, T.134 N., R.36 W., Otter Tail County, at bridge on county road 0.1 mile north of junction with County Highway 50, and 4.9 miles east of Deer Creek, Minn.	-	-	10-13-71 12- 2-71 3-20-72 4-17-72 5-22-72 6-27-72 8-14-72 9-13-72	3.54 12.3 31.3 89.1 26.8 3.11 *39.2 *7.53
Oak Creek	Leaf River	SW¼NE¼ sec.34, T.135 N., R.36 W., Otter Tail County, at box culvert on U.S. Highway 10, 3.5 miles northwest of Wadena, Minn.	-	1968	10-14-71 12- 2-71 3-20-72 4-17-72 5-22-72 6-27-72 8-14-72 9-13-72	4.65 *24.6 54.4 126 47.3 8.42 *58.7 *13.3
Wing River	Leaf River	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, Minn.	-	1967-71	10-13-71 12- 1-71 3-20-72 4-17-72 5-22-72 6-27-72 8-14-72 9-13-72	24.2 62.0 425 327 113 22.3 *216 *65.4
Crow Wing River	Mississippi River	Lat 46°20'30", long 94°38'30", in SW¼SW¼ sec.7, T.133 N., R.31 W., Morrison County, at bridge on U.S. Highway 210 at Motley, Minn., and 2 miles upstream from Long Prairie River.	2,140	1913-17* 1930-31* 1946, 1965	7-27-72	3,780
Long Prairie River	Crow Wing River	On line between secs.14 and 15, T.129 N., R.37 W., Douglas County, at bridge on State Highway 29, about 1.2 miles northwest of Carlos, Minn., and about 1.5 miles downstream from Carlos Lake.	-	1943-45	10-14-71 12- 1-71 3-20-72 4-17-72 5-22-72 6-27-72 8-14-72 9-13-72	12.4 *73.8 85.4 160 206 193 *235 *204
Spruce Creek	Long Prairie River	On line between secs.21 and 28, T.130 N., R.36 W., Douglas County, at bridge on County Highway 14, 3.4 miles east of Miltna, Minn.	-	-	10-14-71 12- 1-71 3-20-72 4-17-72 5-22-72 6-27-72 8-14-72 9-13-72	10.1 *38.9 55.1 76.3 35.9 15.6 *60.9 *21.7
Long Prairie River	Crow Wing River	Lat 46°19'10", long 94°38'50", in NW¼ sec.19, T.133 N., R.31 W., Morrison County, at bridge on U.S. Highway 210, 1.5 miles south of Motley, Minn., and 3.3 miles upstream from mouth.	973	1909-17* 1930-31* 1965	7-26-72	6,640
Nokasippi River basin						
Nokasippi River	Mississippi River	NW¼SE¼ sec.27, T.34 N., R.32 W., Crow Wing County, at bridge on U.S. Highway 371, in Fort Ripley, Minn.	216	-	4-14-72 5-18-72 5-25-72 6-29-72 7-27-72	420 358 232 152 2,350

* Base flow.

* Operated as a continuous-record gaging station.

Discharge measurements made at miscellaneous sites during water year 1972

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
Mississippi River main stem						
Mississippi River	Gulf of Mexico	NE½SE¼ sec.35, T.42 N., R.32 W., Morrison County, at bridge on State Highway 115, 0.4 mile west of Camp Ripley Junction, Minn., and at mile 974 upstream from Ohio River.	all,300	-	4-14-72 5- 8-72 5-25-72 6-29-72 7-26-72	10,700 17,700 11,600 6,090 22,500
Fletcher Creek basin						
Fletcher Creek	Mississippi River	Lat 46°03'47", long 94°19'39", at center of W½ sec.1, T.41 N., R.32 W., Morrison County, at box culvert on U.S. Highway 371, 0.2 mile upstream from mouth, and 0.6 mile south of Camp Ripley Junction, Minn.	a19	1969-70	7-22-72	b924
Mississippi River tributary basin						
Mississippi River tributary	Mississippi River	Lat 46°04'05", long 94°19'40", in NE¼NW¼ sec.1, T.41 N., R.32 W., Morrison County, at culvert on U.S. Highway 371, 0.3 mile south of Camp Ripley Junction, Minn., and 0.7 mile upstream from mouth.	a1.5	-	7-22-72	b215
Swan River basin						
Swan River	Mississippi River	Lat 45°55'58", long 94°24'37", in NW¼NW¼ sec.1, T.128 N., R.30 W., Morrison County, at bridge on State Highway 238, 1.5 miles upstream from mouth, and 3 miles southwest of Little Falls, Minn.	a188	1968-70	7-25-72 7-27-72	1,760 1,010
Platte River basin						
Platte River	Mississippi River	On line between secs.11 and 14, T.40 N., R.31 W., Morrison County, at bridge on State Highway 27, 3.2 miles west of the junction of State Highways 25 and 27 in Genola, Minn.	a150	-	7-25-72 7-28-72	1,850 683
Skunk River	Platte River	Lat 45°56'14", long 94°06'55", on line between secs.29 and 30, T.40 N., R.30 W., Morrison County, at culvert on State Highway 25, 1.6 miles south of Genola, Minn.	a143	1969-70	7-25-73 7-28-72	1,260 476
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, 1971	7-25-72	35,100
Mississippi River	Gulf of Mexico	NW¼NE¼ sec.11, T.121 N., R.25 W., Wright County, at bridge on State Highway 25 in Monticello, Minn.	-	-	3-23-72	20,600
Elk River basin						
Elk River	Mississippi River	Lat 46°05'21", long 94°29'55", in SE¼NE¼ sec.7, T.130 N., R.30 W., Morrison County, at bridge on State Highway 115 in Randall, Minn., 0.2 mile upstream from Little Elk River.	a65	1970	7-22-72	b8,500
Little Elk River	Elk River	Lat 46°05'09", long 94°29'52", in NE¼SE¼ sec.7, T.130 N., R.30 W., Morrison County, at box culvert on U.S. Highway 10 in Randall, 0.2 mile upstream from mouth.	a59	1970	7-22-72	b6,100

a Approximately.

b Peak discharge by indirect measurement.

Discharge measurements made at miscellaneous sites during water year 1972

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
Crow River basin						
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, 1971	3-23-72	4,890
Rum River basin						
Rum River	Mississippi River	Lat 46°09'37", long 93°45'46", in SW¼ sec.33, T.43 N., R.27 W., Mille Lacs County, at bridge on U.S. Highway 169 at Mille Lacs Lake outlet, at Vine-land, Minn.	a378	1909-10, 1946-47, 1952-53, 1965, 1969, 1970	7-25-72 9- 8-72 9-20-72	342 416 463
Rum River	Mississippi River	Lat 46°04'09", long 93°40'48", in SW¼ sec.31, T.41 N., R.26 W., Mille Lacs County, at bridge on State Highway 27, at Onamia Lake outlet, at Onamia, Minn.	a414	1910-13, 1946-47, 1952-53, 1965, 1968-70	9- 8-72 9-20-72	432 449
Rum River	Mississippi River	Lat 45°31'45", long 93°26'21", in NW¼NE¼ sec.15, T.35 N., R.25 W., Isanti County, at bridge on County Highway 7, 200 ft downstream from Spencer Brook, and 0.5 mile north of Spencer Brook, Minn.	1,000	1957-59, 1960-64, 1965, 1970	7-25-72 7-27-72 7-28-72	12,800 6,390 4,880
Rum River	Mississippi River	SE¼SE¼ sec.36, T.36 N., R.24 W., Isanti County, at bridge on State Highway 47 at West Point, Minn.	1,010	1958-62, 1965-67	7-24-72	8,400
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.	-	1969-71	10-12-71 11-10-71 12-21-71 1-11-72 2-16-72	6.50 100 *31.6 *22.6 9.34
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, 1969-71	10-12-71 11-10-71 12-21-71 1-11-72 2-16-72	26.8 69.0 109 *59.8 *36.6
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.	-	1969-71	10-12-71 11-10-71 12-21-71 1-11-72	17.9 50.4 *34.0 *25.9
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.	-	1969-71	10-12-71 11-10-71 12-21-71 1-11-72 2-16-72	11.8 16.4 *19.2 *14.8 *17.1
Mississippi River main stem						
Mississippi River	Gulf of Mexico	SW¼ sec.24, T.29 N., R.24 W., Hennepin County, at Interstate Highway 35W bridge in Minneapolis, Minn.	-	1938, 1970	11-12-71 3-31-72	21,500 30,100
Mississippi River	Gulf of Mexico	In sec.20, T.28 N., R.23 W., Hennepin-Ramsey County line, downstream from U.S. Lock and Dam No. 1 and Minnehaha Creek, upstream from Minnesota River, and between Minneapolis and St. Paul, Minn.	-	1924-25, 1935, 1938-39, 1941, 1943, 1945-50, 1954, 1957-59, 1961-70	7-18-72	7,250

* Base flow.

* Operated as a continuous-record gaging station.

a Approximately.

Discharge measurements made at miscellaneous sites during water year 1972

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
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.	-	1963-71	10-14-71 11-11-71 5- 2-72 6- 8-72 7-13-72 8-10-72 9-14-72	5.19 *12.4 25.6 *18.5 9.86 18.5 9.00
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.	-	1963-71	10-14-71 11-11-71 5- 2-72 6- 8-72 7-13-72 8-10-72 9-14-72	.62 *.28 3.00 *.97 .72 1.99 .98
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, 1971	6- 8-72 7-13-72 8-10-72 9-14-72	*1.12 1.50 1.30 1.17
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, 1963-71	10-14-71 11-11-71 5- 2-72 6- 8-72 7-13-72 8-10-72 9-14-72	5.40 *16.1 37.7 *20.2 8.98 25.8 14.8
Minnesota River basin						
Lac qui Parle River	Minnesota River	On line between secs.21 and 22, T.115 N., R.44 W., Yellow Medicine County, at bridge on County Highway D8, 5.7 miles northwest of St. Leo, Minn.	-	1966, 1968	6- 2-72	320
West Branch Lac qui Parle River	Lac qui Parle River	Near center of sec.17, T.117 N., R.44 W., Lac qui Parle County, at bridge on U. S. Highway 75, 4.5 miles south of Madison, Minn.	-	1948-49, 1966-69	6- 2-72	1,570
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, 1969-71	10-19-71 11-23-71 12-15-71 1-21-72 2-24-72 3-20-72 3-27-72 5- 3-72 6- 9-72 7-12-72 8- 8-72	225 150 34.6 0 0 871 650 782 538 64.6 89.3
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.	2,050	1910-17, 1931-36, 1937, 1943-58, 1960-67, 1969-71	10-19-71 11-23-71 12-15-71 3-20-72 3-27-72 5- 3-72 6- 9-72 7-12-72 8-17-72	26.3 448 495 266 904 1,040 978 536 678
Mud Creek	Yellow Medicine River	On line between secs.28 and 29, T.114 N., R.43 W., Yellow Medicine County, at bridge on county road, 3.5 miles north of Taunton, Minn.	-	1966, 1968-69	6- 2-72	98.7
Yellow Medicine River	Minnesota River	On line between secs.7 and 18, T.114 N., R.40 W., Yellow Medicine County, at bridge on County Highway 18, 4.3 miles west of Hanley Falls, Minn.	-	1946, 1948, 1951, 1965-66, 1968-69	6- 3-72	865

* Base flow.

* Operated as a continuous-record gaging station.

a Approximately.

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
Minnesota River basin--Continued						
Eagle Lake tributary	Eagle Lake	SE $\frac{1}{4}$ sec.24, T.120 N., R.35 W., Kandiyohi County, at culvert on Eagle Lake Road, 5.1 miles northeast of Willmar, Minn.	-	-	11- 4-71 12-17-71 1-28-72 2-28-72 3-21-72 3-24-72 3-31-72 4- 7-72 4-14-72 4-28-72 5-12-72 5-22-72 5-26-72 6-16-72 6-29-72 7-14-72 7-26-72 7-28-72 8-13-72 8-28-72 9- 8-72 9-26-72	*.08 *T 0 0 .98 .18 .09 *.15 .13 *.16 *.08 a.05 .06 *T .01 .08 3.38 .30 *T T <.01 <.01
Eagle Lake tributary	Eagle Lake	On line between secs.13 and 24, T.120 N., R.35 W., Kandiyohi County, at culvert on County Highway 93, 5.9 miles northeast of Willmar, Minn.	90.01	-	11- 4-71 12-17-71 1-28-72 2-28-72 3-21-72 3-24-72 3-31-72 4- 7-72 4-14-72 4-28-72 5-12-72 5-22-72 5-26-72 6-16-72 6-29-72 7-14-72 7-26-72 7-28-72 7-31-72 9- 8-72 9-26-72	*T *T 0 0 .07 T T *T T *.01 *T T T *T T <.01 <.01 T T T T
Eagle Lake tributary	Eagle Lake	SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec.18, T.120 N., R.34 W., Kandiyohi County, at culvert on County Highway 93, 6 miles northeast of Willmar, Minn.	90.01	-	11- 4-71 12-17-71 1-28-72 2-28-72 3-21-72 3-24-72 3-31-72 4- 7-72 4-14-72 4-28-72 5-12-72 5-26-72 6-16-72 6-29-72 7-14-72 7-26-72 7-28-72 7-31-72 8-13-72 8-28-72 9- 8-72 9-26-72	*.05 *.05 T 0 c.08 0 c.03 *c.06 c.03 *c.04 *c.02 c.02 *c.01 c<.01 c.07 c0 .01 ac.10 *c.06 c.03 a.03 a.03

* Base flow.
< Less than.
T Trace flow.
.a Approximately.
c Flow bypassing site.

Discharge measurements made at miscellaneous sites during water year 1972

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
Minnesota River basin--Continued						
Eagle Lake tributary	Eagle Lake	SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec.18, T.120 N., R.34 W., Kandiyohi County, at culvert on County Highway 93, 6 miles northeast of Willmar, Minn.	90.03	-	11- 4-71 12-17-71 1-28-72 2-28-72 3-21-72 3-24-72 3-31-72 4- 7-72 4-14-72 4-28-72 5-12-72 5-22-72 5-26-72 6-16-72 6-29-72 7-14-72 7-26-72 7-28-72 7-31-72 8-13-72 8-28-72 9- 8-72 9-26-72	*.06 *T a.05 .02 .10 .05 .09 *.06 .08 *.06 *.07 a.07 .12 *.03 .05 .07 T .05 a.05 *.03 .08 .06 .05
Eagle Lake tributary	Eagle Lake	NW $\frac{1}{4}$ NE $\frac{1}{4}$ sec.19, T.120 N., R.34 W., Kandiyohi County, at corrugated pipe culvert on County Highway 93, 6 miles northeast of Willmar, Minn.	-	-	11- 4-71 12-17-71 1-28-72 2-28-72 3-21-72 3-24-72 3-31-72 4- 7-72 4-14-72 4-28-72 5-12-72 5-22-72 5-26-72 6-16-72 6-29-72 7-14-72 7-26-72 7-28-72 7-31-72 8-28-72 9- 8-72 9-26-72	0 0
Eagle Lake tributary	Eagle Lake	NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec.19, T.120 N., R.34 W., Kandiyohi County, at concrete pipe culvert on County Highway 9, 700 ft south of the junction of County Highways 9 and 93, and 5.8 miles northeast of Willmar, Minn.	-	-	11- 4-71 12-17-71 1-28-72 2-28-72 3-21-72 3-24-72 3-31-72 4- 7-72 4-14-72 4-28-72 5-12-72 5-22-72 5-26-72 6-16-72 6-29-72 7-14-72 7-26-72 7-28-72 7-31-72 8-28-72 9- 8-72 9-26-72	*.03 *T 0 0 .30 .06 .06 *.03 .04 *.06 *.01 a.05 .02 0 .01 .08 .20 .07 a.06 *T .01 .01 .01

* Base flow.

T Trace flow.

a Approximately.

Discharge measurements made at miscellaneous sites during water year 1972

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
Minnesota River basin--Continued						
Eagle Lake tributary	Eagle Lake	NW¼NE¼ sec.30, T.120 N., R.34 W., Kandiyohi County, at culvert on County Highway 9, just south of junction of County Highways 9 and 26, and 5.3 miles northeast of Willmar, Minn.	-	-	4-14-72 4-28-72 5-12-72 5-22-72 5-26-72 6-16-72 6-29-72 7-14-72 7-26-72 7-28-72 7-31-72 8-28-72 9- 8-72 9-26-72	.13 *.30 *.06 a.08 .13 *.02 .02 .06 .57 .70 a.10 T 0 0
Eagle Lake tributary	Eagle Lake	NE¼SE¼ sec.25, T.120 N., R.35 W., Kandiyohi County, at corrugated pipe culvert on county road about 100 ft west of junction with County Highway 9, and 4.2 miles northeast of Willmar, Minn.	-	-	11- 4-71 12-17-71 1-28-72 2-28-72 3-21-72 3-24-72 3-31-72 4- 7-72 4-14-72 4-28-72 5-12-72 5-22-72 5-26-72 6-16-72 6-29-72 7-14-72 7-26-72 7-28-72 7-31-72 8-13-72 8-28-72 9- 8-72 9-26-72	*T *T 0 0 0 T 0 T *T *T T T 0 T T a.26 *.06 T *T T 0

* Base flow.
 < Less than.
 T Trace flow.
 a Approximately.

Discharge measurements made at miscellaneous sites during water year 1972

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Data	Discharge (cfs)
Minnesota River basin--Continued						
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.	-	1971	5-17-72	*3.04
Mississippi River main stem						
Mississippi River	Gulf of Mexico	On line between sec.21, 22, T.115 N., R.17 W., on Dakota, Washington County line, at bridge on U.S. Highway 61, at Hastings, Minn.	a37,100	1928, 1931-39, 1941-57, 1959-71	11- 9-71 5-10-72 6-19-72 7-28-72	30,600 42,000 25,000 54,900
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, 1971	7-24-72	17,100
Snake River	St. Croix River	Lat 45°56'53", long 93°14'18", on line between secs.17 and 20, T.40 N., R.23 W., Kanabec County, at bridge on County Highway 19, 3.8 miles northwest of Quamba, Minn., and 4.5 miles upstream from Knife River.	a295	-	7-25-72 7-28-72	5,860 1,350
Knife River	Snake River	NW¼NE¼ sec.15, T.40 N., R.24 W., Kanabec County, at bridge on County Highway 19, 200 ft downstream from Knife Lake, and 4.8 miles north of Mora, Minn.	a90	-	7-25-72 7-26-72	2,060 1,350
Snake River	St. Croix River	Lat 45°51'50", long 93°17'50", in SW¼SW¼ sec.14, T.39 N., R.24 W., Kanabec County, at bridge on State Highways 23 and 65 in Mora, Minn., 1.2 miles upstream from Ann River, and about 4.5 miles downstream from Knife River.	a422	1909-13, 1950, 1966-69	7-24-72 7-25-72	17,300 8,330
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, 1969-71	10-22-71 11-18-71 12-10-71 1-19-72	12.3 15.5 *11.0 *10.8
St. Croix River	Mississippi River	SE¼SE¼ sec.9, T.26 N., R.20 W., Pierce County, at bridge on U.S. Highway 10, at Prescott, Wis., about 500 ft upstream from mouth.	a7,650	1928-30, 1932-39, 1946-48, 1950, 1953-57, 1959-71	11- 9-71 5-10-72 6-19-72 7-28-72	13,900 13,400 3,960 37,400
Vermillion River basin						
Vermillion River	Mississippi River	Lat 44°40'00", long 93°03'17", on line between secs.23 and 24, Y.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, 1969-71	10-21-71 11-18-71 12- 9-71 1-19-72	31.3 65.2 *40.5 *20.4
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, 1965-71	10-21-71 11-18-71 12-10-71 1-19-72	47.3 87.1 *91.0 *29.1
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	1965-71	11-22-71	94.9

* Base flow.

Operated as a continuous-record gaging station.

a Approximately.

Discharge measurements made at miscellaneous sites during water year 1972

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
Cannon River basin--Continued						
Straight River	Cannon River	Lat 44°05'04", long 93°13'48", at center of SE $\frac{1}{4}$ sec.9, T.107 N., R.20 W., Steele County, at bridge on West Bridge Street, in Owatonna, Minn.	209	1961, 1966-71	10-14-71 11-23-71 3-24-72	*13.1 33.6 198
Cannon River	Mississippi River	NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec.1, T.111 N., R.20 W., Rice County, at 6th Street bridge in Northfield, Minn.	-	-	3-24-72	1,280
Mississippi River main stem						
Mississippi River	Gulf of Mexico	S $\frac{1}{2}$ SE $\frac{1}{4}$ sec.17, T.110 N., R.9 W., Buffalo County, at U.S. Corps of Engineers lock and dam No. 4 at Alma, Wis.	a57,100	1930-31, 1944, 1946, 1965, 1969	6- 8-72	43,300
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, 1971	5- 2-72	87,200
Des Moines River basin						
Des Moines River	Mississippi River	Near center of sec.20, T.105 N., R.38 W., Cottonwood County, at Talcott Lake outlet, 3.2 miles northeast of Dundee, Minn.	-	1963-70	9-19-72	*2.05

* Base flow.

† Operated as a continuous-record gaging station.

a Approximately.

Low-flow investigations in the Little Fork River basin

Discharge measurements were made Sept. 11-12, 1972, in the Little Fork River basin to study the distribution of base flows. In the 17 days preceding the measurements, there was 0 to 0.5 inch of rain on Aug. 30, 31, and 0.6 to 1.0 inch Sept. 4-7. There were small increases in streamflow from the rain Sept. 4-7, but by Sept. 11 streams were near normal so the measurements should be approaching base flow.

Discharge measurements made in the Little Fork River basin, Minn., Sept. 11-12, 1972

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
Little Fork River	Rainy River	NE¼NE¼ sec.19, T.62 N., R.17 W., St. Louis County, at bridge on County Road 420, 7 miles east of Cook, Minn.			9-12-72	15.4
Little Fork River	Rainy River	SE¼NE¼ sec.19, T.62 N., R.19 W., St. Louis County, at bridge on U.S. Highway 53, 0.6 mile west of Cook, Minn.		1950, 1958-71	*9-12-72	22.4
Rice River	Little Fork River	NE¼SE¼ sec.12, T.60 N., R.18 W., St. Louis County, at bridge on County Road 405, 4 miles northwest of Britt, Minn.			9-11-72	11.0
Rice River	Little Fork River	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, 1971	9-11-72	19.9
Johnson Creek	Rice River	SE¼SE¼ sec.31, T.61 N., R.18 W., St. Louis County, at triple culverts on County Highway 111, 1.7 miles southwest of Idington, Minn.		1971	9-11-72	11.0
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.		1971	9-11-72	33.7
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 and 2.6 miles southwest of Angora, Minn.		1971	9-11-72	36.3
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.		1971	9-12-72	32.7
Rice River	Little Fork River	NW¼SW¼ sec.32, T.62 N., R.18 W., St. Louis County, at bridge on U.S. Highway 53, 3.5 miles south of Cook, Minn.		1958-63, 1971	9-12-72	39.6
Flint Creek	Little Fork River	SE¼SW¼ sec.18, T. 62 N., R.19 W., St. Louis County, at bridge on County Road 500, 6 miles west of Cook, Minn.			9-12-72	10.8
Sturgeon River	Little Fork River	SE¼SE¼ sec.35, T.62 N., R.21 W., St. Louis County, at bridge on County Road 87, 6 miles southwest of Meadow Brook, Minn.			9-12-72	169
Sand River	Sturgeon River	NE¼NE¼ sec.3, T.61 N., R.21 W., St. Louis County, at bridge on County Road 87, 5 miles southwest of Meadow Brook, Minn.			9-12-72	7.26
Bear River	Sturgeon River	SW¼SW¼ sec.3, T.60 N., R.23 W., Itasca County, at culvert on County Highway 52, 9.5 miles southwest of Togo, Minn.			9-11-72	14.7
Bear River tributary	Bear River	SE¼SE¼ sec.6, T.60 N., R.23 W., Itasca County, at culvert on County Road 544, 13.5 miles northwest of Side Lake, Minn.			9-11-72	3.97
Bear River tributary No. 2	Bear River	NE¼SE¼ sec.6, T.60 N., R.23 W., Itasca County, at culverts on County Road 544, 14 miles northwest of Side Lake, Minn.			9-11-72	2.34
Bear River tributary No. 3	Bear River	NW¼SE¼ sec.22, T.61 N., R.23 W., Itasca County, at bridge on the Dahlberg Road, 7 miles southwest of Togo, Minn.			9-11-72	6.18

* 1972 water year measurements other than those shown are listed under measurements made at low-flow partial-record stations.

Discharge measurements made in the Little Fork River basin, Minn., Sept. 11-12, 1972--Continued

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
Bear River	Sturgeon River	SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec.30, T.61 N., R.22 W., Itasca County, at bridge on State Highway 65, 6 miles southwest of Bear River, Minn.			9-11-72	45.6
Bear River	Sturgeon River	SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec.12, T.61 N., R.22 W., Itasca County, at bridge on County Highway 22, at Bear River, Minn.			9-12-72	55.1
Stony Brook	Bear River	SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec.7, T.61 N., R.21 W., St. Louis County, at culvert on County Highway 22, at Bear River, Minn.			9-12-72	3.44
Bear River	Sturgeon River	On line between secs.9 and 16, T.62 N., R.21 W., St. Louis County, at bridge on County Highway 5, 4.5 miles east of Togo, Minn.		1970-71	*9-12-72	66.3
Willow River	Little Fork River	SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec.7, T.63 N., R.20 W., St. Louis County, at bridge on County Road 76, 6 miles west of Gheen, Minn.			9-12-72	8.60
Little Fork River	Rainy River	NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec.3, T.63 N., R.22 W., Koochiching County, at bridge on State Highway 65, 1.5 miles north of Rauch, Minn.			9-11-72	379
Valley River	Little Fork River	SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec.2, T.62 N., R.23 W., Itasca County, at culvert on the Holstrum Spur Trail, 6 miles northwest of Togo, Minn.			9-12-72	2.59
Valley River	Little Fork River	SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec.7, T.63 N., R.22 W., Koochiching County, at bridge on County Highway 57, 2 miles west of Rauch, Minn.		1970-71	*9-12-72	10.5
Little Fork River	Rainy River	NW $\frac{1}{4}$ NE $\frac{1}{4}$ sec.13, T.66 N., R.25 W., Koochiching County, at bridge on State Highway 65, 13 miles east of Big Falls, Minn.			9-12-72	479
Nett Lake River	Little Fork River	SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec.18, T.65 N., R.22 W., Koochiching County, at bridge on Indian Service Road, 6 miles west of Nett Lake, Minn.			9-11-72	54.8
Nett Lake River	Little Fork River	SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec.8, T.66 N., R.24 W., Koochiching County, at bridge on County Highway 8, 13.2 miles southeast of Littlefork, Minn.		1970-71	*9-12-72	55.0
Ester Brook	Little Fork River	NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec.20, T.67 N., R.24 W., Koochiching County, at bridge on County Highway 8, 9 miles southeast of Littlefork, Minn.			9-12-72	.33
Cross River	Little Fork River	SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec.36, T.68 N., R.25 W., Koochiching County, at bridge on County Road 73, 5 miles southeast of Littlefork, Minn.			9-12-72	3.12
Beaver Brook	Little Fork River	NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec.36, T.68 N., R.24 W., Koochiching County, at bridge on forest road, 9 miles southwest of Ray, Minn.			9-12-72	2.38

* 1972 water year measurements other than those shown are listed under measurements made at low-flow partial-record stations.

LOW-FLOW INVESTIGATIONS

Low-flow investigations in the Big Fork River basin

During the period Aug. 29 to Sept. 1, 1972, a series of discharge measurements was made in the Big Fork River basin to study the distribution of streamflow. These measurements do not represent base flow conditions since the streams contained some overland runoff caused by frequent rains in August.

Discharge measurements made in the Big Fork River basin, Minn., Aug. 29 to Sept. 1, 1972

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
Bowstring River	Big Fork River	NE¼NW¼ sec.23, T.58 N., R.27 W., Itasca County, at bridge on County Road 253, 1.1 miles north of Suomi, Minn.			8-30-72	10.4
Potatoe Creek	Bowstring River	SW¼SE¼ sec.36, T.59 N., R.27 W., Itasca County, at bridge on County Road 253, 3.2 miles southwest of Marcell, Minn.			8-30-72	3.97
Turtle River	Bowstring River	NW¼NW¼ sec.13, T.59 N., R.27 W., Itasca County, at bridge on State Highway 286, 1.8 miles northwest of Marcell, Minn.			8-30-72	12.5
Little Turtle Creek	Turtle River	NW¼NE¼ sec.15, T.59 N., R.27 W., Itasca County, at bridge on State Highway 286, 0.8 mile east of Talmoon, Minn.			8-30-72	8.62
Bowstring River	Big Fork River	On line between secs.23 and 24, T.147 N., R.25 W., Itasca County, at bridge on State Highway 6, 4.5 miles southwest of Talmoon, Minn.	90	1969-71	*8-30-72	49.1
Jessie Brook	Bowstring River	NW¼NE¼ sec.23, T.147 N., R.25 W., Itasca County, at bridge on National Forest Road, 4.5 miles southwest of Talmoon, Minn.			8-29-72	16.8
Grouse Creek	Bowstring Lake	NE¼NW¼ sec.3, T.146 N., R.25 W., Itasca County, at double box culvert on State Highway 6, 7.8 miles southwest of Talmoon, Minn.			8-29-72	9.35
Bowstring River	Big Fork River	SE¼NE¼ sec.26, T.149 N., R.27 W., Itasca County, at old damsite, 3.1 miles south of Dora Lake, Minn.			8-31-72	128
Popple River	Big Fork River	NW¼SE¼ sec.8, T.149 N., R.28 W., Itasca County, at bridge on County Highway 29, 0.8 mile northeast of Aluwood, Minn.			8-31-72	8.32
Popple River	Big Fork River	NW¼NW¼ sec.12, T.148 N., R.28 W., Itasca County, at bridge on County Highway 32, 3 miles northwest of Squaw Lake, Minn.			9-1-72	9.20
Round Lake tributary	Round Lake	NW¼NW¼ sec.9, T.148 N., R.28 W., Itasca County, at culverts on County Highway 32, 5.4 miles northwest of Squaw Lake, Minn.			8-31-72	1.06
Popple River	Big Fork River	NE¼SE¼ sec.28, T.149 N., R.27 W., Itasca County, at bridge on National Forest Road, 4.3 miles southwest of Dora Lake, Minn.			9-1-72	71.6
Moose Brook	Big Fork River	NW¼NE¼ sec.35, T.150 N., R.27 W., Itasca County, at triple box culvert on County Highway 26, 2.4 miles northwest of Dora Lake, Minn.			9-1-72	1.88
Big Fork River	Rainy River	Lat 47°45'05", long 93°46'33", SE¼NE¼ sec.27, T.61 N., R.27 W., Itasca County, at bridge on State Highway 6, 5.5 miles west of Bigfork, Minn.	585	1970-71	*8-30-72	240
Big Fork River tributary	Big Fork River	SE¼NE¼ sec.28, T.61 N., R.26 W., Itasca County, at culvert on County Road 236, at Bigfork, Minn.			9-1-72	1.30
Rice River	Big Fork River	NE¼NW¼ sec.7, T.59 N., R.25 W., Itasca County, at culvert at outlet of Clubhouse Lake, on National Forest Road, 6 miles northeast of Marcell, Minn.			9-1-72	10.8

* 1972 water year measurements other than those shown are listed under measurements made at low-flow partial-record stations.

Discharge measurements made in the Big Fork River basin, Minn., Aug. 29 to Sept. 1, 1972--Continued

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
Rice River tributary	Rice River	NW¼NE¼ sec.7, T.59 N., R.25 W., Itasca County, at outlet of East Lake, 6.3 miles northeast of Marcell, Minn.			9-1-72	16.4
Rice River	Big Fork River	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, Minn.	76	1969-71	*8-30-72	56.0
Rice River tributary	Rice River	SW¼SW¼ sec.5, T.60 N., R.26 W., Itasca County, at culvert on State Highway 38, 3 miles southwest of Bigfork, Minn.			9-1-72	.12
Gale Brook	Rice River	SE¼SW¼ sec.21, T.60 N., R.25 W., Itasca County, at culvert on National Forest Road, 9.2 miles northeast of Marcell, Minn.			9-1-72	4.52
Gale Brook	Rice River	NE¼NW¼ sec.4, T.60 N., R.26 W., Itasca County, at culvert on County Highway 7, 1.5 miles south of Bigfork, Minn.		1969-71	*9-1-72	10.4
Big Fork River	Rainy River	SE¼SW¼ sec.23, T.62 N., R.25 W., Itasca County, at bridge on State Highway 1, 6.6 miles southeast of Craigville, Minn.			9-1-72	382
Deer Creek	Big Fork River	NE¼SE¼ sec.23, T.62 N., R.25 W., Itasca County, at bridge on County Road 230, 7.2 miles east of Effie, Minn.			8-31-72	43.1
Big Fork River	Rainy River	NE¼SW¼ sec.14, T.63 N., R.27 W., Koochiching County, at bridge on State Highway 6, 9.5 miles northwest of Effie, Minn.	950	1970-71	*8-30-72	472
Bowerman Brook	Big Fork River	SW¼SW¼ sec.14, T.63 N., R.27 W., Koochiching County, at culvert on Caldwell Trail, 7.2 miles north of Effie, Minn.		1970-71	*9-1-72	.79
Plum Creek	Big Fork River	NW¼NW¼ sec.36, T.152 N., R.25 W., Koochiching County, at bridge on Caldwell Trail, 10 miles northwest of Effie, Minn.			9-1-72	.80
Caldwell Brook	Big Fork River	NE¼SW¼ sec.2, T.151 N., R.27 W., Koochiching County, at bridge on County Road 52, 6.5 miles east of Mizpah, Minn.			8-31-72	.05
Caldwell Brook	Big Fork River	SW¼NW¼ sec.29, T.152 N., R.25 W., Koochiching County, at bridge on Caldwell Trail, 11.6 miles north of Effie, Minn.		1969-71	*8-31-72	2.34
Big Fork River	Rainy River	NE¼SW¼ sec.13, T.64 N., R.27 W., Koochiching County, at bridge on State Highway 6, 9.8 miles southeast of Margie, Minn.			8-31-72	405
Reilly Brook	Big Fork River	SE¼SW¼ sec.7, T.63 N., R.25 W., Koochiching County, at bridge on County Road 62, 4 miles northeast of Craigville, Minn.			8-31-72	6.98
Reilly Brook	Big Fork River	SW¼NW¼ sec.8, T.64 N., R.26 W., Koochiching County, at mouth, 11 miles southeast of Big Falls, Minn.			8-31-72	30.1
Big Fork River tributary	Big Fork River	SW¼SW¼ sec.28, T.65 N., R.26 W., Koochiching County, at culvert on State Highway 6, 8.5 miles southeast of Big Falls, Minn.			8-31-72	.08
Tributary No. 2	Big Fork River	NW¼NE¼ sec.21, T.65 N., R.26 W., Koochiching County, at culvert on State Highway 6, 7.2 miles southeast of Big Falls, Minn.			8-31-72	.47

* 1972 water year measurements other than those shown are listed under measurements made at low-flow partial-record stations.

Discharge measurements made in the Big Fork River basin, Minn., Aug. 29 to Sept. 1, 1972--Continued

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
Tributary ditch	Big Fork River	SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec.34, T.155 N., R.25 W., Koochiching County, at culvert on County Highway 30, 1.6 miles west of Big Falls, Minn.			9-1-72	3.60
Sturgeon River	Big Fork River	SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec.28, T.155 N., R.27 W., Koochiching County, at bridge on State Forest Road, 11.5 miles northwest of Margie, Minn.			8-31-72	11.7
Tributary ditch	Sturgeon River	NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec.28, T.155 N., R.27 W., Koochiching County, at culvert on State Forest Road, 14.2 miles west of Big Falls, Minn.			8-31-72	1.04
Tributary No. 2	Sturgeon River	NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec.28, T.155 N., R.27 W., Koochiching County, at bridge on State Forest Road, 14.1 miles west of Big Falls, Minn.			8-31-72	8.41
Tributary No. 3	Big Fork River	SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec.6, T.65 N., R.26 W., Koochiching County, at culvert on State Highway 6, 3.5 miles southeast of Big Falls, Minn.			8-31-72	0
Tributary No. 4	Big Fork River	SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec.36, T.66 N., R.27 W., Itasca County, at culvert on State Highway 6, 3.2 miles southeast of Big Falls, Minn.			8-31-72	.05
Tributary No. 5	Big Fork River	NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec.1, T.154 N., R.25 W., Koochiching County, at double culvert on State Highway 6, at Big Falls, Minn.			9-1-72	.14
Dinner Creek	Sturgeon River	SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec.16, T.152 N., R.26 W., Koochiching County, at culvert on State Forest Road, 6.9 miles northeast of Gemmell, Minn.			8-31-72	1.23
Dinner Creek	Sturgeon River	NW $\frac{1}{4}$ SE $\frac{1}{4}$ sec.10, T.153 N., R.26 W., Koochiching County, at box culvert on U.S. Highway 71, at Margie, Minn.			8-31-72	7.74
Dinner Creek	Sturgeon River	SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec.30, T.155 N., R.26 W., Koochiching County, at mouth, 10.6 miles west of Big Falls, Minn.			8-31-72	8.09
Tributary No. 3	Sturgeon River	SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec.28, T.155 N., R.26 W., Koochiching County, at culvert on County Highway 30, 8.2 miles west of Big Falls, Minn.			8-31-72	1.00
Sturgeon River	Big Fork River	NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec.26, T.155 N., R.26 W., Koochiching County, at bridge on County Highway 30, 6.2 miles northwest of Big Falls, Minn.	322	1970-71	*8-31-72	33.0
Big Fork River	Rainy River	NW $\frac{1}{4}$ NE $\frac{1}{4}$ sec.24, T.157 N., R.25 W., Koochiching County, at bridge on State Highway 1, at Lindford, Minn.			8-31-72	695
Bear River	Big Fork River	SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec.19, T.67 N., R.26 W., Koochiching County, at U.S. Highway 71, 6.6 miles northeast of Big Falls, Minn.			8-31-72	6.42
Bear River tributary	Bear River	NW $\frac{1}{4}$ SE $\frac{1}{4}$ sec.7, T.67 N., R.26 W., Koochiching County, at culvert on U.S. Highway 71, 8.9 miles northeast of Big Falls, Minn.			8-31-72	2.02
Bear River	Big Fork River	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, Minn.	113	1970-71	*8-31-72	18.4

* 1972 water year measurements other than those shown are listed under measurements made at low-flow partial-record stations.

Low-flow investigations in the Lake of the Woods basin

During the period Aug. 28-30, 1972, a series of discharge measurements was made to study variations of base flow in the Lake of the Woods basin. In the two weeks preceding the measurement period, there were light rains on Aug. 15, 16, and again on Aug. 20, 21. Rainfall amounts varied from 0.1 to 0.2 inch for each storm. There was little or no increase in streamflow from these rains so flows measured should represent base flow.

Discharge measurements made in the Lake of the Woods basin, Minn., Aug. 28-30, 1972

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
Black River	Rainy River	NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec.2, T.157 N., R.28 W., Koochiching County, at culvert on State Forest Road, 15 miles southeast of Frontier, Minn.			8-29-72	0
Tributary ditch	Black River	NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec.29, T.158 N., R.27 W., Koochiching County, at ditch 14 miles southeast of Frontier, Minn.			8-29-72	0
Black River	Rainy River	SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec.28, T.158 N., R.27 W., Koochiching County, at bridge on County Road 101, 11 miles south of Birchdale, Minn.			8-29-72	3.52
Black River tributary	Black River	SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec.28, T.158 N., R.27 W., Koochiching County, at mouth 11.5 miles south of Birchdale, Minn.			8-29-72	0
Tributary ditch	Black River	NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec.27, T.158 N., R.27 W., Koochiching County, at culvert on County Road 101, 13 miles east of Loman, Minn.			8-29-72	.28
Tributary ditch	Black River	NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec.22, T.157 N., R.25 W., Koochiching County, at culvert on county road, 2.5 miles west of Lindford, Minn.			8-29-72	0
Black River	Rainy River	SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec.34, T.158 N., R.25 W., Koochiching County, on County Road 11, 4.0 miles south by southwest of Loman, Minn.	255	1970-71	*8-29-72	9.00
West Fork Black River	Black River	SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec.22, T.159 N., R.27 W., Koochiching County, at bridge on County Road 86, 4 miles south of Birchdale, Minn.			8-29-72	.29
Tributary ditch	West Fork Black River	SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec.22, T.159 N., R.27 W., Koochiching County, 100 ft above bridge on County Road 86, 6 miles southwest of Manitou, Minn.			8-29-72	.81
West Fork Black River	Black River	SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec.3, T.158 N., R.25 W., Koochiching County, at bridge on County Highway 82, 1.6 miles northwest of Loman, Minn.	118	1969-71	*8-28-72	7.96
Rainy River	Lake of the Woods	Lat 48°38'04", long 93°54'47", sec.36, T.160 N., R.26 W., Koochiching County, on left bank above Manitou Rapids, 3.5 miles east of Manitou, and 4 miles west of Indus, Minn.	19,400	1928-71 [#]	8-29-72	14,000
Tributary ditch	Rainy River	SE $\frac{1}{4}$ NW $\frac{1}{4}$ sec.8, T.160 N., R.28 W., Koochiching County, at culvert on State Highway 11, at Border, Minn.			8-30-72	0
Tributary ditch	Rainy River	NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec.7, T.160 N., R.28 W., Koochiching County, at culvert on State Highway 11, 1 mile west of Border, Minn.			8-30-72	0
Rapid River	Rainy River	SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec.24, T.157 N., R.34 W., Lake of the Woods County, at bridge on State Forest Road, 13.5 miles south of Faunce, Minn.			8-29-72	1.36
Tributary ditch	Rapid River	SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec.18, T.157 N., R.33 W., Lake of the Woods County, at culvert on State Forest Road, 12.5 miles south of Faunce, Minn.			8-29-72	.20

* 1972 water year measurements other than those shown are listed under measurements made at low-flow partial-record stations.

[#] Continuous-record gaging station.

Discharge measurements made in the Lake of the Woods basin, Minn., Aug. 28-30, 1972--Continued

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
Tributary ditch No. 2	Rapid River	NE¼NE¼ sec.24, T.157 N., R.33 W., Lake of the Woods County, at ditch 10.2 miles southwest of Carp, Minn.			8-29-72	.11
Tributary ditch No. 3	Rapid River	SE¼SE¼ sec.13, T.157 N., R.33 W., Lake of the Woods County, at culvert on State Forest Road, 10 miles southwest of Carp, Minn.			8-29-72	.17
Tributary ditch No. 4	Rapid River	NW¼SW¼ sec.16, T.157 N., R.32 W., Lake of the Woods County, at culvert on State Forest Road, 8.5 miles southwest of Carp, Minn.			8-29-72	4.80
Miller Creek	Rapid River	SW¼NW¼ sec.11, T.157 N., R.32 W., Lake of the Woods County, at culvert on State Forest Road, 6.3 miles southwest of Carp, Minn.			8-29-72	1.27
Rapid River	Rainy River	NE¼NW¼ sec.11, T.157 N., R.32 W., Lake of the Woods County, 19 miles south of Pitt, Minn.			8-28-72	25.4
Chase Brook	Rapid River	SW¼SE¼ sec.1, T.157 N., R.32 W., Lake of the Woods County, at culvert on State Forest Road, 4.8 miles southwest of Carp, Minn.			8-28-72	2.07
Thompson Brook	Chase Brook	SE¼SE¼ sec.1, T.157 N., R.32 W., Lake of the Woods County, at culvert on State Forest Road, 4.7 miles southwest of Carp, Minn.			8-28-72	.85
Troy Creek	Rapid River	NW¼NW¼ sec.9, T.157 N., R.31 W., Lake of the Woods County, at bridge on County Highway 1, 4.5 miles south of Carp, Minn.			8-28-72	2.60
Christy Creek	Rapid River	SW¼SW¼ sec.11, T.158 N., R.31 W., Lake of the Woods County, at bridge on County Road 83, 2.3 miles east of Carp, Minn.			8-30-72	.16
Rapid River	Rainy River	SW¼SE¼ sec.2, T.158 N., R.31 W., Lake of the Woods County, 3.0 miles northeast of Carp, Minn.			8-30-72	30.0
North Branch Rapid River	Rapid River	NW¼NW¼ sec.30, T.158 N., R.33 W., Lake of the Woods County, at culvert on State Forest Road, 7.8 miles south of Faunce, Minn.			8-29-72	.37
North Branch Rapid River tributary	North Branch Rapid River	NE¼SE¼ sec.36, T.158 N., R.34 W., Lake of the Woods County, at double box culvert on State Forest Road, 9 miles south of Faunce, Minn.			8-29-72	.14
North Branch Rapid River	Rapid River	SE¼SE¼ sec.13, T.158 N., R.33 W., Lake of the Woods County, at bridge on State Forest Road, 4.2 miles west of Carp, Minn.			8-29-72	1.59
North Branch Rapid River	Rapid River	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, Minn.		1969-71	*8-30-72	1.66
Kvalnes Creek	North Branch Rapid River	SE¼SE¼ sec.32, T.159 N., R.31 W., Lake of the Woods County, at culvert on County Road 1, 12.5 miles north of Carp, Minn.			8-29-72	0
Tributary ditch No. 5	Rapid River	SE¼SE¼ sec.1, T.158 N., R.31 W., Lake of the Woods County, at culvert on County Road 83, 4 miles northeast of Carp, Minn.			8-30-72	0

* 1972 water year measurements other than those shown are listed under measurements made at low-flow partial-record stations.

Discharge measurements made in the Lake of the Woods basin, Minn., Aug. 28-30, 1972--Continued

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
Rapid River	Rainy River	Lat 48°32'10", long 94°33'45", NE¼ sec.1, T.158 N., R.31 W., Lake of the Woods County, at bridge on State Highway 72, and 12 miles south of Baudette, Minn.	543	1957-71*	8-30-72	34.2
Tributary ditch	Rapid River	NE¼SW¼ sec.6, T.158 N., R.30 W., Lake of the Woods County, at bridge on County Highway 16, 4.8 miles northeast of Carp, Minn.			8-30-72	3.00
Tributary ditch	Rapid River	SE¼NE¼ sec.28, T.159 N., R.30 W., Lake of the Woods County, at ditch 8 miles northeast of Carp, Minn.			8-29-72	0
East Fork Rapid River	Rapid River	SW¼SE¼ sec.26, T.158 N., R.29 W., Koochiching County, at culvert on State Forest Road, 14.5 miles south-east of Carp, Minn.			8-29-72	4.34
East Fork Rapid River tributary	East Fork Rapid River	NE¼SW¼ sec.28, T.158 N., R.29 W., Koochiching County, at culvert on State Forest Road, 12.2 miles south-east of Carp, Minn.			8-29-72	0
Bartons Creek	East Fork Rapid River	NE¼NE¼ sec.36, T.159 N., R.30 W., Lake of the Woods County, on County Road 100, 11 miles southwest of Frontier, Minn.			8-29-72	0
East Fork Rapid River	Rapid River	NE¼NE¼ sec.19, T.160 N., R.29 W., Koochiching County, at Eidems Rapids, 2.0 miles southeast of Clementson, Minn.	247	1970-71	*8-30-72	7.54
Rapid River	Rainy River	NE¼SE¼ sec.12, T.160 N., R.30 W., Lake of the Woods County, at bridge on State Highway 11, at Clementson, Minn.	853	1969-71	*8-30-72	67.0
Silver Creek	Rainy River	SW¼SE¼ sec.10, T.160 N., R.30 W., Lake of the Woods County, at bridge on County Road 94, 2 miles west of Clementson, Minn.			8-30-72	0
Tributary ditch	Rainy River	NW¼NW¼ sec.7, T.160 N., R.30 W., Lake of the Woods County, at culvert on County Road 78, 1 mile southeast of Baudette, Minn.			8-29-72	0
Baudette River	Rainy River	NW¼SW¼ sec.8, T.159 N., R.31 W., Lake of the Woods County, on County Road 77, 7 miles northwest of Carp, Minn.			8-30-72	0
Tributary ditch	Baudette River	NE¼NE¼ sec.8, T.159 N., R.31 W., Lake of the Woods County, at ditch, 7.5 miles north of Carp, Minn.			8-30-72	0
Baudette River	Rainy River	On line between secs.22 and 27, T.160 N., R.30 W., Lake of the Woods County, at bridge on county road, 4 miles southwest of Baudette, Minn.		1969-71	*8-30-72	.004
West Fork Baudette River	Baudette River	NW¼NW¼ sec.22, T.160 N., R.31 W., Lake of the Woods County, at bridge on County Road 77, 3.5 miles southwest of Baudette, Minn.			8-30-72	0
Miller Creek	Rainy River	SW¼SW¼ sec.33, T.161 N., R.31 W., Lake of the Woods County, at culvert on old State Highway 11, at Baudette, Minn.			8-28-72	0
Winter Road River	Rainy River	NW¼NW¼ sec.16, T.160 N., R.33 W., Lake of the Woods County, at bridge on County Road 4, 6 miles southeast of Williams, Minn.			8-29-72	.02

* 1972 water year measurements other than those shown are listed under measurements made at low-flow partial-record stations.

* Continuous-record gaging station.

Discharge measurements made in the Lake of the Woods basin, Minn., Aug. 28-30, 1972--Continued

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Data	Discharge (cfs)
Winter Road River	Rainy River	NW¼SW¼ sec.1, T.160 N., R.32 W., Lake of the Woods County, at bridge on County Road 76, 1.2 miles southeast of Pitt, Minn.			8-28-72	.04
Peppermint Creek	Winter Road River	SE¼NE¼ sec.21, T.160 N., R.32 W., Lake of the Woods County, at bridge on State Forest Road, 3.8 miles southwest of Pitt, Minn.			8-28-72	0
Tributary ditch	Peppermint Creek	SE¼SE¼ sec.11, T.160 N., R.32 W., Lake of the Woods County, at bridge on County Highway 3, 2.5 miles southeast of Pitt, Minn.			8-28-72	0
Winter Road River	Rainy River	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, Minn.	138	1969-71	*8-28-72	.44
Wabanica Creek	Rainy River	SW¼NW¼ sec.14, T.161 N., R.32 W., Lake of the Woods County, at culvert on county road, 3.2 miles northeast of Pitt, Minn.			8-28-72	0
Canfield Creek	Bostick Creek	NW¼SW¼ sec.13, T.161 N., R.33 W., Lake of the Woods County, at bridge on County Road 96, 1.5 miles northwest of Graceton, Minn.			8-29-72	0
Bostick Creek	Lake of the Woods	NW¼NW¼ sec.6, T.161 N., R.32 W., Lake of the Woods County, at bridge at County Highway 4, 4.2 miles north of Graceton, Minn.			8-29-72	0
Bostick Creek	Lake of the Woods	SW¼SW¼ sec.28, T.162 N., R.32 W., Lake of the Woods County, at bridge on County Road 70, 7.1 miles northwest of Pitt, Minn.			8-29-72	0
South Branch Zipple Creek	Lake of the Woods	SE¼SE¼ sec.22, T.162 N., R.33 W., Lake of the Woods County, at culverts on County Highway 12, 5.8 miles northeast of Williams, Minn.			8-29-72	.27
Tomato Creek	County ditch No. 1	NE¼NE¼ sec.3, T.161 N., R.34 W., Lake of the Woods County, at culvert on County Road 58, 3 miles northwest of Williams, Minn.			8-29-72	.19
County ditch No. 1	West Branch Zipple Creek	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, Minn.		1969-71	*8-29-72	.43
Willow Creek	Lake of the Woods	SE¼SW¼ sec.35, T.163 N., R.35 W., Roseau County, at culvert on county road, 5.8 miles northwest of Roosevelt, Minn.			8-29-72	0
Tributary ditch	Lake of the Woods	SW¼SW¼ sec.3, T.162 N., R.35 W., Roseau County, at culvert on County Highway 12, 5.2 miles northwest of Roosevelt, Minn.			8-29-72	0
Tributary ditch	Lake of the Woods	SW¼SE¼ sec.4, T.162 N., R.35 W., Roseau County, at culvert on County Highway 12, 2.8 miles northeast of Swift, Minn.			8-29-72	0
County ditch No. 26	Lake of the Woods	SW¼SE¼ sec.5, T.162 N., R.35 W., Roseau County, at culvert on county road, 2 miles northeast of Swift, Minn.			8-29-72	0
East Branch Warroad River	Warroad River	NW¼NW¼ sec.35, T.161 N., R.35 W., Roseau County, at bridge on State Forest Road, 5.5 miles southwest of Roosevelt, Minn.			8-29-72	0

* 1972 water year measurements other than those shown are listed under measurements made at low-flow partial-record stations.

Discharge measurements made in the Lake of the Woods basin, Minn., Aug. 28-30, 1972--Continued

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
East Branch Warroad River	Warroad River	NW¼NW¼ sec.2, T.161 N., R.36 W., Roseau County, at culvert on County Highway 2, 4.1 miles southwest of Swift, Minn.			8-30-72	.17
East Branch Warroad River	Warroad River	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.	102	1946-54 1966-71*	8-30-72	0
West Branch Warroad River	Warroad River	SW¼SW¼ sec.6, T.161 N., R.36 W., Roseau County, at bridge on County Highway 2, 7.5 miles southwest of Swift, Minn.			8-30-72	.04
West Branch Warroad River	Warroad River	Lat 48°52'00", long 95°21'20", in SE¼NE¼ sec.12, T.162 N., R.37 W., Roseau County, on downstream handrail of bridge near center of span, 0.5 mile upstream from Bulldog Run, and 2.5 miles south of Warroad.	110	1946-71*	8-30-72	.87
Bulldog Run	West Branch Warroad River	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.	14.2	1946-51 1966-71*	8-30-72	0

* 1972 water year measurements other than those shown are listed under measurements made at low-flow partial-record stations.

PART 2. WATER QUALITY RECORDS

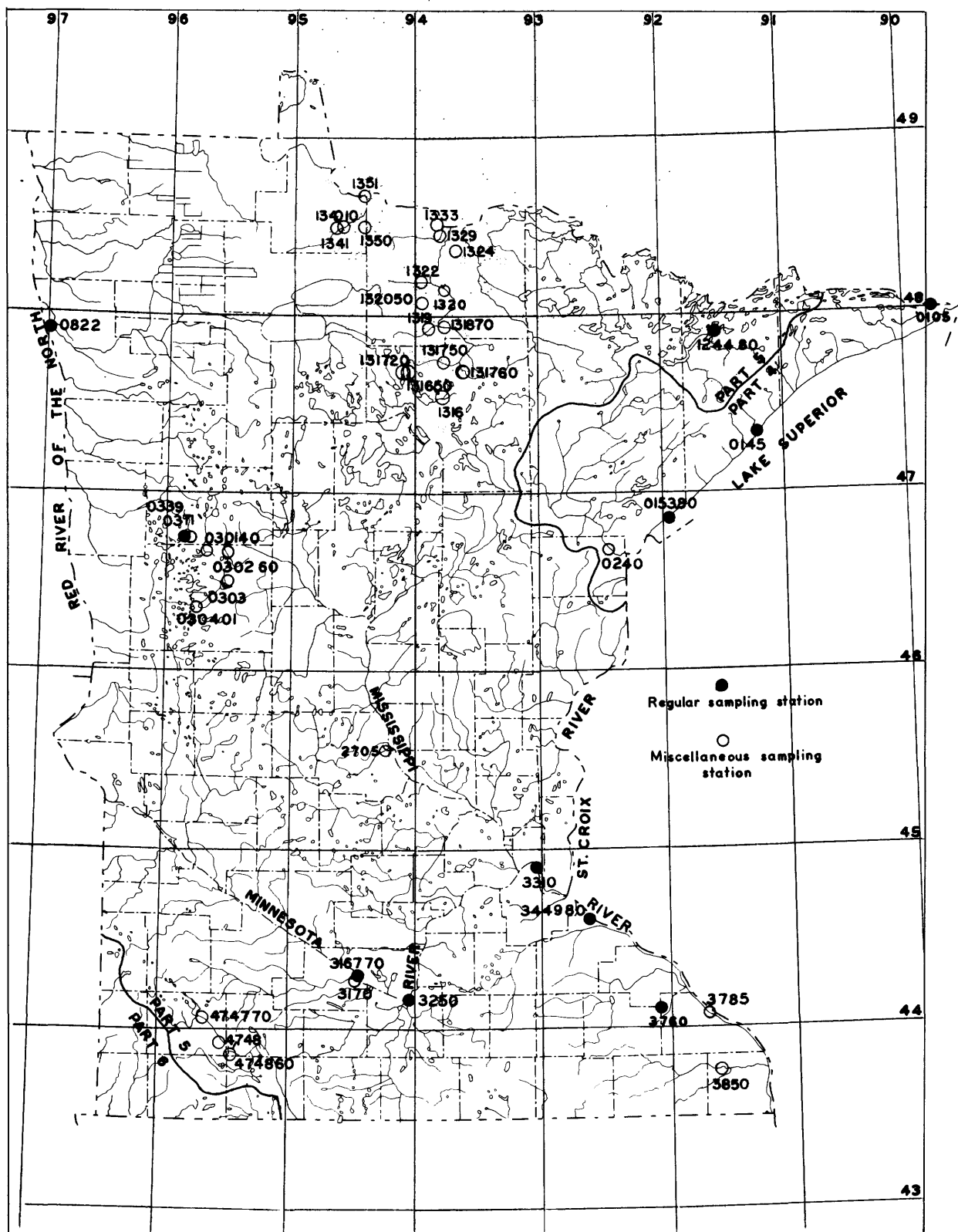


Figure 3.-- Map showing location of water-quality stations.

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 1972.

EXTREMES, current year: Water temperatures: Maximum, 22°C Aug. 20; minimum, freezing point on many days during winter period.

Period of record.--Water temperatures: Maximum, 22°C Aug. 20, 1972; minimum, freezing point on many days during winter period.

TEMPERATURE (°C) OF WATER, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972
(ONCE-DAILY MEASUREMENT AT ABOUT 0800)

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	12.5	---	---	---	---	---	---	1.0	15.0	---	18.5	18.5
2	12.5	---	---	---	---	---	---	1.5	16.0	---	18.5	---
3	12.5	---	---	---	---	---	---	1.5	---	15.5	16.5	---
4	12.0	---	---	---	---	---	---	3.0	---	15.0	16.5	---
5	12.0	---	---	---	---	---	---	3.5	16.5	17.0	---	13.5
6	10.5	---	---	---	---	---	---	---	16.5	17.5	---	14.5
7	9.5	---	---	---	---	---	---	---	17.0	17.5	15.5	13.5
8	10.0	---	---	---	---	---	---	5.0	---	17.5	15.5	13.0
9	9.5	---	---	---	---	---	---	6.0	17.0	17.5	15.5	---
10	8.0	---	---	---	---	---	---	6.5	---	18.0	15.0	---
11	8.0	---	---	---	---	---	---	8.0	---	17.0	16.5	14.5
12	7.5	---	---	---	---	---	---	9.0	13.5	19.5	---	15.0
13	7.0	---	---	---	---	---	---	---	13.5	19.5	---	15.5
14	9.0	---	---	---	---	---	---	---	14.5	20.0	18.0	13.5
15	8.5	---	---	---	---	---	---	8.5	15.0	20.0	17.5	13.5
16	---	---	---	---	---	---	---	10.0	14.0	18.5	18.5	---
17	---	2.5	---	---	---	---	---	11.5	---	18.5	19.5	---
18	---	3.5	---	0.0	---	---	---	12.5	---	18.5	21.0	12.5
19	---	2.0	---	---	---	---	---	13.5	16.0	19.0	---	12.5
20	---	---	---	---	---	---	---	---	14.5	20.5	21.0	14.0
21	---	---	---	---	---	---	1.0	---	15.5	19.5	22.0	---
22	---	---	---	---	---	---	---	15.5	16.0	18.5	17.5	9.5
23	---	---	---	---	0.5	---	---	16.0	15.0	---	16.5	---
24	---	---	---	---	---	---	1.0	16.0	---	18.5	17.5	---
25	---	---	---	---	---	---	1.0	17.0	---	18.0	17.0	9.5
26	---	---	---	---	---	---	1.0	17.5	18.5	17.5	---	8.5
27	---	---	---	---	---	---	1.0	---	18.5	17.0	---	8.0
28	---	---	---	---	---	0.0	1.0	---	18.5	18.0	19.0	8.5
29	---	---	0.5	---	---	---	---	---	18.5	19.0	18.5	8.5
30	---	---	---	---	---	---	---	14.0	19.0	19.0	18.5	---
31	---	---	---	---	---	---	---	14.0	---	19.5	20.5	---
MONTH	---	---	---	---	---	---	---	---	---	18.5	---	---
YEAR	13.5											

NOTE: NUMBER OF MISSING DAYS OF RECORD EXCEEDED 20% OF YEAR

STREAMS TRIBUTARY TO LAKE SUPERIOR

04014500 BAPTISM RIVER NEAR BEAVER BAY, MINN.

LOCATION.--Lat 47°20'15", long 91°12'00", in SE 1/4 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 1972.

EXTREMES, current year.--Water temperatures: Maximum, 23.0°C June 8; minimum, freezing point on many days during winter period.

Period of record.--Water temperatures: Maximum, 23.0°C June 8, 1972; minimum, freezing point on many days during winter period.

TEMPERATURE (°C) OF WATER, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972
(ONCE-DAILY MEASUREMENT AT ABOUT 0800)

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	13.0	3.0	0.0	---	---	---	0.0	2.0	16.0	18.5	20.5	14.5
2	10.5	3.0	0.0	---	---	---	0.0	2.0	16.0	15.5	19.0	15.0
3	13.5	3.0	0.0	---	---	---	0.0	2.0	22.0	14.5	18.5	15.5
4	10.5	0.0	0.0	---	---	---	0.0	4.0	20.0	14.0	19.5	15.0
5	11.5	3.0	0.0	---	---	---	0.0	5.0	20.0	17.5	20.0	15.0
6	10.0	0.0	0.0	---	---	---	0.0	4.0	19.5	18.5	14.0	15.0
7	---	3.0	0.0	---	---	---	0.0	4.0	21.0	19.0	14.0	15.0
8	10.0	1.0	0.0	---	---	---	0.0	6.0	23.0	16.0	14.5	15.0
9	9.0	1.0	0.0	---	---	---	0.0	6.0	18.0	15.5	14.5	15.0
10	9.0	1.0	0.0	---	---	---	0.0	10.0	15.0	15.0	14.5	14.5
11	9.0	2.0	0.0	---	---	---	0.0	8.0	13.0	18.5	15.0	14.5
12	4.0	2.0	---	---	---	---	0.0	10.0	13.0	19.5	15.0	14.5
13	9.0	2.0	0.0	---	---	---	0.0	10.0	13.0	18.0	18.0	14.0
14	8.0	2.0	---	---	---	---	0.0	10.0	14.0	19.5	16.0	14.0
15	8.0	3.0	---	---	---	---	0.0	10.0	15.0	19.5	15.5	13.0
16	7.0	3.0	---	---	---	---	0.5	10.5	15.0	19.5	15.0	12.0
17	10.0	2.0	---	0.0	---	---	0.5	10.5	15.0	18.0	18.0	12.0
18	10.0	0.0	---	---	---	---	0.5	15.0	14.0	18.5	17.5	12.0
19	10.0	0.0	---	---	---	0.0	0.5	17.0	16.0	19.5	20.0	12.0
20	10.0	0.0	---	---	---	0.0	0.5	20.0	17.0	20.0	20.0	11.0
21	10.0	0.0	---	---	---	0.0	0.0	20.0	16.0	19.5	20.0	12.0
22	10.0	1.0	---	---	1.0	0.0	0.0	20.0	16.0	18.0	20.0	12.0
23	9.0	1.0	---	---	---	0.0	0.5	20.0	17.0	18.5	20.0	11.0
24	9.0	1.0	---	---	---	0.0	2.0	20.0	18.0	19.0	19.5	11.0
25	9.0	1.0	---	---	---	0.0	3.0	20.0	18.0	19.5	18.5	10.5
26	9.0	1.0	---	---	---	0.0	4.0	18.0	16.0	19.0	19.0	10.5
27	10.0	0.0	---	---	---	0.0	3.0	19.0	15.5	18.5	20.0	9.0
28	8.0	0.0	---	---	---	0.0	3.0	18.0	14.5	16.5	20.5	8.0
29	5.0	0.0	---	---	---	0.0	3.0	15.0	21.0	19.5	20.5	7.5
30	5.0	0.0	---	---	---	0.0	3.0	15.0	21.5	20.0	20.0	7.0
31	5.0	---	---	---	---	0.0	---	16.0	---	20.5	15.5	---
WYNT4	9.0	1.0	---	---	---	---	1.0	12.0	17.0	18.0	18.0	12.5
YEAR	10.0											

NOTE: NUMBER OF MISSING DAYS OF RECORD EXCEEDED 20% OF YEAR

STREAMS TRIBUTARY TO LAKE SUPERIOR

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 1971 TO SEPTEMBER 1972

DATE	TEMPER- ATURE (DEG C)	TUR- BID- ITY (JTU)	COLOR (PLAT- INUM- COBALT UNITS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	DIS- SOLVED OXYGEN (MG/L)	BIO- CHEM- ICAL OXYGEN DEMAND (MG/L)	PH	ALKA- LITY AS CACO3 (MG/L)	HARD- NESS (CA+MG) (MG/L)	DIS- SOLVED CHLO- RIDE (CL) (MG/L)	DIS- SOLVED SULFATE (SO4) (MG/L)
OCT.											
04...	13.0	2	0	95	10.3	.3	8.1	44	44	1.3	4.7
04...	13.0	--	--	--	--	--	--	--	--	--	--
07...	10.0	1	5	95	12.0	.3	7.9	44	45	1.0	4.3
12...	11.1	1	0	92	10.7	.4	7.9	43	44	1.3	3.8
18...	11.0	1	0	90	10.9	.3	8.0	44	44	1.5	4.8
25...	10.6	1	0	90	10.8	.2	8.1	43	44	1.5	3.6
NOV.											
01...	10.0	2	0	95	11.0	.2	8.0	43	44	1.3	3.8
08...	6.0	--	--	--	--	--	--	--	--	--	--
09...	6.1	1	0	95	12.5	.0	7.8	43	44	1.3	2.9
15...	6.7	5	0	97	12.0	.2	8.0	43	44	1.3	4.1
22...	6.7	4	0	95	12.1	.2	7.9	43	44	1.3	3.5
29...	4.4	3	0	95	12.1	.2	7.9	43	44	1.3	5.0
DEC.											
06...	4.4	3	0	95	12.3	.2	7.9	43	44	1.3	4.3
13...	3.9	3	0	95	11.7	.3	8.1	43	44	1.3	3.4
13...	4.0	--	--	--	--	--	--	--	--	--	--
20...	3.3	2	0	92	12.4	.0	7.9	43	44	1.3	3.6
27...	2.8	0	0	92	13.0	.2	7.9	43	44	1.2	4.3
JAN.											
03...	3.3	1	0	95	12.6	.2	7.9	43	44	1.3	4.3
10...	2.8	0	0	95	12.8	.0	7.9	43	44	1.3	3.6
17...	2.8	2	0	95	12.7	.2	7.9	43	44	1.3	3.0
17...	3.0	--	--	--	--	--	--	--	--	--	--
24...	2.2	1	0	95	13.0	.1	7.9	43	44	1.3	3.8
31...	1.7	2	0	93	13.1	.1	8.0	43	44	1.3	3.4
FEB.											
07...	.6	1	0	92	13.4	.3	7.8	43	44	1.3	2.8
14...	.6	0	0	92	13.2	.3	7.9	43	44	1.3	3.4
22...	.6	0	5	92	13.5	.2	7.9	43	44	1.3	3.8
22...	.5	--	--	--	--	--	--	--	--	--	--
28...	.6	0	5	95	13.6	.0	7.9	43	44	1.3	4.1
MAR.											
06...	.7	0	0	95	13.4	.2	7.9	43	44	1.3	2.9
13...	.6	0	0	91	14.9	.2	7.9	43	44	1.3	4.3
20...	.6	1	5	90	14.1	.2	8.0	43	44	1.3	3.8
27...	.6	1	5	92	13.6	.2	7.9	43	44	1.3	4.1
27...	.6	--	--	--	--	--	--	--	--	--	--
APR.											
03...	1.1	2	5	92	13.5	.2	8.1	43	44	1.3	3.8

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.

[illegible]

STREAMS TRIBUTARY TO LAKE SUPERIOR

04015380 LAKE SUPERIOR AT DULUTH, MINN.--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DATE	DIS-SOLVED SULFATE (504) (MG/L)	IMME- DIATE COLI- FORM (COL. PER 100 ML)	DIS-SOLVED SODIUM (NA) (MG/L)	DIS- SOLVED PD- TAS- SIUM (K) (MG/L)	DIS- SOLVED FLUO- GINE (F) (MG/L)	TOTAL NITRO- GEN (N) (MG/L)	ORGANIC NITRO- GEN (N) (MG/L)	AMMONIA NITRO- GEN (N) (MG/L)	DIS- SOLVED NITRITE (N) (MG/L)
APR.									
10...	3.6	1	--	--	--	--	--	--	--
17...	5.6	18	--	--	--	--	--	--	--
24...	4.3	24	--	--	--	--	--	--	--
MAY									
01...	4.0	11	--	--	--	--	--	--	--
06...	--	--	--	--	--	.31	.00	.07	--
09...	--	--	1.0	.7	.1	.41	.09	.02	--
15...	4.7	10	--	--	--	--	--	--	--
22...	4.3	0	--	--	--	--	--	--	--
30...	4.1	54	--	--	--	--	--	--	--
JUNE									
05...	4.2	1	--	--	--	--	--	--	--
12...	4.1	--	--	--	--	--	--	--	--
19...	4.3	0	--	--	--	--	--	--	--
26...	4.1	1	--	--	--	--	--	--	--
JULY									
05...	3.8	1	--	--	--	--	--	--	--
10...	4.3	2	--	--	--	--	--	--	--
10...	--	--	--	--	--	.37	.09	.01	.00
17...	3.4	2	--	--	--	--	--	--	--
24...	5.4	17	--	--	--	--	--	--	--
AUG.									
08...	5.6	8	--	--	--	--	--	--	--
14...	3.8	5	--	--	--	--	--	--	--
14...	--	--	1.5	.4	.1	.37	.10	.04	.00
21...	4.3	57	--	--	--	--	--	--	--
28...	4.5	45	--	--	--	--	--	--	--
SEP.									
05...	5.0	10	--	--	--	--	--	--	--
11...	4.3	15	--	--	--	--	--	--	--
18...	4.1	18	--	--	--	--	--	--	--
18...	--	--	--	--	--	.27	.04	.04	.00
25...	4.3	95	--	--	--	--	--	--	--

[illegible]

04015380 LAKE SUPERIOR AT DULUTH, MINN.--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DATE	TEMPER- ATURE (DEG C)	TUR- BID- ITY (JTU)	COLOR (PLAT- INUM- COALTY UNITS)	SPE- CIFIC DUCT- ANCE (MICRO- MHOS)	DIS- SOLVED OXYGEN (MG/L)	RIO- CHEM- ICAL OXYGEN DEMAND (MG/L)	PH (UNITS)	ALKA- LITY AS CAC03 (MG/L)	HARD- NESS (CA+MG) (MG/L)	OIS- SOLVED CHLO- RIDE (CL) (MG/L)
APR.										
10...	1.7	3	0	92	13.7	.1	7.9	43	44	1.3
17...	.6	3	0	90	13.4	13	7.9	43	44	1.3
24...	.6	2	3	91	13.9	.3	8.1	43	44	1.3
MAY										
01...	.6	2	5	92	13.4	.2	8.0	43	44	--
06...	1.0	--	--	--	--	--	--	--	--	--
09...	1.0	--	--	--	--	--	--	--	--	--
15...	.6	2	0	90	13.4	.1	7.8	43	44	.0
22...	.6	2	0	88	13.5	.4	7.9	43	44	1.3
30...	.6	2	0	90	10.4	.2	8.0	43	44	1.3
JUNE										
05...	1.1	2	.0	90	13.5	.2	7.9	43	44	1.3
12...	2.2	1	0	88	13.3	.2	8.0	43	43	1.0
19...	3.9	2	0	92	13.3	.2	8.0	43	44	1.3
26...	4.0	1	<5	92	13.3	.1	8.0	43	44	1.3
JULY										
05...	4.4	2	0	90	13.3	.1	8.0	43	44	1.5
10...	4.4	1	.0	90	13.2	.2	8.0	43	44	1.3
10...	4.4	--	--	--	--	--	--	--	--	--
17...	6.0	2	0	90	13.2	.3	8.0	43	44	1.3
24...	6.0	1	<5	90	12.9	.2	8.0	43	43	1.5
AUG.										
08...	10.6	3	.0	98	11.1	.3	7.9	43	44	1.3
14...	12.2	2	5	92	11.0	.1	7.9	43	44	1.3
14...	12.2	--	--	--	--	--	--	--	--	--
21...	11.1	3	5	95	11.1	.2	8.0	43	44	1.3
28...	12.4	3	5	92	10.3	.3	7.9	43	44	1.5
SEP.										
05...	8.3	2	5	92	11.9	.2	7.9	43	44	1.5
11...	6.1	2	0	95	12.2	.2	8.0	43	44	1.5
18...	7.8	3	0	92	11.8	.2	7.9	43	44	1.5
18...	8.5	--	--	--	--	--	--	--	--	--
25...	8.0	3	--	--	11.9	.0	7.9	43	44	1.5

RED RIVER OF THE NORTH BASIN

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 April 1972 (discontinued).

WATER QUALITY DATA, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DATE	DIS- CHARGE (CFS)	TEMPER- ATURE (DEG C)	PH (UNITS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	DIS- SOLVED SOLIDS (RESI- DUE AT 180 C) (MG/L)	DIS- SOLVED SOLIDS (TDNS PER DAY)	DIS- SOLVED SOLIDS (TONS PER AC-FT)	TOTAL NITRO- GEN (N) (MG/L)	ORGANIC NITRO- GEN (N) (MG/L)	DIS- SOLVED AMMONIA NITRO- GEN (N) (MG/L)
JAN. 10...	.15	.0	7.6	1120	780	.32	1.06	--	--	1.0
APR. 18...	35	2.5	7.5	384	266	25.5	.36	1.1	.41	.06

DATE	DIS- SOLVED NITRITE (N) (MG/L)	DIS- SOLVED NITRATE (N) (MG/L)	TOTAL KJEL- DAHL NITRO- GEN (N) (MG/L)	DIS- SOLVED NITRITE PLUS NITRATE (N) (MG/L)	DIS- SOLVED ORTHO PHOS- PHATE (PO4) (P) (MG/L)	TOTAL PHOS- PHORUS (P) (MG/L)	DIS- SOLVED ORTHO. PHOS- PHORUS (P) (MG/L)	DIS- SOLVED AMMONIA (NH4) (N) (MG/L)	DIS- SOLVED NITRATE (NO3) (N) (MG/L)	DIS- SOLVED NITRITE (NO2) (N) (MG/L)
JAN. 10...	.00	.06	--	.06	.05	.02	.02	1.3	--	--
APR. 18...	.01	.59	.47	.60	.00	.06	.00	.08	2.6	.0

05033810 FLOYD LAKE OUTLET NEAR DETROIT LAKES, MINN.

LOCATION.--Lat 46°52'42", long 95°50'23", in SE 1/4 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 April 1972 (discontinued).

WATER QUALITY DATA, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DATE	DIS- CHARGE (CFS)	TEMPER- ATURE (DEG C)	PH (UNITS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	DIS- SOLVED SOLIDS (RESI- DUE AT 180 C) (MG/L)	DIS- SOLVED SOLIDS (TONS PER DAY)	DIS- SOLVED SOLIDS (TONS PER AC-FT)	TOTAL NITRO- GEN (N) (MG/L)	ORGANIC NITRO- GEN (N) (MG/L)	DIS- SOLVED AMMONIA NITRO- GEN (N) (MG/L)
JAN. 10...	6.8	1.0	8.0	470	310	5.73	.42	--	--	.15
APR. 18...	29	5.0	7.6	404	272	21.4	.37	1.2	.53	.17

DATE	DIS- SOLVED NITRITE (N) (MG/L)	DIS- SOLVED NITRATE (N) (MG/L)	TOTAL KJEL- DAHL NITRO- GEN (N) (MG/L)	DIS- SOLVED NITRITE PLUS NITRATE (N) (MG/L)	DIS- SOLVED ORTHO PHOS- PHATE (PO4) (P) (MG/L)	TOTAL PHOS- PHORUS (P) (MG/L)	DIS- SOLVED ORTHO. PHOS- PHORUS (P) (MG/L)	DIS- SOLVED AMMONIA (NH4) (MG/L)	DIS- SOLVED NITRATE (NO3) (MG/L)	DIS- SOLVED NITRITE (NO2) (MG/L)
JAN. 10...	.00	.14	--	.14	.00	.01	.00	.19	--	--
APR. 18...	.01	.47	.70	.48	.00	.06	.00	.22	2.1	.0

RED RIVER OF THE NORTH BASIN

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.13S 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 June 1972 (discontinued).

WATER QUALITY DATA, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DATE	DIS- CHARGE (CFS)	TEMPER- ATURE (DEG C)	PH (UNITS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	DIS- SOLVED SOLIDS (RESI- DUE AT 180 C) (MG/L)	DIS- SOLVED SOLIDS (TONS PER DAY)	DIS- SOLVED SOLIDS (TONS PER AC-FT)	TOTAL NITRO- GEN (N) (MG/L)	ORGANIC NITRO- GEN (N) (MG/L)	DIS- SOLVED AMMONIA NITRO- GEN (N) (MG/L)
OCT. 28...	65	7.5	8.2	397	224	39.3	.30	--	--	.05
JAN. 11...	50	1.0	8.2	444	268	36.6	.36	--	--	.10
FEB. 09...	40	1.0	8.2	470	264	28.7	.36	.81	.78	.02
MAR. 14...	35	1.5	8.0	468	264	25.1	.36	.89	.72	.04
APR. 18...	103	5.0	8.2	393	236	65.6	.32	.50	.39	.04
MAY 23...	133	19.0	8.1	419	250	89.8	.34	.94	.58	.35
JUNE 28...	47	24.0	8.7	404	260	33.1	.35	1.2	1.1	.15

DATE	DIS- SOLVED NITRITE (N) (MG/L)	DIS- SOLVED NITRATE (N) (MG/L)	TOTAL KJEL- DAHL NITRO- GEN (N) (MG/L)	DIS- SOLVED NITRITE PLUS NITRATE (N) (MG/L)	DIS- SOLVED ORTHO PHOS- PHATE (PO4) (MG/L)	TOTAL PHOS- PHORUS (P) (MG/L)	DIS- SOLVED ORTHO PHOS- PHORUS (P) (MG/L)	DIS- SOLVED AMMONIA (NH4) (MG/L)	DIS- SOLVED NITRATE (NO3) (MG/L)	DIS- SOLVED NITRITE (NO2) (MG/L)
OCT. 28...	.00	.00	--	.02	.03	.07	.01	.06	--	--
JAN. 11...	.00	.02	--	.02	.00	.01	.00	.13	--	--
FEB. 09...	.00	.01	.80	.01	.03	.05	.01	.03	--	.0
MAR. 14...	.00	.13	.76	.13	.00	.03	.00	.05	.60	.0
APR. 18...	.00	.07	.43	.07	.03	.02	.01	.05	.30	.0
MAY 23...	.00	.01	.93	.01	.03	.05	.01	.45	.00	.0
JUNE 28...	.00	.02	1.2	.02	.00	.04	.00	.19	.10	.0

RED RIVER OF THE NORTH BASIN

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 1971 TO SEPTEMBER 1972

DATE	DIS- CHARGE (CFS)	DIS- SOLVED CAL- CIUM (CA) (MG/L)	DIS- SOLVED MAG- NE- SIUM (MG)	DIS- SOLVED SODIUM SULFATE (NA) (MG/L)	DIS- SOLVED SULFATE MAG- NESIUM (MG/L)	DIS- SOLVED CAL- CIUM (CA) (MG/L)	DIS- SOLVED FLUO- RIDE (F) (MG/L)	DIS- SOLVED MANG- NESE (MG/L)	DIS- SOLVED AMMONIA NITRO- GEN (N) (MG/L)	DIS- SOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL PHOS- PHORUS (P) (MG/L)
OCT.											
13...	1680	59	23	--	69	3.1	--	--	.15	.15	.15
13...	1680	--	--	--	--	--	--	--	--	--	--
NOV.											
16...	--	69	25	6.3	100	3.8	.2	20	.33	.37	.20
16...	4270	--	--	--	--	--	--	--	--	--	--
DEC.											
15...	1000	66	22	--	43	4.6	--	--	.27	.05	.10
15...	1000	--	--	--	--	--	--	--	--	--	--
FEB.											
01...	908	--	--	--	--	--	--	--	--	--	--
01...	40	--	--	--	--	--	--	--	--	--	--
01...	--	53	17	4.3	18	3.4	.2	10	.12	.13	.10
29...	880	49	17	--	15	3.2	--	--	.13	.11	.01
29...	880	--	--	--	--	--	--	--	--	--	--
MAR.											
28...	--	32	11	3.8	23	4.2	.2	40	.74	.91	.23
28...	4500	--	--	--	--	--	--	--	--	--	--
MAY											
02...	--	47	16	--	48	2.9	--	--	.15	.05	.11
02...	4400	--	--	--	--	--	--	--	--	--	--
JUNE											
06...	2150	--	--	--	--	--	--	--	--	--	--
07...	--	53	20	--	40	2.4	--	--	.04	.07	.02

DATE	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)	DIS- SOLVED CHRO- MIUM (CR) (UG/L)	DIS- SOLVED COPPER (CU) (UG/L)	DIS- SOLVED LEAD (PB) (UG/L)
NOV.							
16...	1	0	70	0	--	79	0
FEB.							
01...	0	0	70	1	0	5	7
MAR.							
28...	10	0	70	8	0	30	8

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 June 1972 (discontinued).

WATER QUALITY DATA, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DATE	DIS- SOLVED AMMONIA (NH ₄) (MG/L)	DIS- SOLVED SOLIDS (RESI- DUE AT 180 C) (MG/L)	DIS- SOLVED SOLIDS (TDNS PER AC-FT)	HARD- NESS (CA, MG) (MG/L)	SODIUM AD- SORP- TION RATIO	TEMPER- ATURE (DEG C)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	DIS- SOLVED OXYGEN (MG/L)	BIO- CHEM- ICAL OXYGEN DEMAND (MG/L)	FECAL COLI- FORM (COL. PER 100 ML)
DCT.											
13...	.19	358	.49	240	--	8.3	--	--	--	1.9	--
13...	--	--	--	--	--	8.3	470	7.5	9.0	--	285
NOV.											
16...	.43	386	.53	280	.2	.0	--	--	--	2.0	--
16...	--	--	--	--	--	.0	510	7.9	12.9	--	550
DEC.											
15...	.35	378	.45	260	--	.0	477	--	--	2.8	--
15...	--	--	--	--	--	--	460	7.6	11.8	--	35
FEB.											
01...	--	--	--	--	--	--	--	--	--	1.5	--
01...	--	--	--	--	--	--	380	7.1	12.0	--	679
01...	.15	248	.34	200	.1	.0	399	--	--	--	--
29...	.17	242	.33	190	--	.0	375	--	--	1.1	--
29...	--	--	--	--	--	--	360	6.9	11.9	--	632
MAR.											
28...	.95	192	.26	130	.1	.0	275	--	--	4.0	--
28...	--	--	--	--	--	.0	260	6.7	10.2	--	22
MAY											
02...	.19	252	.34	180	--	13.8	361	--	--	--	--
02...	--	--	--	--	--	13.8	370	8.4	7.1	--	160
JUNE											
06...	--	--	--	--	--	22.5	430	8.3	7.6	--	45
07...	.05	306	.42	210	--	22.0	411	--	--	--	--

DATE	DIS- SOLVED MOLYB- DENUM (MD) (UG/L)	DIS- SOLVED NICKEL (NT) (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.						
16...	0	51	--	60	6	.2
FEB.						
01...	9	9	1	10	10	.3
MAR.						
28...	1	80	1	100	0	2.6

LAKE OF THE WOODS BASIN

05124480 KAWISHIWI RIVER NEAR ELY, MINN.

(Hydrologic bench-mark station)

LOCATION.--Lat 47°55'22", long 91°32'06", in SW 1/4 sec.24, T.63 N., R.10 W., 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.

EXTREMES, Current year.--Water temperatures: Maximum, 21.5°C June 26 to July 4, Aug. 1-7; minimum, freezing point Dec. 15 to Jan. 25.

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 Apr. 18 to June 6, range in temperature, 1.5°C to 21°C.

WATER QUALITY DATA, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DATE	DIS- CHARGE (CFS)	DIS- SOLVED 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)	DIS- SOLVED SODIUM (NA) (MG/L)	DIS- SOLVED PD- TAS- SIUM (K) (MG/L)	BICAR- BONATE (HCO3) (MG/L)	CAR- BONATE (CO3) (MG/L)
OCT.										
13...	43	3.8	80	0	3.4	1.2	.9	.4	12	0
JAN.										
20...	138	5.7	220	10	4.8	1.7	1.2	.5	12	0
AUG.										
25...	303	3.6	200	30	3.3	1.2	1.0	.3	11	0

DATE	ALKAL- INITY AS CACO3 (MG/L)	DIS- SOLVED SULFATE (SO4) (MG/L)	DIS- SOLVED CHLO- RIDE (CL) (MG/L)	DIS- SOLVED FLUO- RIDE (F) (MG/L)	DIS- SOLVED 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)
OCT.										
13...	10	5.3	1.1	.3	.03	.04	50	79	23	9.26
JAN.										
20...	10	6.4	.9	.2	.04	.03	80	42	28	15.6
AUG.										
25...	9	5.7	.9	.1	.02	.02	50	60	22	49.1

DATE	DIS- SOLVED SOLIDS (TONS PER AC-FT)	HARD- NESS (CA+MG) (MG/L)	NON- CAR- BONATE HARD- NESS (MG/L)	SODIUM AD- SORP- TION RATIO	PERCENT SODIUM	TEMPER- ATURE (DEG C)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MMHS)	PH	COLOR (PLAT- INUM- COMAL- UNITS)
OCT.									
13...	.11	13	4	.1	12	10.5	30	6.5	50
JAN.									
20...	.06	19	9	.1	12	.0	36	6.5	70
AUG.									
25...	.08	13	4	.1	14	21.0	29	6.0	50

(Hydrologic bench-mark station)

TEMPERATURE (°C) OF WATER, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972
(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	13.5	13.5	8.0	7.0	1.0	1.0	0.0	0.0	0.5	0.5	1.5	1.5
2	13.5	13.5	7.0	6.5	1.0	1.0	0.0	0.0	0.5	0.5	1.5	1.5
3	13.5	13.5	6.5	6.0	1.0	1.0	0.0	0.0	0.5	0.5	1.5	1.5
4	13.5	13.5	6.0	5.5	1.0	1.0	0.0	0.0	0.5	0.5	1.5	1.5
5	13.5	13.5	5.5	5.0	1.0	1.0	0.0	0.0	0.5	0.5	1.5	1.5
6	13.5	13.0	5.5	4.5	1.0	1.0	0.0	0.0	0.5	0.5	1.5	1.5
7	13.0	13.0	4.5	3.5	1.0	1.0	0.0	0.0	0.5	0.5	1.5	1.5
8	13.0	12.0	3.5	3.0	1.0	1.0	0.0	0.0	0.5	0.5	1.5	1.5
9	12.0	11.5	3.0	3.0	1.0	0.5	0.0	0.0	0.5	0.5	1.5	1.5
10	11.5	11.0	3.0	3.0	0.5	0.5	0.0	0.0	0.5	0.5	1.5	1.5
11	11.0	11.0	3.0	2.0	0.5	0.5	0.0	0.0	0.5	0.5	1.5	1.5
12	11.0	10.5	3.0	2.0	0.5	0.5	0.0	0.0	0.5	0.5	1.5	1.0
13	10.5	10.5	3.0	3.0	0.5	0.5	0.0	0.0	0.5	0.5	1.0	1.0
14	10.5	10.0	3.0	3.0	0.5	0.5	0.0	0.0	1.0	0.5	1.0	1.0
15	10.0	10.0	3.0	3.0	0.5	0.0	0.0	0.0	1.0	1.0	1.0	1.0
16	10.0	10.0	3.0	2.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0
17	10.0	9.5	2.0	2.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0
18	9.5	9.5	2.0	2.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0
19	9.5	9.5	2.0	2.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0
20	9.5	9.5	2.0	2.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0
21	9.5	9.5	2.0	1.5	0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0
22	9.5	9.5	1.5	1.5	0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0
23	9.5	9.0	1.5	1.5	0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0
24	9.0	9.0	1.5	1.5	0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0
25	9.0	9.0	1.5	1.5	0.0	0.0	0.0	0.0	1.5	1.0	1.0	1.0
26	9.0	9.0	1.5	1.5	0.0	0.0	0.5	0.0	1.5	1.5	1.0	1.0
27	9.0	9.0	1.5	1.0	0.0	0.0	0.5	0.5	1.5	1.5	1.0	1.0
28	9.0	9.0	1.0	1.0	0.0	0.0	0.5	0.5	1.5	1.5	1.0	1.0
29	9.0	9.0	1.0	1.0	0.0	0.0	0.5	0.5	1.5	1.5	1.0	1.0
30	9.0	8.5	1.0	1.0	0.0	0.0	0.5	0.5	---	---	1.0	1.0
31	8.5	8.0	---	---	0.0	0.0	0.5	0.5	---	---	1.0	1.0
MONTH	13.5	8.0	8.0	1.0	1.0	0.0	0.5	0.0	1.5	0.5	1.5	1.0
APRIL			MAY		JUNE		JULY		AUGUST		SEPTEMBER	
DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
1	1.0	1.0	---	---	---	---	21.5	21.5	21.5	21.0	19.5	19.0
2	1.0	1.0	---	---	---	---	21.5	21.5	21.5	21.5	19.0	19.0
3	1.0	1.0	---	---	---	---	21.5	21.5	21.5	21.5	19.0	19.0
4	1.0	1.0	---	---	---	---	21.5	21.0	21.5	21.5	19.0	19.0
5	1.0	1.0	---	---	---	---	21.0	21.0	21.5	21.5	19.0	18.5
6	1.0	1.0	---	---	21.0	21.0	21.0	21.0	21.5	21.5	18.5	18.0
7	1.0	1.0	---	---	21.0	21.0	21.0	21.0	21.5	21.0	18.0	17.0
8	1.0	1.0	---	---	21.0	21.0	21.0	21.0	21.0	21.0	17.0	16.5
9	1.0	1.0	---	---	21.0	21.0	21.0	21.0	21.0	21.0	16.5	16.5
10	1.0	1.0	---	---	21.0	21.0	21.0	21.0	21.0	20.5	16.5	16.0
11	1.0	1.0	---	---	21.0	21.0	21.0	21.0	20.5	20.5	16.0	16.0
12	1.5	1.0	---	---	21.0	21.0	21.0	21.0	21.0	20.5	16.0	16.0
13	1.5	1.5	---	---	21.0	21.0	21.0	21.0	21.0	21.0	16.0	16.0
14	1.5	1.5	---	---	21.0	21.0	21.0	21.0	21.0	21.0	16.0	15.0
15	1.5	1.5	---	---	21.0	20.5	21.0	21.0	21.0	21.0	15.0	15.0
16	1.5	1.5	---	---	20.5	20.5	21.0	21.0	21.0	20.5	15.0	14.5
17	1.5	1.5	---	---	20.5	20.5	21.0	21.0	20.5	20.5	14.5	14.0
18	---	---	---	---	20.5	20.0	21.0	21.0	20.5	20.5	14.0	14.0
19	---	---	---	---	20.0	20.0	21.0	21.0	21.0	20.5	14.0	13.5
20	---	---	---	---	20.0	20.0	21.0	21.0	21.0	21.0	13.5	13.5
21	---	---	---	---	20.0	20.0	21.0	21.0	21.0	21.0	13.5	13.5
22	---	---	---	---	20.5	20.0	21.0	21.0	21.0	21.0	13.5	13.0
23	---	---	---	---	20.5	20.5	21.0	21.0	21.0	21.0	13.0	13.0
24	---	---	---	---	20.5	20.5	21.0	21.0	21.0	21.0	13.0	13.0
25	---	---	---	---	21.0	20.5	21.0	21.0	21.0	21.0	13.0	13.0
26	---	---	---	---	21.5	21.0	21.0	21.0	21.0	20.5	13.0	13.0
27	---	---	---	---	21.5	21.5	21.0	21.0	20.5	20.0	13.0	12.0
28	---	---	---	---	21.5	21.5	21.0	21.0	20.0	19.5	12.0	12.0
29	---	---	---	---	21.5	21.5	21.0	21.0	19.5	19.5	12.0	11.5
30	---	---	---	---	21.5	21.5	21.0	21.0	19.5	19.5	11.5	11.0
31	---	---	---	---	---	---	21.0	21.0	19.5	19.5	---	---
MONTH	---	---	---	---	21.5	20.0	21.5	21.0	21.5	19.5	19.5	11.0
YEAR	21.5	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.--9,530 sq mi, approximately.

PERIOD OF RECORD.--Specific conductance: October 1971 to current year.

Water temperature: October 1967 to current year.

Sediment records: October 1967 to current year.

EXTREMES, current year.--Specific conductance: Maximum daily observed, 1080 micromhos Jan. 23; minimum daily observed, 420 micromhos Mar. 19.

Water temperatures: Maximum, 25°C Sept. 12; minimum, freezing point on many days during winter period.

Sediment concentrations: Maximum daily, 523 mg/l July 27; minimum daily, 27 mg/l May 7.

Sediment loads: Maximum daily, 5,430 tons Mar. 20; minimum daily, 20 tons Oct. 10.

EXTREMES, period of record.--Specific conductance: Maximum daily observed, 1080 micromhos Jan. 23, 1972; minimum daily observed, 420 micromhos Mar. 19, 1972.

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.

SPECIFIC CONDUCTANCE (MICROMHOS AT 25°C), WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	790	800	910	---	---	---	750	870	770	743	777	815
2	780	800	---	930	---	---	730	860	740	743	777	815
3	770	800	---	---	---	920	780	860	700	738	788	767
4	770	800	900	---	---	---	647	870	710	752	777	752
5	770	800	---	---	---	990	780	900	700	743	767	883
6	760	810	---	910	1000	---	790	890	720	743	804	810
7	750	810	---	---	---	---	790	880	720	743	810	821
8	750	810	---	---	---	---	800	870	770	743	810	752
9	750	800	---	---	---	---	810	900	800	738	793	890
10	770	850	---	990	---	---	810	900	830	752	815	777
11	760	870	---	---	---	---	890	900	840	752	752	793
12	930	850	---	---	---	600	870	910	900	743	804	799
13	750	880	---	---	1000	---	860	920	910	747	815	890
14	760	880	---	---	---	---	850	900	738	729	799	804
15	750	880	---	---	---	---	880	890	752	743	815	799
16	750	850	---	1000	---	---	890	890	711	752	762	793
17	770	830	---	---	---	---	900	870	743	747	762	883
18	780	810	930	---	---	---	900	870	752	752	827	890
19	770	830	---	---	---	420	850	880	777	783	815	777
20	770	860	---	---	1000	480	870	880	752	788	810	804
21	780	860	---	---	---	430	900	880	752	793	815	810
22	770	860	---	---	---	451	900	890	777	789	810	897
23	770	860	---	1080	---	1040	900	880	752	777	821	793
24	770	880	---	---	---	1030	900	860	777	777	740	804
25	780	850	925	---	---	1020	900	860	747	788	804	815
26	780	880	---	---	---	1020	900	890	788	772	752	799
27	780	970	---	---	1000	1000	900	840	743	762	890	---
28	790	980	---	---	---	950	900	830	752	777	821	752
29	790	940	---	---	---	920	910	800	743	783	810	---
30	790	1070	---	1000	---	920	910	780	743	772	752	---
31	790	---	---	---	---	800	---	780	---	777	897	---
MONTH	775	859	---	---	---	---	849	871	764	759	800	813
YEAR	MAX	1080	MIN	420	MEAN	819						

05316770 MINNESOTA RIVER AT NEW ULM, MINN.--Continued

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972
RANDOM (INSTANTANEOUS)

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	16.0	8.0	0.0	---	---	---	4.0	12.0	15.0	21.0	22.0	24.0
2	15.0	7.0	---	0.0	---	---	6.0	12.0	15.0	22.0	23.0	24.0
3	14.0	7.0	---	---	---	---	6.0	13.0	16.0	22.0	23.0	24.0
4	13.0	7.0	0.0	---	---	---	6.0	13.0	15.0	21.0	23.0	24.0
5	15.0	7.0	---	---	---	0.0	6.0	13.0	14.0	22.0	22.0	24.0
6	14.0	2.0	---	0.0	0.0	---	5.0	12.0	14.0	22.0	23.0	24.0
7	13.0	0.0	---	---	---	---	5.0	13.0	14.0	22.0	23.0	24.0
8	13.0	0.0	---	---	---	---	6.0	13.0	16.0	22.0	24.0	24.0
9	12.0	0.0	---	0.0	---	---	7.0	14.0	18.0	22.0	24.0	24.0
10	12.0	0.0	---	---	---	---	6.0	13.0	17.0	22.0	23.0	24.0
11	11.0	2.0	0.0	---	---	---	6.0	14.0	18.0	22.0	23.0	24.0
12	10.0	1.0	---	---	---	2.0	7.0	12.0	18.0	22.0	23.0	25.0
13	12.0	1.0	---	---	0.0	---	8.0	13.0	17.0	22.0	23.0	24.0
14	11.0	4.0	---	---	---	---	8.0	13.0	18.0	23.0	22.0	24.0
15	10.0	5.0	---	---	---	---	7.0	12.0	17.0	22.0	23.0	24.0
16	11.0	5.0	---	0.0	---	---	7.0	10.0	18.0	22.0	23.0	24.0
17	12.0	5.0	---	---	---	---	9.0	15.0	19.0	21.0	24.0	24.0
18	13.0	4.0	0.0	---	---	---	8.0	12.0	20.0	22.0	24.0	24.0
19	13.0	4.0	---	---	---	2.0	8.0	13.0	20.0	22.0	24.0	24.0
20	14.0	2.0	---	---	0.0	1.5	9.0	14.0	20.0	22.0	24.0	24.0
21	14.0	0.0	---	---	---	1.5	10.0	13.0	21.0	23.0	24.0	24.0
22	14.0	0.0	---	---	---	2.0	10.0	14.0	21.0	23.0	23.0	24.0
23	13.0	0.0	---	0.0	---	---	11.0	14.0	21.0	23.0	24.0	24.0
24	12.0	0.0	---	---	---	---	11.0	13.0	20.0	23.0	24.0	24.0
25	13.0	0.0	0.0	---	---	---	11.0	12.0	20.0	23.0	23.0	24.0
26	13.0	0.0	---	---	---	---	11.0	13.0	22.0	21.0	24.0	24.0
27	13.0	0.0	---	---	0.0	2.0	12.0	13.0	20.0	23.0	24.0	---
28	10.0	0.0	---	---	---	2.0	12.0	13.0	21.0	23.0	24.0	15.5
29	10.0	0.0	---	---	---	3.0	12.0	14.0	20.0	23.0	24.0	---
30	9.0	2.0	---	0.0	---	4.0	12.0	14.0	21.0	22.0	24.0	---
31	8.0	---	---	---	---	5.0	---	14.0	---	23.0	24.0	---
MONTH	12.5	2.5	---	---	---	---	8.0	13.0	18.0	22.0	23.5	23.5

BED MATERIAL PARTICLE SIZE, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

(METHODS OF ANALYSIS: B, BOTTOM WITHDRAWAL TUBE; C, CHEMICALLY DISPERSED; N, IN NATIVE WATER; P, PIPET; S, SIEVE; V, VISUAL ACCUMULATION TUBE; W, IN DISTILLED WATER)

DATE	TIME	DIS- CHARGE (CFS) 00060	NUMBER OF SAM- PLING POINTS 00063	BED	BED	BED	BED	BED	BED	
				MAT. FALL DIAM. % FINER THAN .062 MM 80158	MAT. FALL DIAM. % FINER THAN .125 MM 80159	MAT. FALL DIAM. % FINER THAN .250 MM 80160	MAT. FALL DIAM. % FINER THAN .500 MM 80161	MAT. FALL DIAM. % FINER THAN 1.00 MM 80162	MAT. FALL DIAM. % FINER THAN 2.00 MM 80169	MAT. FALL DIAM. % FINER THAN 4.00 MM 80170
MAR. 22...	1600	7700	4	49	71	82	93	97	98	100
MAY 11...	1205	7540	4	53	66	82	90	96	98	100
JULY 21...	1100	2380	4	68	95	98	100	--	--	--

SUSPENDED SEDIMENT PARTICLE SIZE, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

(METHODS OF ANALYSIS: B, BOTTOM WITHDRAWAL TUBE; C, CHEMICALLY DISPERSED; N, IN NATIVE WATER; P, PIPET; S, SIEVE; V, VISUAL ACCUMULATION TUBE; W, IN DISTILLED WATER)

DATE	TIME	TEMPER- ATURE (DEG C) 00010	DIS- CHARGE (CFS) 00060	SUS- PEN- DED SEDI- MENT CONC. (MG/L) 80154	SUS- PEN- DED 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	SUS. SED. FALL DIAM. % FINER THAN .125 MM 70343
JULY 21....	1100	24.5	2380	236	1520	34	43	58	76	88	96	100

MINNESOTA RIVER BASIN

05316770 MINNESOTA RIVER AT NEW ULM, MINN.--Continued

SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	APRIL			MAY			JUNE		
	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	6690	110	1990	7940	47	1010	8800	57	1350
2	6580	105	1870	7850	40	846	10700	50	1440
3	6450	102	1780	7930	42	899	10900	43	1270
4	6270	98	1660	8150	39	856	11000	61	1810
5	6120	88	1450	8320	63	1420	11000	57	1490
6	6020	93	1350	8380	60	1360	11000	74	2200
7	5920	78	1250	8450	27	616	11200	65	1970
8	5850	75	1180	8360	47	1060	11800	76	2420
9	5760	73	1140	8180	123	2720	12300	76	2520
10	5650	63	961	7970	89	1920	12400	90	3010
11	5580	55	926	7790	40	841	12000	96	3110
12	5450	47	692	7600	37	759	11600	94	2940
13	5320	46	661	7400	64	1280	10900	80	2350
14	5290	50	714	7200	57	1110	10500	85	2410
15	5390	45	655	7000	65	1230	9830	95	2520
16	5610	45	662	6800	126	2350	9130	90	2420
17	5840	34	599	6600	153	2730	8520	85	1960
18	6010	29	471	6800	100	2850	7960	74	1590
19	6040	124	2020	6600	95	1690	7440	148	2970
20	5990	88	1420	6000	193	3440	7050	147	2800
21	5990	41	663	4500	137	2400	6600	152	2710
22	5980	34	549	6400	100	1730	6090	159	2610
23	6110	43	709	6300	83	1410	5670	162	2480
24	6560	80	1426	6200	72	1210	5340	241	3470
25	7100	55	1050	6300	84	1430	5050	211	2880
26	7680	37	767	6400	47	812	4770	145	1870
27	8250	53	1180	6500	47	825	4520	118	1640
28	8490	46	1050	6500	57	1000	4330	171	2000
29	8420	41	932	6600	57	1020	4220	112	1280
30	8150	54	1190	6600	67	1230	4230	103	1180
31	--	--	--	7500	78	1580	--	--	--
TOTAL	190540	--	32861	223720	--	45638	256850	--	66670

DAY	JULY			AUGUST			SEPTEMBER		
	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	4160	127	1430	3090	255	2130	1840	95	472
2	3850	269	2800	3640	360	2950	1790	126	809
3	3650	273	2690	2440	310	2500	1750	226	1070
4	3510	254	2410	2970	396	3180	1720	145	873
5	3320	248	2220	2960	459	3670	1680	96	435
6	3170	303	2590	2400	334	2620	1460	107	480
7	3040	326	2690	2830	239	1930	1620	93	407
8	2940	256	2030	2810	233	1770	1540	73	311
9	2910	229	1800	2760	326	2450	1490	70	282
10	2880	206	1600	2730	311	2290	1390	112	420
11	2470	217	1680	2670	267	1920	1300	124	435
12	2910	237	1860	2610	270	1900	1240	116	308
13	2930	255	2020	2560	273	1890	1250	96	324
14	2890	295	2300	2510	261	1770	1250	83	280
15	2810	363	2910	2490	288	1910	1220	81	267
16	2730	365	2690	2420	267	1740	1160	79	247
17	2660	236	1690	2390	210	1580	1120	76	230
18	2560	206	1440	2340	177	1140	1120	83	251
19	2470	262	1750	2310	179	1120	1120	128	307
20	2430	314	2060	2270	190	1160	1120	94	284
21	2390	312	2010	2210	203	1210	1010	84	175
22	2400	306	1960	2140	183	1060	895	77	186
23	2490	378	2590	2090	103	541	885	111	265
24	2510	396	2690	2060	202	1120	835	110	248
25	2490	334	2270	2040	210	1160	794	90	194
26	2540	392	2690	2040	192	1000	806	73	159
27	2590	523	3590	2020	141	769	421	76	168
28	2670	513	3700	2010	141	765	421	108	235
29	2790	336	2550	1960	84	449	748	115	248
30	2930	387	3060	1930	91	474	776	100	210
31	3050	316	2550	1690	115	587	--	--	--
TOTAL	89540	--	72340	74090	--	50475	36667	--	10340

TOTAL DISCHARGE FOR YEAR (CFS-DAYS)

TOTAL SUSPENDED-SEDIMENT DISCHARGE FOR YEAR (TONS)

1096719

353947

05316770 MINNESOTA RIVER AT NEW ULM, MINN.--Continued

SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCTOBER			NOVEMBER			DECEMBER		
	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	250	106	74	1320	102	364	1150	44	102
2	256	97	47	1360	95	340	1510	66	277
3	247	110	73	1390	115	414	1550	91	341
4	242	114	74	1360	125	459	1470	115	497
5	238	105	47	1470	119	472	1500	110	475
6	236	80	51	1650	140	610	1550	105	459
7	238	75	48	1640	123	558	1500	100	405
8	234	90	57	1650	124	562	1460	45	359
9	224	68	41	1600	114	501	1300	91	319
10	220	34	20	1470	89	353	1200	57	294
11	226	47	29	1320	79	262	1100	83	247
12	262	70	53	1240	61	271	1000	41	219
13	325	100	68	1210	80	261	930	70	196
14	300	119	96	1140	84	264	900	76	165
15	268	94	71	1120	82	248	850	75	172
16	258	95	66	1150	73	223	830	74	166
17	253	110	71	1220	60	196	810	73	160
18	253	149	102	1430	76	293	790	72	154
19	251	190	129	1600	97	419	770	72	150
20	253	140	96	1480	68	399	750	72	146
21	282	156	119	1810	89	435	740	72	144
22	288	131	102	1920	92	477	730	72	142
23	240	140	110	1950	93	490	720	72	140
24	302	133	108	1670	93	470	710	72	138
25	402	139	151	1770	94	449	705	72	137
26	545	133	196	1740	82	385	700	73	136
27	696	130	244	1820	69	339	695	75	141
28	792	125	267	1830	57	282	690	77	143
29	651	130	249	1770	74	353	680	79	147
30	916	139	344	1520	79	324	682	81	148
31	1120	132	399	--	--	--	682	84	155
TOTAL	11846	--	3722	46050	--	11529	31134	--	6995
DAY	JANUARY			FEBRUARY			MARCH		
	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	632	66	158	520	88	124	372	68	88
2	632	40	106	515	86	120	370	90	90
3	632	93	171	507	84	115	365	92	91
4	632	97	179	500	83	112	365	115	113
5	632	105	193	495	82	110	365	129	127
6	632	113	209	468	81	107	365	130	128
7	630	122	224	480	81	109	365	135	133
8	645	130	233	475	81	104	365	140	136
9	660	138	241	470	80	102	370	145	145
10	650	134	239	465	80	100	375	152	154
11	640	138	238	460	80	99	380	160	164
12	639	138	237	455	80	98	400	165	178
13	630	137	233	450	81	98	425	175	201
14	620	134	224	445	81	97	450	182	221
15	610	130	214	440	81	96	460	183	296
16	605	129	211	435	81	95	1050	205	581
17	608	124	201	430	82	95	1700	225	1030
18	590	122	194	425	82	94	2500	250	1690
19	585	120	190	420	83	94	4000	300	3240
20	580	117	183	415	84	94	6240	322	5430
21	578	113	178	410	84	93	7130	266	5120
22	565	110	168	405	84	92	7810	118	2420
23	560	106	163	400	84	91	7640	180	3890
24	558	107	160	395	84	90	7490	151	3190
25	550	104	154	390	85	90	7640	105	2170
26	545	101	149	385	86	89	7450	88	1820
27	540	98	143	380	86	88	7500	96	1940
28	535	95	137	375	86	87	7360	138	2740
29	530	93	133	373	86	87	7230	141	2750
30	525	91	129	--	--	--	7020	125	2370
31	520	90	126	--	--	--	6830	115	2120
TOTAL	18837	--	5773	12803	--	2866	102742	--	44716

MINNESOTA RIVER BASIN

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 at 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.

Specific conductance: October 1971 to current year.

Water temperature: October 1967 to current year.

Sediment records: October 1967 to current year.

EXTREMES, current year.--Specific conductance: Maximum daily observed, 980 micromhos May 7; minimum daily observed, 420 micromhos March 17.

Water temperatures: Maximum, 30°C Aug. 19; minimum, freezing point on many days during winter period.

Sediment concentrations: Maximum daily, 867 mg/l Mar. 17; minimum daily, 40 mg/l Dec. 2.

Sediment loads: Maximum daily, 30,600 tons June 9; minimum daily, 53 tons Oct. 4.

EXTREMES, period of record.--Specific conductance: Maximum daily observed, 980 micromhos May 7; minimum daily observed, 420 micromhos March 17, 1972.

Water temperatures: Maximum, 30°C Aug. 19, 1972; 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 period.

SPECIFIC CONDUCTANCE (MICROMHOS AT 25°C), WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

OAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	700	790	880	---	---	---	670	930	900	---	849	747
2	710	800	850	---	---	890	660	910	860	820	843	752
3	730	810	880	---	---	850	660	910	860	840	852	777
4	730	850	880	910	---	---	650	930	880	850	862	747
5	780	850	870	---	---	---	650	920	890	---	865	738
6	730	890	860	---	950	---	660	950	900	830	849	733
7	750	890	850	---	---	---	660	940	910	830	822	752
8	770	900	870	---	---	---	670	930	890	830	837	752
9	750	900	880	880	---	---	680	---	800	830	825	757
10	780	890	880	---	---	---	690	930	820	840	813	743
11	770	880	900	---	---	---	700	920	810	845	813	752
12	770	860	900	---	---	---	710	865	820	830	810	752
13	790	870	880	---	880	---	730	830	840	840	807	729
14	770	910	880	---	---	810	750	850	850	840	801	729
15	760	890	910	---	---	---	760	820	850	850	790	729
16	---	890	---	880	---	---	780	840	830	850	790	743
17	760	900	---	---	---	420	820	850	860	---	779	747
18	750	880	---	---	---	---	880	860	840	---	779	757
19	770	800	---	---	---	---	890	870	840	886	769	752
20	750	800	---	---	880	---	890	870	850	869	769	752
21	760	830	---	---	---	480	890	870	830	849	764	752
22	770	840	---	---	---	490	870	880	860	754	769	777
23	780	870	---	---	---	520	870	900	870	769	749	752
24	750	900	---	---	---	565	870	870	820	810	747	839
25	770	920	---	---	---	620	860	870	820	837	735	747
26	790	816	900	---	850	670	890	880	820	859	729	729
27	800	900	---	---	---	690	900	880	830	849	729	756
28	790	900	---	---	---	680	900	870	835	875	729	740
29	800	920	---	---	---	690	930	860	840	896	735	744
30	820	910	---	---	---	680	930	850	840	889	738	744
31	780	---	---	---	---	657	---	890	---	889	738	---
MONTH	764	869	---	---	---	---	782	886	849	843	791	751
YEAR	MAX	980	MIN	420	MEAN	813						

BED MATERIAL PARTICLE SIZE, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

(METHODS OF ANALYSIS: B, BOTTOM WITHDRAWAL TUBE; C, CHEMICALLY DISPERSED; N, IN NATIVE WATER; P, PIPET; S, SIEVE; V, VISUAL ACCUMULATION TUBE; W, IN DISTILLED WATER)

DATE	TIME	NUMBER OF SAMPLING POINTS	DISCHARGE (CFS)	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)	METHOD OF ANALYSIS
MAR. 21...	1245	4	11700	1	2	26	72	92	94	96	SV
MAY 12...	1445	4	10400	0	1	32	76	92	95	97	SV
JULY 20...	1030	4	4110	0	2	33	88	94	96	98	SV

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972
RANDOM (INSTANTANEOUS)

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	19.0	6.5	0.0	---	---	---	1.0	9.0	20.5	---	24.0	21.5
2	21.0	7.0	0.0	---	---	0.0	1.0	9.0	22.0	---	22.0	22.5
3	16.0	5.5	1.0	---	---	0.0	1.0	10.0	22.0	23.0	22.0	21.0
4	18.0	5.5	1.0	0.0	---	---	0.0	11.0	22.0	22.0	24.0	21.0
5	18.0	4.5	1.0	---	---	---	2.0	11.0	23.0	22.5	22.0	20.5
6	17.0	1.5	1.0	---	0.0	---	---	11.0	24.0	20.0	21.0	20.5
7	17.0	1.5	1.0	---	---	---	2.0	11.0	22.0	20.0	22.0	20.0
8	13.0	2.0	0.0	---	---	---	2.0	11.0	22.5	21.0	20.0	20.5
9	12.0	3.5	0.0	0.0	---	---	3.5	---	22.0	23.0	20.5	20.5
10	12.0	3.5	0.0	---	---	---	3.5	12.0	20.0	25.0	21.0	20.5
11	13.0	3.5	0.5	---	---	---	4.5	13.5	21.0	25.5	20.5	21.5
12	11.0	4.0	0.0	---	---	---	4.5	16.0	23.0	23.5	22.0	20.0
13	14.0	4.5	0.0	---	0.0	---	3.5	15.0	24.0	25.0	25.0	20.0
14	15.0	4.5	0.0	---	---	0.0	4.5	14.0	23.0	24.5	26.0	18.0
15	13.0	5.5	0.0	---	---	---	6.0	16.5	22.0	25.5	27.0	19.5
16	12.0	6.5	---	0.0	---	---	9.0	20.0	22.0	25.5	28.0	22.0
17	17.0	6.0	---	---	---	0.0	9.0	22.0	20.0	---	29.0	21.0
18	16.0	5.0	---	---	---	---	9.0	22.0	21.0	---	29.0	22.0
19	15.0	4.5	---	---	---	---	8.0	22.0	20.0	25.0	30.0	21.0
20	12.0	4.5	---	---	---	---	9.0	22.0	18.0	24.0	29.0	20.0
21	13.0	3.5	---	---	---	1.0	7.0	24.0	18.5	25.5	29.0	19.0
22	15.0	1.5	---	---	0.0	0.0	6.5	24.0	20.0	27.0	25.0	18.0
23	13.0	1.5	---	---	---	0.0	5.5	22.0	21.0	27.0	24.0	19.0
24	15.0	2.0	---	---	---	0.0	6.5	21.0	21.5	27.0	22.5	20.0
25	13.5	2.0	---	---	---	0.0	9.0	20.5	22.0	26.0	21.0	14.0
26	15.0	1.5	0.0	---	0.0	0.0	10.0	22.0	22.0	24.0	21.0	15.0
27	13.0	1.0	---	---	---	0.0	9.0	22.0	---	22.0	22.0	15.5
28	10.0	0.0	---	---	---	0.0	9.0	21.0	21.0	22.0	22.0	15.0
29	8.5	0.0	---	---	---	0.0	9.0	19.0	24.0	22.5	25.0	13.0
30	9.5	1.0	---	---	---	0.0	9.0	19.0	24.0	25.0	24.0	14.0
31	8.0	---	---	---	---	2.5	---	19.0	---	24.0	24.0	---

(METHODS OF ANALYSIS: B, BOTTOM WITHDRAWAL TUBE; C, CHEMICALLY DISPERSED; N, IN NATIVE WATER; P, PIPET; S, SIEVE; V, VISUAL ACCUMULATION TUBE; W, IN DISTILLED WATER)

DATE	TIME	TEMPER- ATURE (DEG C) (00010)	DIS- CHANGE (CFS) (00060)	SUS- PENDEN SECT-	SUS- SED. FALL	SUS- SED. FALL	
				MENT MENT (MG/L) (80154)	DIS- CHANGE (7/DAY) (80155)	DIAM. THAN (70337)	DIAM. THAN (70338)
MAY 12...	1445	16.0	10400	141	3960	16	22
JULY 20...	1030	24.0	4110	259	2870	31	44

DATE	SUS- SED. FALL DIAM. % FINEK THAN	SUS- SED. FALL DIAM. % FINEK THAN	SUS- SED. FALL DIAM. % FINEK THAN	SUS- SED. FALL DIAM. % FINEK THAN	SUS- SED. FALL DIAM. % FINEK THAN	SUS- SED. FALL DIAM. % FINEK THAN	METHOD OF ANALY- SIS
	(70339)	(70340)	(70341)	(70342)	(70343)	(70344)	
MAY 12...	31	43	51	60	71	94	VPWC
JULY 20...	56	71	84	93	96	100	VPWC

05325000 MINNESOTA RIVER AT MANKATO, MINN.--Continued

SUSPENDED=SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCTOBER			NOVEMBER			DECEMBER		
	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	471	83	106	2420	290	1890	2040	71	391
2	467	78	98	2690	245	1780	2000	40	216
3	456	55	68	2630	179	1270	2100	84	476
4	417	47	53	2460	142	943	2200	88	523
5	415	52	58	2390	140	900	2200	75	466
6	425	58	67	2490	159	1070	2200	95	564
7	415	55	62	2440	200	1320	2200	73	434
8	416	51	57	2450	179	1180	2180	64	377
9	415	65	73	2570	152	1050	2100	91	516
10	395	81	86	2410	109	709	2050	116	642
11	391	75	79	2190	80	473	1980	98	524
12	404	73	80	1980	72	385	1800	108	525
13	439	76	90	1870	75	379	1700	150	689
14	470	88	112	1820	76	373	1550	95	368
15	439	81	96	1760	66	314	1500	61	247
16	395	83	89	1770	67	320	1400	65	246
17	375	94	95	1880	94	477	1350	70	255
18	355	83	80	2230	125	753	1300	76	267
19	382	107	110	2570	141	978	1250	80	270
20	362	108	106	2820	165	1260	1200	86	279
21	401	86	93	2950	177	1410	1150	92	286
22	424	94	108	2990	185	1490	1100	98	291
23	416	91	102	3050	200	1650	1080	104	303
24	416	99	111	3020	178	1450	1060	110	315
25	408	99	109	2850	129	993	1040	115	323
26	531	110	154	2870	96	744	1030	121	337
27	883	139	331	2900	129	1010	1020	127	350
28	1150	184	571	2950	145	1150	1010	132	360
29	1280	217	750	2920	107	844	1000	136	367
30	1530	206	851	2530	70	478	1000	139	375
31	2080	322	1810	--	--	--	1000	140	378
TOTAL	17823	--	6659	74840	--	29043	47790	--	11970
DAY	JANUARY			FEBRUARY			MARCH		
	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	1000	141	381	775	95	199	500	86	116
2	990	141	377	775	92	193	500	87	117
3	980	141	373	775	91	190	500	89	120
4	975	140	369	770	90	187	500	90	122
5	972	140	367	760	89	183	500	91	123
6	970	138	361	750	88	178	505	93	127
7	965	136	354	745	89	179	510	94	129
8	960	135	350	740	90	180	515	95	132
9	955	135	348	730	92	181	520	96	135
10	950	136	349	720	95	185	530	99	142
11	945	138	352	700	97	183	545	104	153
12	940	139	353	690	98	183	560	112	169
13	930	142	357	670	99	179	580	128	200
14	900	147	357	660	98	175	630	152	259
15	860	150	348	650	97	170	1000	300	810
16	830	157	352	640	95	164	1900	500	2570
17	810	152	332	620	93	156	3700	867	8660
18	800	147	318	605	90	147	7000	740	14000
19	780	142	299	590	87	139	10000	660	17800
20	770	137	285	580	85	133	11400	600	18500
21	760	132	271	565	83	127	11700	545	17200
22	755	127	259	555	82	123	11800	585	18600
23	750	123	249	545	81	119	11500	418	13000
24	745	118	237	535	81	117	10900	375	11000
25	740	114	228	525	81	115	10400	290	8140
26	735	111	220	520	82	115	10100	359	9790
27	730	108	213	515	83	115	9800	410	10800
28	722	104	203	510	84	116	9540	422	10900
29	722	102	199	505	85	116	9220	315	7840
30	730	99	195	--	--	--	8910	240	5770
31	750	96	194	--	--	--	8410	161	3660
TOTAL	26421	--	9450	18720	--	4547	154675	--	181084

SUSPENDED-SEDIMENT DISCHARGE, FATHOM YEAR OCTOBER 1971 TO SEPTEMBER 1972

APRIL				MAY				JUNE			
DAY	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)		
1	8400	233	5280	10300	163	4530	10200	223	6140		
2	8170	271	5960	10500	190	5390	11100	169	5060		
3	7850	225	4770	11200	214	6470	12100	160	5230		
4	7570	266	5480	12300	216	7170	12500	200	6750		
5	7400	220	4400	12900	200	6910	12600	221	7520		
6	7260	203	3980	12900	183	5680	12400	206	6900		
7	7040	204	3890	12700	170	5390	12300	191	6340		
8	6960	217	4050	12500	177	5970	12500	202	6620		
9	6820	183	3370	12200	164	5400	12400	615	30800		
10	6760	196	3580	11400	156	4800	12300	314	19400		
11	6670	167	3370	10900	185	5440	17500	254	12000		
12	6580	194	3450	10400	175	4910	16700	180	8120		
13	6520	211	3710	10000	211	5700	15500	201	8410		
14	6470	166	2900	9680	145	3790	14300	140	6180		
15	6480	190	3320	9420	183	4650	13300	190	6820		
16	6560	233	4130	9200	190	4870	12300	199	6610		
17	6670	238	4290	9000	163	3960	11300	185	5640		
18	6910	210	3920	8980	142	3440	10500	182	5160		
19	7060	217	4140	8930	172	4150	9760	202	5320		
20	7100	193	3700	8840	185	4420	9220	233	5800		
21	7270	211	4140	8820	164	3910	8750	233	5500		
22	7570	226	4620	8590	153	3550	8530	230	5300		
23	7900	189	4010	8330	191	4300	8150	260	5720		
24	8330	185	4160	8160	190	4190	7510	272	5520		
25	8740	213	5030	8080	210	4580	7010	335	6340		
26	9140	192	4740	8210	154	3410	6600	279	4970		
27	9550	214	5520	8150	159	3500	6270	351	5940		
28	9980	231	6220	8120	240	5260	5000	352	5700		
29	10300	213	5920	8170	256	5650	5920	402	6430		
30	10300	176	4890	8540	235	5420	6900	508	9460		
31	--	--	--	9310	233	5860	--	--	--		
TOTAL	230350	--	130990	306630	--	153110	335470	--	228700		
JULY				AUGUST				SEPTEMBER			
DAY	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)		
1	7180	480	9310	4970	272	3650	2070	195	1090		
2	6910	415	7740	4780	255	3290	1960	206	1090		
3	6250	420	7090	4560	240	2950	1900	184	944		
4	5660	366	5900	4390	272	3220	1840	154	765		
5	5180	337	4710	4260	243	2790	1800	132	642		
6	4860	338	4440	4150	248	2780	1750	135	638		
7	4590	370	4590	3940	235	2500	1760	114	542		
8	4430	481	5750	3860	225	2340	1710	128	591		
9	4520	390	4760	3760	225	2280	1640	144	638		
10	4370	287	3390	3640	232	2280	1550	147	615		
11	4330	259	3030	3530	221	2110	1470	139	552		
12	4430	246	2940	3410	221	2030	1440	136	529		
13	4410	260	3100	3300	210	1870	1520	162	665		
14	4360	292	3440	3210	211	1830	1490	140	563		
15	4170	302	3400	3070	207	1720	1440	135	525		
16	4050	332	3630	2950	202	1610	1390	145	544		
17	4010	360	3900	2860	192	1480	1310	126	446		
18	3850	330	3430	2820	202	1540	1240	120	402		
19	3700	311	3110	2690	209	1520	1160	127	398		
20	4140	308	3440	2610	202	1420	1190	143	459		
21	4640	345	4320	2570	197	1370	1200	143	463		
22	5720	485	7490	2500	224	1510	1100	134	396		
23	6550	474	8380	2420	213	1390	1050	117	332		
24	6750	326	5940	2370	188	1200	1030	107	298		
25	6050	340	5550	2320	200	1250	1090	102	300		
26	5520	314	4680	2330	187	1180	1200	103	334		
27	5230	333	4700	2360	183	1170	1240	106	355		
28	5070	345	4720	2320	177	1110	1470	134	532		
29	5080	318	4360	2270	165	1130	1580	125	533		
30	5050	325	4430	2190	194	1170	1600	112	484		
31	5070	304	4160	2130	194	1120	--	--	--		
TOTAL	156130	--	149830	98540	--	58810	44190	--	16667		
TOTAL DISCHARGE FOR YEAR (CFS-DAYS)									1511549		
TOTAL SUSPENDED-SEDIMENT DISCHARGE FOR YEAR (TONS)									980860		

MINNESOTA RIVER BASIN

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, at gaging station on left bank, 1.5 miles northwest of Jordan, and at mile 39.4 upstream from Mississippi River.

WATER QUALITY DATA. WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DATE	DIS- CHARGE (CFS)	DIS- SOLVED SILICA (SiO ₂) (MG/L)	DIS- SOLVED IRON (FE) (UG/L)	DIS- SOLVED MANG- NESE (MN) (UG/L)	DIS- SOLVED CAL- CIUM (CA) (MG/L)	DIS- SOLVED MAG- NES- SIUM (MG)	DIS- SOLVED SODIUM (NA) (MG/L)	DIS- SOLVED PO- TAS- SIUM (K) (MG/L)	RICAR- BONATE (HCO ₃) (MG/L)	CAR- BONATE (CO ₃) (MG/L)
OCT.										
20...	540	16	50	140	98	45	39	5.8	363	0
NOV.										
29...	3950	--	--	--	--	--	--	--	--	--
DEC.										
07...	3700	18	70	30	120	52	32	6.2	330	0
JAN.										
08...	1320	23	60	90	130	60	31	6.8	423	0
MAR.										
01...	611	26	30	500	130	55	40	6.7	475	0
MAY										
03...	12400	13	80	20	100	47	19	7.7	262	0
JUNE										
02...	10600	17	20	0	96	41	15	4.7	262	0
JULY										
06...	5730	21	320	130	120	46	19	5.5	315	0
AUG.										
09...	4470	24	190	0	100	45	20	4.9	318	0
SEP.										
12...	1910	19	40	10	88	43	22	6.1	334	0

DATE	ALKA- LINITY AS CACO ₃ (MG/L)	DIS- SOLVED SULFATE (SO ₄) (MG/L)	DIS- SOLVED CHLO- RIDE (CL) (MG/L)	DIS- SOLVED FLUO- RIDE (F) (MG/L)	DIS- SOLVED 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)
OCT.										
20...	298	170	30	.3	.05	.26	170	468	583	733
NOV.										
29...	--	--	--	--	--	--	--	--	--	--
DEC.										
07...	271	240	22	.4	4.1	.15	130	712	671	7110
JAN.										
08...	347	260	26	.4	3.2	.18	140	820	760	2920
MAR.										
01...	390	220	31	.3	1.5	--	160	796	750	1310
MAY										
03...	215	230	17	.5	5.0	.22	30	656	585	22000
JUNE										
02...	215	180	19	.4	4.8	.17	110	556	523	15900
JULY										
06...	258	180	16	.5	2.4	.59	100	744	670	11500
AUG.										
09...	261	190	16	.5	2.5	.46	120	632	568	7630
SEP.										
12...	274	150	17	.4	.10	.27	190	564	510	2910

05330000 MINNESOTA RIVER NEAR JORDAN, MINN.--Continued

DRAINAGE AREA.--16,200 sq mi, approximately.

PERIOD OF RECORD.--Chemical analyses: December 1962 to August 1966, water year 1967 (partial-record station), November 1967 to July 1969, October 1971 to September 1972.

WATER QUALITY DATA, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DATE	DIS- SOLVED SOLIDS (TONS PER AC-FT)	HARD- NESS (CA, MG) (MG/L)	NON- CAR- BONATE HARD- NESS (MG/L)	SODIUM AD- SORP- TION RATIO	PERCENT SODIUM	TEMPER- ATURE (DEG C)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	COLOR (PLAT- INUM- COBALT UNITS)
OCT.									
20...	.64	430	130	.8	16	14.0	912	7.9	60
NOV.									
29...	--	--	--	--	--	--	--	--	--
DEC.									
07...	.97	510	240	.6	12	10.0	1010	8.1	40
JAN.									
08...	1.12	570	220	.6	10	.0	1160	7.7	20
MAR.									
01...	1.08	550	160	.7	13	.0	1120	7.4	20
MAY									
03...	.89	440	230	.4	8	12.0	885	8.2	70
JUNE									
02...	.76	410	190	.3	7	20.0	798	7.4	40
JULY									
06...	1.01	490	230	.4	8	21.0	875	7.8	60
AUG.									
09...	.86	430	170	.4	9	20.0	865	8.1	40
SEP.									
12...	.77	400	120	.5	11	19.5	803	8.1	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 (PLAN- CHET COUNT) (PC/L)	DIS- SOLVED RA-226 (RADON METHOD) (PC/L)	DIS- SOLVED GROSS ALPHA AS U-NAT. (UG/L)
OCT.							
20...	<2.3	.4	9.2	2.3	--	.09	<6.8
NOV.							
29...	14	.5	14	5.5	--	.11	41
DEC.							
07...	7.9	1.1	13	6.7	--	.10	24
JAN.							
08...	13	.2	13	2.9	--	.09	38
MAR.							
01...	8.2	<.1	13	1.8	--	.07	25
MAY							
03...	10	2.3	17	7.4	--	.10	30
JUNE							
02...	11	2.7	12	7.0	--	.10	33
JULY							
06...	7.7	7.2	13	12	--	.11	23
AUG.							
09...	12	3.3	11	10	--	.11	35
SEP.							
12...	5.7	.8	14	3.3	<.1	--	17

DATE	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 FILTR- ABLE RESIDUE (MG/L)	TOTAL NON- FILTR- ABLE RESIDUE (MG/L)
OCT.						
20...	1.2	7.4	2.1	3.2	630	25
NOV.						
29...	1.4	12	4.7	14	810	50
DEC.						
07...	3.3	11	5.4	12	850	83
JAN.						
08...	.6	11	2.4	13	830	25
MAR.						
01...	<.4	11	1.7	5.7	870	3
MAY						
03...	6.9	14	9.3	19	770	100
JUNE						
02...	8.1	9.9	5.9	9.9	600	130
JULY						
06...	22	11	10	8.9	680	340
AUG.						
09...	10	8.9	8.4	7.8	650	230
SEP.						
12...	2.3	12	2.8	6.6	620	46

MISSISSIPPI RIVER MAIN STEM

05331000 MISSISSIPPI RIVER AT ST. PAUL, MINN.

LOCATION.--Lat 44°56'40", long 93°05'20", in SE 1/4 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 S39.3 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 1971 TO SEPTEMBER 1972
(WATER-STAGE RECORDER WITH TEMPERATURE ATTACHMENT)

DAY	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
1	17.0	16.5	8.0	5.5	1.0	0.0	2.0	1.5	2.0	0.5	2.0	1.0
2	18.0	16.5	5.5	5.5	1.0	0.0	2.0	0.0	1.5	0.5	3.0	1.0
3	17.0	16.5	5.5	4.5	0.0	0.0	1.5	0.0	1.5	0.5	3.0	1.5
4	16.5	16.0	6.5	4.0	0.5	0.0	1.5	0.0	1.5	0.5	3.0	1.0
5	16.0	16.0	6.5	5.5	0.0	0.0	1.5	0.0	1.5	0.5	3.5	1.5
6	16.0	15.5	5.5	4.0	0.5	0.0	1.5	0.0	2.0	1.0	3.5	1.0
7	15.5	15.0	4.5	3.0	0.5	0.0	1.5	0.0	2.0	1.0	2.0	1.0
8	15.5	15.0	4.0	2.0	0.5	0.0	1.5	0.5	3.0	1.0	3.0	1.5
9	15.0	14.0	4.0	2.0	0.5	0.0	1.5	0.0	2.0	1.0	3.5	1.5
10	14.5	13.5	3.5	2.0	1.0	0.0	1.5	0.0	2.0	1.0	3.5	1.5
11	14.0	13.5	3.0	1.5	1.0	0.0	1.5	0.0	2.0	0.5	3.5	2.0
12	14.0	12.0	3.5	2.0	2.0	0.0	1.5	0.0	2.0	1.0	4.0	3.0
13	13.5	12.0	3.5	2.0	1.5	0.0	1.5	0.0	1.5	0.5	4.0	3.0
14	13.5	12.0	4.0	3.0	1.5	0.0	1.5	0.0	1.5	0.5	4.0	2.0
15	13.0	12.0	4.0	3.5	1.5	0.0	2.0	0.0	2.0	0.5	3.5	3.0
16	13.0	12.0	3.5	3.0	0.5	0.0	2.0	0.0	2.0	1.0	3.5	1.5
17	13.0	12.0	3.5	3.0	0.5	0.0	2.0	0.5	2.0	0.5	1.5	1.5
18	13.0	12.0	3.5	3.0	1.5	0.0	2.0	0.0	2.0	0.5	1.5	0.5
19	13.5	13.0	3.5	3.0	2.0	0.5	2.0	0.0	2.0	0.5	1.0	0.5
20	13.5	13.5	4.0	3.0	1.5	0.0	2.0	0.0	2.0	1.5	0.5	0.5
21	13.5	12.0	3.5	1.0	1.5	0.0	2.0	0.0	3.0	1.5	1.5	0.5
22	12.0	12.0	1.5	0.5	1.5	0.0	2.0	0.0	2.0	1.0	1.5	0.5
23	12.0	11.5	1.5	0.0	1.0	0.0	2.0	0.0	2.0	1.0	0.5	0.5
24	12.0	11.5	1.5	0.0	0.5	0.0	2.0	0.5	2.0	1.0	0.5	0.0
25	12.0	11.5	0.0	0.0	1.5	0.0	2.0	1.0	1.5	1.0	0.0	0.0
26	11.5	11.5	0.0	0.0	1.5	0.0	3.0	0.5	2.0	1.0	0.0	0.0
27	11.5	11.5	0.0	0.0	1.5	0.0	2.0	0.5	2.0	1.0	0.5	0.5
28	11.5	11.0	0.0	0.0	2.0	0.0	1.5	0.5	2.0	1.0	1.0	0.5
29	11.0	9.5	0.5	0.0	1.5	0.0	2.0	1.0	2.0	1.0	1.0	0.5
30	11.0	9.0	0.5	0.0	1.5	0.0	2.0	1.5	---	---	1.0	1.0
31	10.0	8.0	---	---	1.5	1.0	2.0	0.5	---	---	1.0	1.0
MONTH	18.0	8.0	8.0	0.0	2.0	0.0	3.0	0.0	3.0	0.5	4.0	0.5

EXTREMES, current year.--Water temperatures: Maximum, 27°C Aug. 18-21; 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.

[illegible]

MISSISSIPPI RIVER MAIN STEM

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 1971 TO SEPTEMBER 1972

DATE	TEMPER- ATURE (DEG C)	DIS- CHARGE (CFS)	TUR- BID- ITY (JTU)	COLOR (PLAT- INUM- COBALT UNITS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	DIS- SOLVED OXYGEN (MG/L)	BIO- CHEM- ICAL OXYGEN DEMAND (MG/L)	PH (UNITS)	ALKA- LINITY AS CAC03 (MG/L)	TOTAL NITRO- GEN (N) (MG/L)
OCT.										
18...	15.0	9800	15	25	--	8.6	2.0	8.0	156	--
NOV.										
02...	8.5	44300	--	--	--	--	--	--	--	--
15...	5.0	33300	14	70	--	12.1	2.3	7.6	91	--
DEC.										
07...	1.0	23520	--	--	--	--	--	--	--	--
20...	.0	12200	15	60	--	12.2	2.4	7.7	152	--
JAN.										
17...	1.0	11400	5	35	--	11.8	1.4	8.6	184	--
19...	.0	11500	--	--	489	--	--	--	--	--
FEB.										
14...	2.0	10400	--	--	--	--	--	--	--	2.4
22...	.0	9900	15	25	--	9.7	2.0	7.5	170	--
MAR.										
20...	1.0	30100	20	20	--	10.0	3.5	7.6	94	--
24...	2.0	48900	--	--	--	--	--	--	--	6.5
APR.										
17...	7.0	32900	--	50	--	11.5	--	7.9	156	--
24...	7.8	42700	--	--	--	--	--	--	--	2.1
MAY										
15...	15.0	48100	60	55	--	8.8	2.4	8.0	146	--
30...	19.0	35200	--	--	--	--	--	--	--	2.2
JUNE										
12...	--	33000	80	45	--	7.2	3.0	7.6	187	--
JULY										
07...	21.0	16200	--	--	--	--	--	--	--	3.8
AUG.										
11...	21.5	41800	--	--	--	--	--	--	--	2.0
23...	23.0	33600	50	65	--	6.1	3.3	8.1	148	--
SEP.										
12...	20.0	18400	--	--	--	--	--	--	--	1.8
20...	21.0	16500	40	65	420	8.6	4.0	8.1	134	--

EXTREMES, current year.--Water temperatures: Maximum, 27.5°C July 23, 24, Aug. 18, 19; 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.--Recorded stopped Oct. 1-4. Some analyses furnished by Metropolitan Wastewater Treatment Plant and Water Quality office, Environmental Protection Agency. Water discharge furnished by the St. Paul District, Corps of Engineers.

[illegible]

MISSISSIPPI RIVER MAIN STEM

05344980 MISSISSIPPI RIVER AT LOCK AND DAM 3, NEAR RED WING, MINN.--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DATE	DIS- SOLVED PO- TAS- SIUM (K) (MG/L)	DIS- SOLVED CHLO- RIDE (CL) (MG/L)	DIS- SOLVED SULFATE (SO4) (F) (MG/L)	DIS- SOLVED FLUO- RIDE (F) (MG/L)	IMME- DIATE COLI- FORM (COL, PER 100 ML)	METHY- LENE BLUE ACTIVE SUB- STANCE (MG/L)	DIS- SOLVED AMMONIA (NH4) (MG/L)	DIS- SOLVED NITRATE (NO3) (MG/L)	DIS- SOLVED NITRITE (NO2) (MG/L)
OCT.									
18...	--	14	27	--	--	--	--	--	--
NOV.									
02...	--	--	--	--	--	.00	.61	--	--
15...	--	10	40	--	--	--	--	--	--
DEC.									
07...	--	--	--	--	--	.00	.66	--	--
20...	--	7.8	49	--	--	--	--	--	--
JAN.									
17...	--	18	50	--	240000	--	--	--	--
19...	3.5	--	--	.0	--	.01	1.0	--	--
FEB.									
14...	--	--	--	--	--	.04	1.2	--	--
22...	--	19	38	--	--	--	--	--	--
MAR.									
20...	--	22	55	--	--	--	--	--	--
24...	4.2	--	--	.3	--	.00	.70	--	--
APR.									
17...	--	9.5	44	--	--	--	--	--	--
24...	2.8	--	--	.6	--	.00	.21	--	--
MAY									
15...	--	12	92	--	--	--	--	--	--
30...	--	--	--	--	--	.00	.24	--	--
JUNE									
12...	--	13	--	--	--	--	--	--	--
JULY									
07...	--	--	--	--	--	--	.31	11	.1
AUG.									
11...	--	--	--	--	--	--	.17	2.7	.0
23...	--	8.7	28	--	--	--	--	--	--
SEP.									
12...	--	--	--	--	--	--	.39	1.9	.1
20...	--	8.7	28	--	--	--	--	--	--

053449S0 MISSISSIPPI RIVER AT LOCK AND DAM 3, NEAR RED WING, MINN.--Continued

TEMPERATURE (°C) OF WATER. WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
1	---	---	10.0	9.5	1.0	0.5	0.5	0.5	0.5	0.5	1.0	0.0
2	---	---	9.5	9.0	1.0	0.5	0.5	0.5	0.5	0.0	0.5	0.0
3	---	---	9.0	7.5	1.0	0.5	0.5	0.0	0.0	0.0	0.5	0.0
4	---	---	7.5	7.0	1.0	0.5	0.0	0.0	0.0	0.0	0.5	0.0
5	18.0	17.5	7.0	6.0	1.0	1.0	0.0	0.0	0.0	0.0	0.5	0.0
6	17.5	16.5	6.0	3.5	1.0	1.0	0.5	0.0	0.0	0.0	0.5	0.0
7	16.5	16.0	3.5	3.0	1.5	1.0	0.5	0.5	0.0	0.0	0.5	0.5
8	16.5	16.0	3.0	3.0	1.5	1.0	0.5	0.5	0.5	0.0	0.5	0.5
9	16.0	15.5	3.5	2.5	1.0	0.5	0.5	0.5	0.0	0.0	0.5	0.5
10	15.5	15.0	3.5	3.0	1.0	0.5	0.5	0.5	0.0	0.0	0.5	0.5
11	15.0	14.5	3.5	3.0	1.0	0.5	0.5	0.5	0.0	0.0	1.0	0.5
12	14.5	14.0	4.0	3.5	0.5	0.5	0.5	0.0	0.5	0.0	1.0	1.0
13	14.0	13.5	4.0	3.5	0.5	0.5	0.5	0.0	0.5	0.5	1.5	1.0
14	14.0	13.5	4.5	4.0	0.5	0.5	0.0	0.0	0.5	0.5	1.5	1.0
15	14.0	13.5	5.0	4.5	0.5	0.5	0.0	0.0	0.5	0.5	1.5	1.5
16	14.0	14.0	5.5	5.0	0.5	0.5	0.0	0.0	0.5	0.0	2.0	1.5
17	14.5	14.0	5.5	5.5	0.5	0.0	0.5	0.0	0.5	0.5	2.0	1.5
18	15.0	14.5	5.5	5.0	0.5	0.0	0.5	0.0	0.5	0.0	2.5	1.5
19	16.0	15.0	5.0	4.5	0.5	0.5	0.0	0.0	0.5	0.0	2.5	1.5
20	16.0	15.0	4.5	4.0	0.5	0.5	0.0	0.0	0.5	0.0	2.5	2.0
21	15.0	15.0	4.0	3.0	0.5	0.5	0.5	0.0	0.5	0.5	2.0	1.5
22	15.0	15.0	3.0	2.5	0.5	0.5	0.5	0.0	0.5	0.0	2.0	1.5
23	15.0	14.5	2.5	2.0	0.5	0.5	0.5	0.0	0.5	0.5	2.0	1.5
24	15.0	14.5	2.0	2.0	0.5	0.5	0.5	0.0	0.5	0.5	2.0	1.5
25	14.5	14.5	2.0	2.0	0.5	0.5	0.0	0.0	0.5	0.5	2.0	1.5
26	15.0	14.5	2.0	1.5	0.5	0.5	0.0	0.0	0.5	0.5	2.0	1.0
27	15.0	14.0	1.5	1.5	0.5	0.0	0.0	0.0	0.5	0.5	1.0	1.0
28	14.0	13.0	1.5	1.5	0.5	0.0	0.0	0.0	1.0	0.5	2.0	1.0
29	13.0	12.0	1.5	1.0	0.5	0.0	0.0	0.0	1.0	0.5	2.0	1.5
30	12.5	12.0	1.0	1.0	0.5	0.0	0.0	0.0	---	---	2.5	1.5
31	12.0	10.0	---	---	0.5	0.0	0.5	0.0	---	---	2.0	2.0
MONTH	18.0	10.0	10.0	1.0	1.5	0.0	0.5	0.0	1.0	0.0	2.5	0.0
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
1	2.0	2.0	11.5	10.0	21.5	19.5	25.5	24.5	24.0	23.5	23.0	22.5
2	3.0	2.0	11.5	11.0	22.0	21.0	25.0	24.0	24.0	23.5	22.5	21.5
3	3.0	2.5	11.0	10.5	23.0	21.5	24.0	23.0	23.5	23.0	22.5	21.0
4	3.5	2.5	12.0	11.0	23.0	22.0	23.5	22.5	23.5	22.5	21.0	20.5
5	4.0	3.0	12.5	12.0	22.5	22.0	23.5	22.0	23.0	22.5	21.0	20.5
6	4.5	4.0	12.0	12.0	24.0	22.0	23.0	21.5	22.5	21.5	21.0	20.0
7	4.0	3.5	12.5	11.5	24.0	23.5	22.5	21.0	21.5	21.0	20.0	20.0
8	4.5	3.5	12.5	12.0	24.5	23.0	22.0	21.5	21.0	20.5	20.5	19.5
9	4.0	3.5	13.5	12.0	24.0	23.0	23.0	21.5	21.5	20.0	20.5	19.5
10	5.5	4.0	14.5	13.0	23.0	21.5	23.5	22.5	21.0	20.5	20.5	20.0
11	5.0	4.5	15.0	14.0	22.5	21.5	24.0	23.5	22.0	20.5	20.5	19.5
12	5.0	4.5	14.5	14.0	23.5	22.0	24.5	23.5	23.0	21.5	20.0	20.0
13	5.0	5.0	15.5	14.5	24.5	23.0	25.0	23.5	23.0	22.0	20.0	20.0
14	5.0	4.5	15.0	14.5	24.0	23.0	25.0	24.0	24.5	23.0	20.0	19.5
15	6.5	4.5	15.5	14.5	23.5	22.5	25.0	24.0	24.5	23.5	20.5	19.5
16	8.5	6.0	17.0	15.0	22.5	22.0	25.0	24.0	26.0	24.5	20.5	19.5
17	9.5	6.5	19.0	17.0	22.0	21.0	24.0	23.5	27.0	25.5	20.5	19.5
18	9.0	8.0	20.5	18.0	22.5	21.5	24.5	23.0	27.5	26.0	21.0	20.0
19	8.0	7.5	21.0	19.0	22.0	21.5	24.5	24.0	27.5	26.5	21.5	20.5
20	9.0	7.5	21.5	20.0	21.5	20.0	25.5	24.5	27.0	26.0	21.5	21.0
21	8.5	7.5	22.0	21.0	21.0	19.5	26.5	25.0	27.0	26.0	21.0	19.5
22	7.5	7.0	23.0	21.5	22.0	20.5	27.0	26.0	26.5	24.5	19.5	18.5
23	7.5	7.0	23.0	22.0	21.5	20.5	27.5	26.0	24.5	23.0	18.5	18.0
24	8.5	7.0	23.0	22.0	22.0	20.5	27.5	26.5	23.0	22.5	18.5	18.0
25	9.5	8.0	23.5	22.0	23.0	21.0	26.5	25.0	22.5	22.0	18.5	18.0
26	10.0	9.0	23.5	22.5	23.5	22.0	25.0	23.0	22.0	21.0	18.0	16.5
27	10.0	9.5	23.5	22.5	23.5	23.0	23.0	22.5	22.5	21.0	16.5	16.0
28	10.0	9.5	23.0	23.0	24.0	23.0	23.5	22.5	23.0	21.5	16.5	16.0
29	10.5	10.0	23.0	21.0	24.5	22.5	23.5	22.5	24.0	22.5	16.0	15.0
30	11.5	10.0	21.0	20.0	25.0	24.0	24.5	23.0	24.0	23.0	15.0	14.0
31	---	---	20.5	19.5	---	---	24.5	23.5	23.5	23.0	---	---
MONTH	11.5	2.0	23.5	10.0	25.0	19.5	27.5	21.0	27.5	20.0	23.0	14.0
YEAR	27.5	0.0										

WHITWATER RIVER BASIN

05376000 NORTH FORK WHITWATER 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, 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 1971 TO SEPTEMBER 1972

DATE	DIS- CHARGE (CFS)	DIS- SOLVED SILICA (SI02) (MG/L)	DIS- SOLVED IRON (FE) (UG/L)	DIS- SOLVED MANG- ANESF (MN) (UG/L)	DIS- SOLVED CAL- CIUM (CA) (MG/L)	DIS- SOLVED MAG- NE- SIUM (MG) (MG/L)	DIS- SOLVED SODIUM (NA) (MG/L)	DIS- SOLVED PO- TAS- SIUM (K) (MG/L)	BICAR- BONATE (HCO3) (MG/L)	CAR- BONATE (CO3) (MG/L)	ALKA- LITY AS CAC03 (MG/L)
OCT.											
13...	26	15	10	30	72	25	4.7	1.7	343	0	281
13...	26	--	--	--	--	--	--	--	--	--	--
NOV.											
16...	26	16	10	30	73	24	4.1	1.8	321	0	263
16...	26	--	--	--	--	--	--	--	--	--	--
DEC.											
08...	26	16	0	10	74	26	4.6	1.6	328	0	269
08...	26	--	--	--	--	--	--	--	--	--	--
JAN.											
12...	25	16	50	110	73	25	4.8	1.1	322	0	264
12...	25	--	--	--	--	--	--	--	--	--	--
FEB.											
24...	22	16	20	10	72	25	4.2	1.1	319	0	262
24...	22	--	--	--	--	--	--	--	--	--	--
MAR.											
22...	77	14	10	88	55	16	3.2	5.0	244	0	200
22...	77	--	--	--	--	--	--	--	--	--	--
APR.											
26...	31	10	10	50	69	25	5.0	1.9	308	0	253
26...	31	--	--	--	--	--	--	--	--	--	--
JUNE											
05...	25	18	20	50	72	25	6.2	1.6	320	0	262
05...	25	--	--	--	--	--	--	--	--	--	--
JULY											
13...	24	16	20	43	70	25	5.1	2.3	309	0	253
13...	23	--	--	--	--	--	--	--	--	--	--
AUG.											
16...	22	13	10	50	71	24	4.2	1.4	319	0	262
16...	22	--	--	--	--	--	--	--	--	--	--
SEP.											
26...	75	11	50	30	43	13	3.8	8.0	188	0	154
26...	75	--	--	--	--	--	--	--	--	--	--

DATE	DIS- SOLVED ARSENIC (AS) (UG/L)	DIS- SOLVED MORON (B) (UG/L)	DIS- SOLVED CAD- MIUM (CD) (UG/L)	HFXA- 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.							
13...	0	20	0	0	1	44	8
NOV.							
16...	--	20	--	--	--	--	--
DEC.							
08...	--	20	--	--	--	--	--
JAN.							
12...	--	10	--	--	--	--	--
FEB.							
24...	--	20	--	--	--	--	--
MAR.							
22...	6	10	0	0	0	6	6
APR.							
26...	--	20	--	--	--	--	--
JUNE							
05...	--	40	--	--	--	--	--
JULY							
13...	--	10	--	--	--	--	--
AUG.							
16...	9	20	1	0	1	2	7
SEP.							
26...	--	640	--	--	--	--	--

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 1971 TO SEPTEMBER 1972

DATE	DIS- SOLVED SULFATE (SD4) (MG/L)	DIS- SOLVED CHLO- RIDE (CL) (MG/L)	DIS- SOLVED FLUO- RIDE (F) (MG/L)	DIS- SOLVED 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)
OCT.											
13...	.8	4.4	.4	1.9	.13	20	384	301	27.0	.52	280
13...	--	--	--	--	--	--	--	--	--	--	--
NOV.											
16...	17	5.2	.1	2.0	.15	20	314	308	22.6	.43	280
16...	--	--	--	--	--	--	--	--	--	--	--
DEC.											
08...	17	5.7	.3	2.0	.19	20	326	315	23.2	.44	290
08...	--	--	--	--	--	--	--	--	--	--	--
JAN.											
12...	15	8.6	.0	2.0	.28	10	316	311	21.8	.43	290
12...	--	--	--	--	--	--	--	--	--	--	--
FEB.											
24...	16	6.1	.1	2.0	.09	20	334	306	20.6	.45	280
24...	--	--	--	--	--	--	--	--	--	--	--
MAR.											
22...	18	7.7	.1	2.5	.50	10	292	250	61.1	.40	200
22...	--	--	--	--	--	--	--	--	--	--	--
APR.											
26...	17	7.3	.2	1.5	.20	20	322	294	27.2	.44	280
26...	--	--	--	--	--	--	--	--	--	--	--
JUNE											
05...	15	4.2	.0	1.9	.35	40	334	308	22.5	.45	280
05...	--	--	--	--	--	--	--	--	--	--	--
JULY											
13...	17	6.0	.4	1.8	.37	10	308	302	20.0	.42	280
13...	--	--	--	--	--	--	--	--	--	--	--
AUG.											
16...	16	5.2	.1	1.3	.16	20	306	298	18.2	.42	280
16...	--	--	--	--	--	--	--	--	--	--	--
SEP.											
26...	15	8.4	.2	1.3	1.4	640	212	201	43.1	.29	160
26...	--	--	--	--	--	--	--	--	--	--	--

DATE	DIS- SOLVED MOLYB- DENUM (MO) (UG/L)	DIS- SOLVED NICKEL (NI) (UG/L)	DIS- SOLVED STRON- TIUM (SR) (UG/L)	DIS- SOLVED VANA- DIUM (V) (UG/L)	DIS- SOLVED ZINC (ZN) (UG/L)	DIS- SOLVED LITHIUM (LI) (UG/L)	DIS- SOLVED SELE- NIUM (SF) (UG/L)
OCT.							
13...	1	2	110	.0	30	60	8
NOV.							
16...	--	--	--	--	--	--	--
DEC.							
08...	--	--	--	--	--	--	--
JAN.							
12...	--	--	--	--	--	--	--
FEB.							
24...	--	--	--	--	--	--	--
MAR.							
22...	3	3	90	1.3	0	0	4
APR.							
26...	--	--	--	--	--	--	--
JUNE							
05...	--	--	--	--	--	--	--
JULY							
13...	--	--	--	--	--	--	--
AUG.							
16...	1	3	60	1.4	20	10	0
SEP.							
26...	--	--	--	--	--	--	--

WHITWATER RIVER BASIN

05376000 NORTH FORK WHITWATER RIVER NEAR ELBA, MINN.--Continued

(Hydrologic bench-mark station)

WATER QUALITY DATA, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

	NON-CARBONATE HARDNESS	SODIUM ADSORPTION RATIO	PERCENT SODIUM	TEMPERATURE (DEG C)	BIO-CHEMICAL OXYGEN DEMAND	COLOR (PLATINUM-COBALT UNITS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH	DISSOLVED OXYGEN	IMMEDIATE COLIFORM (COL. PER 100 ML)		
DATE	(MG/L)				(MG/L)			(UNITS)	(MG/L)			
OCT.												
13...	1	.1	3	10.5	.4	5	520	8.1	--	--		
13...	--	--	--	10.5	--	--	510	8.3	12.7	210		
NOV.												
16...	18	.1	3	8.5	--	5	524	8.1	--	--		
16...	--	--	--	8.5	1.1	--	510	8.6	11.4	105		
DEC.												
08...	23	.1	3	5.0	.5	3	528	8.0	--	--		
08...	--	--	--	5.0	--	--	505	8.3	11.2	128		
JAN.												
12...	21	.1	4	3.2	1.4	0	526	8.1	--	--		
12...	--	--	--	3.2	--	--	500	8.0	14.3	15		
FEB.												
24...	21	.1	3	2.0	--	3	505	8.0	--	--		
24...	--	--	--	2.0	.4	--	495	7.6	14.0	10		
MAR.												
22...	3	.1	3	--	3.5	20	430	7.7	--	--		
22...	--	--	--	3.0	--	--	400	7.4	12.3	2200		
APR.												
26...	23	.1	4	10.0	2.2	5	497	8.3	--	--		
26...	--	--	--	10.0	--	--	495	8.6	14.6	<50		
JUNE												
05...	20	.2	5	15.0	1.2	10	530	7.7	--	--		
05...	--	--	--	15.0	--	--	510	8.1	9.2	2100		
JULY												
13...	24	.1	4	15.5	.1	20	514	8.0	--	--		
13...	--	--	--	15.5	--	--	505	8.2	9.5	3300		
AUG.												
16...	14	.1	3	20.5	1.4	3	502	8.0	--	--		
16...	--	--	--	20.5	--	--	460	8.3	10.1	4290		
SEP.												
26...	7	.1	5	12.0	3.6	50	341	7.5	--	--		
26...	--	--	--	12.0	--	--	345	7.6	9.5	--		
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 GROSS RA-226 (RADON METHOD) (PC/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 FILTRABLE RESIDUE (MG/L)	TOTAL NON-FILTRABLE RESIDUE (MG/L)	
OCT.												
13...	<1.1	<.1	3.6	.4	.05	<3.3	<.4	3.1	<.4	.6	310	7
MAR.												
22...	1.8	1.1	6.8	4.2	.06	5.3	3.2	5.6	3.4	.8	270	79

05376000 NORTH FORK WHITEWATER RIVER NEAR ELBA, MINN.--Continued

(Hydrologic bench-mark station)

WATER QUALITY DATA. WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DATE	ALUMIN IN BOTTOM DE- POSITS (UG/L)	ALUMIN IN BOTTOM DE- POSITS (UG/KG)	LINDANE IN BOTTOM DE- POSITS (UG/L)	LINDANE IN BOTTOM DE- POSITS (UG/KG)	CHLOR- DANE IN BOTTOM DE- POSITS (UG/L)	CHLOR- DANE IN BOTTOM DE- POSITS (UG/KG)	DDT IN BOTTOM DE- POSITS (UG/L)	DDT IN BOTTOM DE- POSITS (UG/KG)	DDT
OCT. 13...	.00	<.2	.00	<.2	.0	<1	.00	<.2	.00
AUG. 16...	.00	<.2	.00	<.2	.0	<1	.00	<.2	.00

DATE	DDT IN BOTTOM DE- POSITS (UG/KG)	DDT IN BOTTOM DE- POSITS (UG/L)	DDT IN BOTTOM DE- POSITS (UG/KG)	DDT IN BOTTOM DE- POSITS (UG/L)	DDT IN BOTTOM DE- POSITS (UG/KG)	DDT IN BOTTOM DE- POSITS (UG/L)	DDT IN BOTTOM DE- POSITS (UG/KG)	DDT IN BOTTOM DE- POSITS (UG/L)	DDT
OCT. 13...	<.2	.00	<.2	.00	2.0	.00	<.2	.00	<.2
AUG. 16...	<.2	.00	<.2	.01	2.0	.00	<.2	.00	<.2

DATE	HEPTA- CHLOR EPOXIDE IN BOTTOM DE- POSITS (UG/L)	HEPTA- CHLOR EPOXIDE IN BOTTOM DE- POSITS (UG/KG)	MAL- THION (UG/L)	PARA- THION (UG/L)	DI- ATINON (UG/L)	METHYL PARA- THION (UG/L)	2,4-D (UG/L)	2,4,5-T (UG/L)	SILVEX (UG/L)
OCT. 13...	.00	<.2	.00	.00	.00	.00	.00	.00	.00
AUG. 16...	.00	<.2	.00	.00	.00	.00	.00	.00	.00

DATE	TIME	DIS- CHARGE (CFS)	TEMPER- ATURE (DEG C)	SUS- PENDE SEDI- MENT (MG/L)	SUS- PENDE SEDI- MENT DIS- CHARGE (T/DAY)
OCT. 13...	1316	26	10.5	42	2.9
NOV. 16...	1135	27	8.5	66	4.8
DEC. 08...	1131	26	5.0	148	10
JAN. 12...	1445	26	3.0	15	1.1
FEB. 24...	1220	23	2.0	25	1.6
APR. 26...	1105	31	10.0	11	.92
JUNE 05...	1234	25	15.0	102	6.9
JULY 13...	1217	24	15.5	76	4.9
AUG. 16...	1709	22	20.5	18	1.1
SEP. 26...	1330	75	12.0	750	151

MISCELLANEOUS ANALYSES OF STREAMS IN MINNESOTA

DATE	DIS- CHARGE (CFS)	DIS- SOLVED SILICA (SIOP) (MG/L)	DIS- SOLVED IRON (IFE) (UG/L)	DIS- SOLVED MANGANESE (MNF) (UG/L)	DIS- SOLVED CALCIUM (CA) (MG/L)	DIS- SOLVED MAGNESIUM (MG) (MG/L)	DIS- SOLVED SODIUM (NA) (MG/L)	DIS- SOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)
04024000 - ST. LOUIS RIVER AT SCANLON, MINN. (LAT 46 42 12 LONG 092 25 07)										
OCT.. 1971										
19... 2860		9.9	670	50	18	7.3	6.2	1.7	71	0
JAN.. 1972										
06... 1280		11	540	33	23	6.1	9.8	1.1	82	0
APR..										
11... 1810		--	--	50	21	6.3	8.2	--	--	--
05131600 - HOWSTRING RIVER NEAR TALMOON, MINN (LAT 47 32 12 LONG 093 47 45)										
AUG.. 1972										
30... 49		10	190	30	30	10	2.9	1.6	141	0
05131650 - HOWSTRING R AT SHOGRENS DAM NR DORA LK MIN (LAT 47 41 45 LONG 094 03 25)										
AUG.. 1972										
31... 128		5.3	140	0	22	4.6	1.1	.2	105	0
05131720 - POPPLE RIVER NEAR DORA LAKE, MINN (LAT 47 41 35 LONG 094 06 19)										
AUG.. 1972										
31... E72		8.7	50	10	27	8.8	2.3	1.2	126	0
05131750 - BIG FORK RIVER NEAR BIGFORK, MINN (LAT 47 45 05 LONG 093 46 33)										
AUG.. 1972										
30... 240		9.8	160	30	28	9.4	2.4	.9	131	0
05131760 - RICE RIVER NEAR BIGFORK, MINN. (LAT 47 40 27 LONG 093 39 22)										
AUG.. 1972										
30... 56		10	120	40	35	8.2	2.7	1.4	148	0
DATE	ALKALINITY AS CACO3 (MG/L)	DIS- SOLVED SULFATE (SO4) (MG/L)	DIS- SOLVED CHLORIDE (CL) (MG/L)	DIS- SOLVED FLUORIDE (F) (MG/L)	DIS- SOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	DIS- SOLVED BORON (B) (UG/L)	DIS- SOLVED SOLIDS (RESIST- ANCE AT 180 C) (MG/L)	DIS- SOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L)	DIS- SOLVED SOLIDS (TONS PER DAY)
04024000 - ST. LOUIS RIVER AT SCANLON, MINN. (LAT 46 42 12 LONG 092 25 07)										
OCT.. 1971										
19... 2860	58	28	4.6	.2	.00	.10	150	148	112	1140
JAN.. 1972										
06... 1280	67	14	14	.2	.03	.06	220	170	120	588
APR..										
11... 1810	--	21	16	.3	.26	.09	200	190	--	929
05131600 - HOWSTRING RIVER NEAR TALMOON, MINN (LAT 47 32 12 LONG 093 47 45)										
AUG.. 1972										
30... 49	116	4.1	1.5	.2	.01	.05	80	174	130	23.1
05131650 - HOWSTRING R AT SHOGRENS DAM NR DORA LK MIN (LAT 47 41 45 LONG 094 03 25)										
AUG.. 1972										
31... 128	86	6.5	.8	.2	.01	.03	70	134	97	46.3
05131720 - POPPLE RIVER NEAR DORA LAKE, MINN (LAT 47 41 35 LONG 094 06 19)										
AUG.. 1972										
31... E72	103	2.5	1.1	.1	.00	.04	60	158	114	--
05131750 - BIG FORK RIVER NEAR BIGFORK, MINN (LAT 47 45 05 LONG 093 46 33)										
AUG.. 1972										
30... 240	107	3.1	.9	.2	.00	.05	80	164	119	106
05131760 - RICE RIVER NEAR BIGFORK, MINN. (LAT 47 40 27 LONG 093 39 22)										
AUG.. 1972										
30... 56	121	3.1	1.1	.1	.00	.03	40	178	135	26.9

DATE	DIS- SOLVED SOLIDS (TONS PER AC-FT)	HARD- NESS (CA+MG) (MG/L)	NON- CAR- BONATE HARD- NESS (MG/L)	SODIUM AD- SORP- TION RATIO	PERCENT SODIUM	TEMPER- ATURE (DEG C)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	COLOR (PLAT- INUM- COBALT UNITS)
------	--	------------------------------------	---	---	-------------------	-----------------------------	--	---------------	--

04024000 - ST. LOUIS RIVER AT SCANLON, MINN. (LAT 46 42 12 LONG 092 25 07)

OCT. 1971									
19...	.20	75	17	.3	15	11.0	166	6.6	100
JAN. 1972									
06...	.23	82	15	.5	20	.0	209	6.8	200
APR. 11...	.26	78	--	.4	--	3.0	218	--	--

05131600 - HOWSTRING RIVER NEAR TALMOON, MINN (LAT 47 32 12 LONG 093 47 45)

AUG. 1972									
30...	.24	120	0	.1	5	20.0	229	6.8	80

05131650 - HOWSTRING R AT SHOGRENS DAM NR DORA LK MIN (LAT 47 41 45 LONG 094 03 25)

AUG. 1972									
31...	.18	90	4	.1	3	21.5	168	7.6	40

05131720 - POPPLE RIVER NEAR DORA LAKE, MINN (LAT 47 41 35 LONG 094 06 19)

AUG. 1972									
31...	.21	100	0	.1	5	21.5	204	7.2	20

05131750 - BIG FORK RIVER NEAR BIGFORK, MINN (LAT 47 45 05 LONG 093 46 33)

AUG. 1972									
30...	.22	110	1	.1	5	22.5	213	6.9	50

05131760 - RICE RIVER NEAR BIGFORK, MINN. (LAT 47 40 27 LONG 093 39 22)

AUG. 1972									
30...	.24	120	0	.1	5	23.0	233	7.5	20

04024000 - ST. LOUIS RIVER AT SCANLON, MINN. (LAT 46 42 12 LONG 092 25 07)

DATE	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)	DIS- SOLVED CHRO- MIUM (CR) (UG/L)	DIS- SOLVED COPPER (CU) (UG/L)	DIS- SOLVED LEAD (PB) (UG/L)
OCT. 19...	--	--	150	--	--	--	--
JAN. 06...	--	--	220	--	--	--	--
APR. 11...	6	0	200	2	0	20	5

DATE	DIS- SOLVED MOLYB- DENUM (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)
OCT. 19...	--	--	--	--	--	--
JAN. 06...	--	--	--	--	--	--
APR. 11...	25	6	0	30	17	.4

MISCELLANEOUS ANALYSES OF STREAMS IN MINNESOTA

DATE	DIS- CHARGE (CFS)	TEMPER- ATURE (DEG C)	PH (UNITS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	DIS- SOLVED SOLIDS (RESI- DUE AT 180 C) (MG/L)	DIS- SOLVED SOLIDS (TONS PER DAY)	DIS- SOLVED SOLIDS (TONS PER AC-FT)	TOTAL NITRO- GEN (N) (MG/L)	ORGANIC NITRO- GEN (N) (MG/L)	DIS- SOLVED AMMONIA NITRO- GEN (N) (MG/L)
05030260 - TOAD RIVER NORTH OF PERHAM, MINN. (LAT 46 38 38 LONG 095 30 33)										
MAY . 1972										
23...	89	21.0	7.4	452	296	71.1	.40	.66	.51	.11
05030300 - OTTER TAIL R. NR RICHVILLE, MN (LAT 46 30 50 LONG 095 31 03)										
MAY . 1972										
24...	595	18.0	7.2	369	232	373	.32	.56	.36	.13
05030401 - OTTER TAIL RIVER SOUTH OF AMOR, MINN. (LAT 46 21 35 LONG 095 43 57)										
MAY . 1972										
24...	852	17.5	8.2	330	200	460	.27	.74	.62	.11
05033900 - PELICAN RIVER AT DETROIT LAKES, MINN. (LAT 46 48 37 LONG 095 49 42)										
JAN.. 1972										
10...	11	.0	7.3	588	374	11.1	.51	--	--	.18
APR.										
18...	100	3.5	7.6	357	228	61.6	.31	.56	.48	.06
05035500 - ST CLAIR L OUTLET NR DETROIT LAKES, MN (LAT 46 48 03 LONG 095 52 37)										
OCT.. 1971										
28...	8.8	5.5	7.9	746	472	11.2	.64	--	--	.32
JAN.. 1972										
10...	4.7	.5	7.4	967	580	7.36	.79	--	--	1.8
FEB.										
09...	5.2	.0	7.4	998	556	7.81	.76	3.6	3.2	.09
MAR.										
13...	6.3	1.0	7.3	877	400	6.84	.54	3.9	.30	3.4
APR.										
18...	19	7.0	7.6	494	302	15.7	.41	1.1	.40	.49
MAY										
23...	14	22.0	8.2	600	364	14.3	.50	1.3	.87	.43
JUNE										
28...	6.7	24.0	9.2	547	372	6.75	.51	4.9	4.2	.71
05035600 - PELICAN R AT MUSKPAT LK OUTLET DETROIT LK, MN (LAT 46 46 55 LONG 095 52 57)										
JAN.. 1972										
11...	32	1.0	7.8	530	336	29.0	.46	--	--	.54
FEB.										
09...	27	1.0	7.6	603	358	26.1	.49	1.6	1.4	.07
MAR.										
13...	24	1.0	7.4	614	266	17.3	.36	1.8	.69	.71
APR.										
18...	91	6.0	8.0	412	264	65.0	.36	.60	.36	.17
MAY										
23...	96	20.5	8.1	434	264	69.1	.36	.79	.70	.08
JUNE										
28...	24	23.0	8.9	393	256	19.5	.35	4.3	4.0	.16
05037100 - PELICAN R AT SALLIF LK OUTLET NR DETROIT LK, MN (LAT 46 45 27 LONG 095 53 57)										
JAN.. 1972										
11...	43	1.0	8.3	470	242	32.7	.38	--	--	.11
FEB.										
09...	34	1.0	8.1	484	290	26.4	.39	.74	.65	.05
MAR.										
14...	30	1.0	7.9	492	278	22.7	.38	1.1	.82	.03
APR.										
18...	90	6.0	8.6	404	238	58.0	.32	.42	.31	.09
MAY										
23...	103	19.5	8.0	434	264	73.4	.36	.44	.34	.09
JUNE										
28...	31	24.0	8.4	383	240	20.1	.33	1.3	1.2	.14

DATE	DIS- SOLVED NITRITE (N) (MG/L)	DIS- SOLVED NITRATE (N) (MG/L)	TOTAL KJFL- NITRO- GEN (MG/L)	DIS- SOLVED NITRITE (N) (MG/L)	DIS- SOLVED PHOS- PHATE (P) (MG/L)	TOTAL PHOS- PHORUS (P) (MG/L)	DIS- SOLVED PHOS- PHORUS (P) (MG/L)	DIS- SOLVED AMMONIA (NH4) (MG/L)	DIS- SOLVED NITRATE (NO3) (MG/L)	DIS- SOLVED NITRITE (NO2) (MG/L)
05030260 - T940 RIVER NDPT OF PERHAM, MINN. (LAT 46 38 38 LONG 095 30 33)										
MAY . 1972										
23...	.00	.04	.62	.04	.06	.11	.02	.14	.20	.0
05030300 - OTTER TAIL R. NR RICHVILLE, MN (LAT 46 30 50 LONG 095 31 03)										
MAY . 1972										
24...	.00	.07	.44	.07	.03	.05	.01	.17	.30	.0
05030401 - OTTER TAIL RIVER SOUTH OF AMOR, MINN. (LAT 46 21 35 LONG 095 43 57)										
MAY . 1972										
24...	.00	.01	.73	.01	.03	.03	.01	.14	.00	.0
05033900 - PELICAN RIVER AT DETROIT LAKES, MINN. (LAT 46 48 37 LONG 095 49 42)										
JAN.. 1972										
10...	.00	.10	--	.10	.00	.02	.00	.23	--	--
APR.										
18...	.00	.02	.54	.02	.00	.04	.00	.09	.10	.0
05035500 - ST CLAIR L OUTLET NR DETROIT LAKES, MN (LAT 46 48 03 LONG 095 52 37)										
OCT.. 1971										
28...	.01	.20	--	.20	1.3	.62	.43	.41	--	--
JAN.. 1972										
10...	.00	.14	--	.14	3.7	1.3	1.2	2.3	--	--
FEB.										
09...	.00	.28	3.3	.28	4.9	2.1	1.6	.12	--	.0
MAR.										
13...	.00	.21	3.7	.21	4.0	1.8	1.3	4.4	.90	.0
APR.										
18...	.01	.20	.89	.21	.49	.29	.16	.63	.90	.0
MAY										
23...	.00	.02	1.3	.02	.80	.55	.26	.55	.10	.0
JUNE										
28...	.01	.03	4.9	.04	.74	.58	.24	.91	.10	.0
05035600 - PELICAN R AT MUSKRAT LK OUTLET DETROIT LK, MN (LAT 46 46 55 LONG 095 52 57)										
JAN.. 1972										
11...	.00	.09	--	.09	.49	.18	.16	.70	--	--
FEB.										
09...	.00	.13	1.5	.13	.89	.36	.29	.09	--	.0
MAR.										
13...	.00	.38	1.4	.38	.92	.40	.30	.91	1.7	.0
APR.										
18...	.00	.07	.53	.07	.00	.00	.00	.22	.30	.0
MAY										
23...	.00	.01	.78	.01	.03	.09	.01	.10	.00	.0
JUNE										
28...	.00	.06	4.2	.06	.03	.10	.01	.21	.30	.0
05037100 - PELICAN R AT SALLIE LK OUTLT NR DETROIT LK, MN (LAT 46 45 27 LONG 095 53 57)										
JAN.. 1972										
11...	.00	.03	--	.03	.03	.03	.01	.14	--	--
FEB.										
09...	.01	.03	.70	.04	.06	.06	.02	.06	--	.0
MAR.										
14...	.00	.21	.85	.21	.03	.05	.01	.04	.90	.0
APR.										
18...	.00	.02	.40	.02	.09	.03	.03	.12	.10	.0
MAY										
23...	.00	.01	.43	.01	.03	.06	.01	.17	.00	.0
JUNE										
28...	.00	.04	1.3	.04	.00	.05	.00	.18	.20	.0

MISCELLANEOUS ANALYSES OF STREAMS IN MINNESOTA

DATE	DIS- CHARGE (CFS)	DIS- SOLVED SILICA (SiO ₂) (MG/L)	DIS- SOLVED IRON (FE) (UG/L)	DIS- SOLVED MANG- NESE (MNI) (UG/L)	DIS- SOLVED CAL- CIUM (CA) (MG/L)	DIS- SOLVED MAG- NESIUM (MG)	DIS- SOLVED SODIUM (NA) (MG/L)	DIS- SOLVED PO- TAS- SIUM (K) (MG/L)	BICAR- BONATE (HCO ₃) (MG/L)	CAR- BONATE (CO ₃) (MG/L)
05131870 - BIG FORK RIVER NEAR EFFIE, MINN. (LAT 47 57 18 LONG 093 45 11)										
AUG.. 1972										
30...	443	10	250	40	29	8.6	2.4	1.1	124	0
05131900 - CALDWELL BR AT CALDWELL TR NR EFFIE, MINN (LAT 47 57 22 LONG 093 52 43)										
AUG.. 1972										
31...	2.3	11	270	120	46	17	6.4	1.3	217	0
05132000 - BIG FORK RIVER AT BIG FALLS, MINN. (LAT 48 11 45 LONG 093 48 25)										
JAN.. 1972										
24...	277	13	220	40	44	13	3.9	2.1	191	0
APR..										
04...	290	12	200	50	41	11	3.3	2.1	175	0
JUNE										
12...	369	5.7	120	30	32	9.6	2.3	1.0	140	0
AUG..										
31...	570	10	330	50	27	8.1	2.3	.9	113	0
05132050 - DINNER CREEK AT MARGIE, MINN (LAT 48 04 55 LONG 093 57 23)										
AUG.. 1972										
31...	7.7	8.2	420	70	9.4	3.5	1.0	.2	33	0
05132200 - STURGEON RIVER NEAR BIG FALLS, MINN (LAT 48 12 53 LONG 093 55 53)										
AUG.. 1972										
31...	33	8.6	540	50	17	5.9	1.1	.3	65	0
05132400 - BEAR RIVER NEAR LITTLEFORK, MINN (LAT 48 24 14 LONG 093 41 29)										
AUG.. 1972										
31...	18	9.4	880	60	17	6.5	.9	.4	62	0
DATE	ALKA- LINITY AS CAC03 (MG/L)	DIS- SOLVED SULFATE (SO ₄) (MG/L)	DIS- SOLVED CHLO- RIDE (CL) (MG/L)	DIS- SOLVED FLUO- RIDE (F) (MG/L)	DIS- SOLVED 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)
05131870 - BIG FORK RIVER NEAR EFFIE, MINN. (LAT 47 57 18 LONG 093 45 11)										
AUG.. 1972										
30...	102	5.0	1.3	.3	.02	.05	100	176	119	230
05131900 - CALDWELL BR AT CALDWELL TR NR EFFIE, MINN (LAT 47 57 22 LONG 093 52 43)										
AUG.. 1972										
31...	178	10	1.6	.4	.01	.09	140	276	201	1.74
05132000 - BIG FORK RIVER AT BIG FALLS, MINN. (LAT 48 11 45 LONG 093 48 25)										
JAN.. 1972										
24...	157	6.6	2.4	.3	.15	.11	70	212	180	159
APR..										
04...	144	5.9	3.0	.2	.21	.05	80	210	166	164
JUNE										
12...	115	6.6	.4	.2	.02	.08	70	174	127	173
AUG..										
31...	92	5.3	1.2	.3	.00	.05	120	162	111	249
05132050 - DINNER CREEK AT MARGIE, MINN (LAT 48 04 55 LONG 093 57 23)										
AUG.. 1972										
31...	27	6.0	1.1	.3	.00	.04	150	100	47	2.09
05132200 - STURGEON RIVER NEAR BIG FALLS, MINN (LAT 48 12 53 LONG 093 55 53)										
AUG.. 1972										
31...	53	7.1	1.2	.4	.00	.04	210	150	74	13.4
05132400 - BEAR RIVER NEAR LITTLEFORK, MINN (LAT 48 24 14 LONG 093 41 29)										
AUG.. 1972										
31...	51	11	2.4	.5	.02	.06	260	164	80	8.15

DATE	DIS- SOLVED SOLIDS (TONS PER AC-FT)	HARD- NESS (CA+MG) (MG/L)	NON- CAR- BONATE HARD- NESS (MG/L)	SODIUM AD- SORP- TION RATIO	PERCENT SODIUM	TEMPER- ATURE (DEG C)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	COLOR (PLAT- INUM- COBALT UNITS)
05131870 - BIG FORK RIVER NEAR EFFIE, MINN. (LAT 47 57 18 LONG 093 45 11)									
AUG., 1972 30...	.24	110	6	.1	5	23.0	200	7.1	100
05131900 - CALDWELL RR AT CALDWELL TR NR EFFIE, MINN (LAT 47 57 22 LONG 093 52 43)									
AUG., 1972 31...	.38	180	7	.2	7	19.5	361	7.5	100
05132000 - BIG FORK RIVER AT BIG FALLS, MINN. (LAT 48 11 45 LONG 093 48 25)									
JAN., 1972 24...	.29	160	7	.1	5	.0	300	7.4	60
APR. 04...	.29	150	4	.1	5	.0	276	7.3	50
JUNE 12...	.24	120	5	.1	4	20.5	223	7.4	60
AUG. 31...	.22	100	8	.1	5	20.5	183	7.1	100
05132050 - DINNER CREEK AT MARGIE, MINN (LAT 48 04 55 LONG 093 57 23)									
AUG., 1972 31...	.14	38	11	.1	5	20.0	59	6.3	100
05132200 - STURGEON RIVER NEAR BIG FALLS, MINN (LAT 48 12 53 LONG 093 55 53)									
AUG., 1972 31...	.20	67	13	.1	3	20.0	110	6.9	200
05132400 - BEAR RIVER NEAR LITTLEFORK, MINN (LAT 48 24 14 LONG 093 41 29)									
AUG., 1972 31...	.22	69	18	.0	3	19.0	106	6.9	400

MISCELLANEOUS ANALYSES OF STREAMS IN MINNESOTA

DATE	DIS- CHARGE (CFS)	DIS- SOLVED SILICA (SiO ₂) (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)	DIS- SOLVED SODIUM (NA) (MG/L)	DIS- SOLVED PO- TAS- SIUM (K) (MG/L)	RICAR- BONATE (HCO ₃) (MG/L)	CAR- BONATE (CO ₃) (MG/L)
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05132900 - BLACK RIVER NEAR LOMAN, MINN. (LAT 48 27 03 LONG 093 49 56)

AUG., 1972										
29...	9.0	9.5	700	90	26	8.8	1.7	.5	108	0

05133200 - WEST FORK BLACK RR NR LOMAN MINN (LAT 48 31 40 LONG 093 49 55)

AUG., 1972										
28...	8.0	6.1	570	60	13	5.8	1.5	.6	59	0

05134010 - RAPID RR NR CARP MINN (LAT 48 31 36 LONG 094 35 20)

AUG., 1972										
30...	30	6.6	290	70	30	9.6	2.2	.7	120	0

05134100 - NORTH BRANCH RAPID R NR RAUDETTE, MINN (LAT 48 31 56 LONG 094 38 50)

AUG., 1972										
30...	1.7	11	160	60	40	13	2.4	.6	176	0

05135000 - E F RAPID RIVER NR CLEMENTSON, MINN (LAT 48 40 48 LONG 094 24 50)

AUG., 1972										
30...	7.5	12	270	280	29	9.5	1.3	.7	107	0

05135100 - RAPID RIVER AT CLEMENTSON, MINN (LAT 48 41 27 LONG 094 25 59)

AUG., 1972										
30...	67	7.1	450	160	33	10	2.2	.9	131	0

05270500 - SAUK RIVER NEAR ST. CLOUD, MINN. (LAT 45 33 35 LONG 094 14 00)

NOV., 1971										
30...	917	17	30	10	57	24	6.8	2.9	251	0

DATE	ALKA- LITY AS CACO ₃ (MG/L)	DIS- SOLVED SULFATE (SO ₄) (MG/L)	DIS- SOLVED CHLO- RIDE (CL) (MG/L)	DIS- SOLVED FLUO- RIDE (F) (MG/L)	DIS- SOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL PHOS- PHORUS (P) (MG/L)	DIS- SOLVED BORON (B) (MG/L)	DIS- SOLVED SOLIDS (PES- DUE AT 180 C) (MG/L)	DIS- SOLVED SOLIDS (SUM OF TUNTS) (MG/L)	DIS- SOLVED SOLIDS (TONS PER DAY)
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05132900 - BLACK RIVER NEAR LOMAN, MINN. (LAT 48 27 03 LONG 093 49 56)

AUG., 1972										
29...	88	9.7	1.9	.3	.00	.08	170	200	112	4.86

05133200 - WEST FORK BLACK RR NR LOMAN MINN (LAT 48 31 40 LONG 093 49 55)

AUG., 1972										
28...	48	8.7	1.9	.3	.00	.08	200	128	68	2.76

05134010 - RAPID RR NR CARP MINN (LAT 48 31 36 LONG 094 35 20)

AUG., 1972										
30...	98	9.7	1.8	.3	.00	.04	160	174	119	14.1

05134100 - NORTH BRANCH RAPID R NR RAUDETTE, MINN (LAT 48 31 56 LONG 094 38 50)

AUG., 1972										
30...	144	5.4	.7	.3	.00	.05	110	216	160	.99

05135000 - E F RAPID RIVER NR CLEMENTSON, MINN (LAT 48 40 48 LONG 094 24 50)

AUG., 1972										
30...	88	11	2.5	.6	.02	.08	280	224	120	4.56

05135100 - RAPID RIVER AT CLEMENTSON, MINN (LAT 48 41 27 LONG 094 25 59)

AUG., 1972										
30...	107	7.3	2.2	.4	.07	.07	170	192	129	34.7

05270500 - SAUK RIVER NEAR ST. CLOUD, MINN. (LAT 45 33 35 LONG 094 14 00)

NOV., 1971										
30...	206	38	8.4	.2	1.1	.16	70	320	283	706

DATE	DIS-SOLVED SOLIDS (TONS PER AC-FT)	HARD- NESS (CA+MG) (MG/L)	NON- CAL- RONATE HARD- NESS (MG/L)	SODIUM AD- SORP- TION RATIO	PERCENT SODIUM	TEMPER- ATURE (DEG C)	SPE- CIFIC CON- DUCT- ANCE (MICHO- MHOS)	PH (UNITS)	COLOR (PLAT- INUM- CORALT UNITS)
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05132400 - BLACK RIVER NEAR LOMAN, MINN. (LAT 48 27 03 LONG 093 49 56)

AUG., 1972 29...	.27	100	13	.1	4	19.0	170	7.2	200
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05133200 - WEST FORK BLACK RR NR LOMAN MINN (LAT 48 31 40 LONG 093 49 55)

AUG., 1972 29...	.17	56	8	.1	5	18.0	104	7.1	200
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05134010 - RAPID RR NR CARP MINN (LAT 48 31 36 LONG 094 35 20)

AUG., 1972 30...	.24	110	16	.1	4	20.2	204	7.6	100
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05134100 - NORTH BRANCH RAPID R NR RAUDETTE, MINN (LAT 48 31 56 LONG 094 38 50)

AUG., 1972 30...	.29	150	9	.1	3	23.5	270	7.7	80
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05135000 - E F RAPID RIVER NR CLEMENTSON, MINN (LAT 48 40 48 LONG 094 24 50)

AUG., 1972 30...	.30	110	24	.1	2	21.5	176	7.2	300
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05135100 - RAPID RIVER AT CLEMENTSON, MINN (LAT 48 41 27 LONG 094 25 59)

AUG., 1972 30...	.26	120	16	.1	4	21.0	217	7.3	200
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05270500 - SAUK RIVER NEAR ST. CLOUD, MINN. (LAT 45 33 35 LONG 094 14 00)

NOV., 1971 30...	.44	240	35	.2	6	.0	480	7.8	40
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DATE	DIS-SOLVED ARSENIC (AS) (UG/L)	DIS-SOLVED BORON (B) (UG/L)	DIS-SOLVED CAD- MIUM (CD) (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)
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NOV. 30...	7	70	2	0	0	5	8
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DATE	DIS-SOLVED NICKEL (NI) (UG/L)	DIS-SOLVED STRON- TIUM (SR) (UG/L)	DIS-SOLVED VANA- DIUM (V) (UG/L)	DIS-SOLVED ZINC (ZN) (UG/L)	DIS-SOLVED LITHIUM (LI) (UG/L)	DIS-SOLVED SELE- NIUM (SE) (UG/L)
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NOV. 30...	0	150	.0	30	30	7
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MISCELLANEOUS ANALYSES OF STREAMS IN MINNESOTA

DATE	DIS- CHARGE (CFS)	TEMPER- ATURE (DEG C)	COLOR (PLAT- INUM- COALIT UNITS)	SPF- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	BICAR- BONATE (HCO3) (MG/L)	CAR- BONATE (CO3) (MG/L)	DIS- SOLVED NITRITE PLUS NITRATE (N) (MG/L)
05378500 - MISSISSIPPI RIVER AT WINONA, MINN. (LAT 44 03 20 LONG 091 38 15)								
NOV., 1971								
10... 59500		5.5	40	321	7.8	161	0	.65
APR., 1972								
27... 93900		9.2	40	344	7.9	158	0	.88
SEP., 1972								
26... 93900		16.5	60	282	7.5	142	0	.54
05385000 - ROOT RIVER NEAR HOUSTON, MINN. (LAT 43 46 05 LONG 091 35 11)								
MAR., 1972								
21... 1640		5.0	40	343	7.7	187	0	2.6
05474770 - BEAVER CREEK NR CURRIE (LAT 44 03 30 LONG 095 43 08)								
SEP., 1972								
19... 8	19.0	20	1240	7.6	254	0	.04	
05474800 - LIME CREEK NR AVOCA, MN (LAT 43 56 57 LONG 095 31 23)								
SEP., 1972								
19... 3	.2	20	1030	7.9	225	0	.41	
05474860 - DES MOINES RBL TALCOTT LK NR DUNDEE, MN (LAT 43 53 09 LONG 095 25 51)								
SEP., 1972								
19... 2.0	24.0	20	953	7.6	281	0	.03	
DATE	HARD- NESS (CA.MG) (MG/L)	NON- CAP- HONATE HARD- NESS (MG/L)	DIS- SOLVED MAG- CAL- CIUM (CA) (MG/L)	DIS- SOLVED MAG- NE- SIUM (MG) (MG/L)	DIS- SOLVED SODIUM (NA) (MG/L)	SODIUM AD- SORP- TION PERCENT SODIUM RATIO	DIS- SOLVED PO- TAS- SIUM (K) (MG/L)	DIS- SOLVED CHLO- RIDE (CL) (MG/L)
05378500 - MISSISSIPPI RIVER AT WINONA, MINN. (LAT 44 03 20 LONG 091 38 15)								
NOV., 1971								
10... 150	21	40	13	8.2	.3	10	2.2	11
APR., 1972								
27... 160	35	41	15	6.5	.2	8	2.8	7.7
SEP., 1972								
26... 130	18	34	12	6.2	.2	9	2.0	6.8
05385000 - ROOT RIVER NEAR HOUSTON, MINN. (LAT 43 46 05 LONG 091 35 11)								
MAR., 1972								
21... 170	13	47	12	2.6	.1	3	5.5	8.6
05474770 - BEAVER CREEK NR CURRIE (LAT 44 03 30 LONG 095 43 08)								
SEP., 1972								
19... 550	340	120	61	56	1.0	18	5.5	94
05474800 - LIME CREEK NR AVOCA, MN (LAT 43 56 57 LONG 095 31 23)								
SEP., 1972								
19... 520	340	110	60	27	5.0	10	5.7	34
05474860 - DES MOINES RBL TALCOTT LK NR DUNDEE, MN (LAT 43 53 09 LONG 095 25 51)								
SEP., 1972								
19... 510	280	110	57	19	.4	7	5.2	20

DATE	DIS- SOLVED SULFATE (SO ₄) (MG/L)	DIS- SOLVED FLUO- RIDE (F) (MG/L)	DIS- SOLVED SILICA (SiO ₂) (MG/L)	DIS- SOLVED BORON (B) (UG/L)	DIS- SOLVED IRON (FE) (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 AC-FY)
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05378500 - MISSISSIPPI RIVER AT WINONA, MINN. (LAT 44 03 20 LONG 091 38 15)

NOV., 1971								
10...	19	.2	11	80	60	212	187	.29
APR., 1972								
27...	36	.3	9.2	60	110	256	200	.35
SEP.								
26...	18	.2	13	80	160	206	165	.28

05385000 - ROOT RIVER NEAR HOUSTON, MINN. (LAT 43 46 05 LONG 091 35 11)

MAR., 1972								
21...	12	.1	9.8	30	40	238	201	.32

05474770 - BEAVER CREEK NR CURRIE (LAT 44 03 30 LONG 095 43 08)

SEP., 1972								
19...	330	.7	9.5	160	120	852	802	1.16

05474800 - LIME CREEK NR AVDCA, MN (LAT 43 56 57 LONG 095 31 23)

SEP., 1972								
19...	330	.9	13	120	80	740	694	1.01

05474860 - DES MOINES RBL TALCOTT LK NR DUNDEE, MN (LAT 43 53 09 LONG 095 25 51)

SEP., 1972								
19...	280	.8	17	110	70	668	648	.91

05132000 BIG FORK RIVER AT BIG FALLS, MINN.

SPECIFIC CONDUCTANCE (MICROMHOS AT 25°C), WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

OCTOBER			NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
1	---	---	---	---	---	---	---	---	270	270	295	295
2	---	---	---	---	---	---	---	---	270	270	295	295
3	---	---	---	---	---	---	---	---	270	270	295	295
4	---	---	---	---	---	---	---	---	270	270	295	295
5	---	---	---	---	---	---	---	---	275	270	295	295
6	---	---	---	---	---	---	---	---	275	275	295	295
7	---	---	---	---	---	---	---	---	275	275	300	295
8	---	---	---	---	---	---	---	---	280	275	300	300
9	---	---	---	---	---	---	---	---	280	280	300	300
10	---	---	---	---	---	---	---	---	280	280	300	300
11	---	---	---	---	---	---	---	---	280	280	300	300
12	---	---	---	---	---	---	---	---	280	280	300	300
13	---	---	---	---	---	---	---	---	280	280	300	300
14	---	---	---	---	---	---	---	---	285	280	300	295
15	---	---	---	---	---	---	---	---	285	285	295	295
16	---	---	---	---	---	---	---	---	285	285	295	295
17	---	---	---	---	---	---	---	---	290	285	295	295
18	---	---	---	---	---	---	---	---	---	---	295	295
19	---	---	---	---	---	---	---	---	---	---	295	295
20	---	---	---	---	---	---	260	255	---	---	295	295
							260	260	---	---	295	295
21	---	---	---	---	---	---	265	260	---	---	295	290
22	---	---	---	---	---	---	265	265	---	---	295	290
23	---	---	---	---	---	---	265	265	---	---	290	270
24	---	---	---	---	---	---	270	265	---	---	270	265
25	---	---	---	---	---	---	270	270	---	---	270	270
26	---	---	---	---	---	---	270	270	---	---	270	270
27	---	---	---	---	---	---	270	270	---	---	270	270
28	---	---	---	---	---	---	270	270	295	290	270	260
29	---	---	---	---	---	---	270	270	295	295	260	255
30	---	---	---	---	---	---	270	270	---	---	---	---
31	---	---	---	---	---	---	270	270	---	---	---	---
MONTH	---	---	---	---	---	---	---	---	---	---	300	255
APRIL			MAY		JUNE		JULY		AUGUST		SEPTEMBER	
DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
1	---	---	---	---	210	205	205	200	165	160	190	185
2	---	---	---	---	210	210	215	205	180	165	195	190
3	---	---	---	---	210	210	220	215	180	180	195	195
4	265	265	---	---	215	210	225	220	185	180	200	195
5	265	265	---	---	220	215	235	225	185	185	200	200
6	265	265	---	---	220	220	235	235	195	185	205	205
7	265	265	---	---	---	---	235	235	195	195	210	205
8	265	265	---	---	---	---	235	235	195	195	210	210
9	270	265	---	---	---	---	235	235	195	195	210	210
10	270	270	---	---	---	---	235	235	195	195	210	210
11	270	270	---	---	---	---	235	235	195	195	215	210
12	270	260	---	---	235	235	---	---	195	195	210	210
13	260	290	---	---	235	225	---	---	195	195	210	210
14	250	230	---	---	225	210	---	---	195	195	210	200
15	230	195	---	---	210	200	---	---	195	195	200	200
16	195	155	---	---	200	200	---	---	200	195	200	200
17	155	125	150	155	230	200	---	---	200	175	200	200
18	125	115	160	160	200	200	---	---	175	165	200	200
19	115	195	165	160	200	195	---	---	165	160	200	200
20	---	---	165	165	195	195	---	---	160	155	200	200
21	---	---	165	165	195	185	---	---	155	155	210	200
22	---	---	175	165	190	185	---	---	155	155	210	165
23	---	---	180	175	190	190	---	---	155	155	175	165
24	---	---	190	180	190	190	---	---	160	155	195	175
25	---	---	195	190	190	190	---	---	165	160	200	195
26	---	---	195	195	195	190	140	140	170	165	200	200
27	---	---	200	195	195	195	140	140	175	175	200	195
28	---	---	200	200	200	195	140	140	180	175	195	185
29	---	---	205	200	200	200	145	140	180	180	190	190
30	---	---	205	205	200	200	150	145	180	180	190	190
31	---	---	205	205	---	---	160	150	185	180	---	---
MONTH	---	---	---	---	235	185	---	---	200	155	215	165
YEAR	300	195										

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972
RANDOM (INSTANTANEOUS)

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	---	---	---	14.0	15.0	---	22.0	---
2	17.0	---	---	0.0	0.0	---	---	13.0	16.0	---	---	---
3	---	---	---	---	---	0.0	3.0	16.0	---	---	---	---
4	---	---	0.0	---	---	---	4.0	14.0	17.0	21.0	---	---
5	---	---	---	---	---	0.0	---	15.0	17.0	---	---	25.0
6	---	6.0	---	---	0.0	---	---	16.0	16.0	---	---	---
7	---	---	---	---	---	---	---	16.0	15.0	---	---	---
8	---	---	---	---	---	---	---	14.0	16.0	---	23.0	---
9	12.0	---	---	0.0	---	---	---	16.0	17.0	---	---	---
10	---	---	---	---	---	---	---	16.0	17.0	---	---	---
11	---	---	---	---	---	---	---	16.0	16.0	21.0	---	---
12	8.0	2.0	0.0	---	---	---	4.0	16.0	16.0	---	---	---
13	---	---	---	---	0.0	1.5	---	14.0	---	---	---	25.0
14	---	---	---	---	---	---	---	16.0	---	---	---	---
15	---	---	0.5	---	---	---	---	16.0	---	---	23.0	---
16	9.0	---	---	0.0	---	---	---	12.0	23.5	---	---	---
17	---	---	---	---	---	---	---	4.0	---	---	---	---
18	---	---	0.0	---	---	---	5.0	15.0	---	21.0	---	---
19	---	---	---	---	---	1.5	---	14.0	---	25.0	---	---
20	---	5.0	---	---	0.0	0.5	---	13.0	16.0	24.5	---	---
21	---	---	---	---	---	1.0	10.0	---	---	---	---	---
22	---	---	---	---	---	1.5	11.0	---	---	---	25.0	---
23	12.0	---	---	0.0	---	1.0	12.0	---	---	---	---	---
24	---	---	---	---	---	2.0	11.0	---	---	---	14.0	---
25	---	---	0.0	---	---	2.0	12.0	---	---	22.0	---	---
26	---	0.0	---	---	---	2.0	13.0	---	---	25.0	---	---
27	---	---	---	---	0.0	1.0	13.0	16.0	20.0	---	---	---
28	---	---	---	---	---	1.0	13.0	15.0	---	---	---	15.0
29	---	2.5	---	---	---	---	13.0	16.0	---	---	23.0	---
30	10.0	---	---	0.0	---	---	14.0	16.0	---	---	---	---
31	---	---	---	---	---	---	---	16.0	---	---	---	---

DATE	TIME	TEMPERATURE (DEG C) 00010	DISCHARGE (CFB) 00060	NUMBER OF SAMPLING POINTS 00063	RED	RED	RED	RED	RED	RED
					MAT. FALL DIAM. % FINE THAN .062 MM 80158	MAT. FALL DIAM. % FINE THAN .125 MM 80159	MAT. FALL DIAM. % FINE THAN .250 MM 80160	MAT. FALL DIAM. % FINE THAN .500 MM 80161	MAT. FALL DIAM. % FINE THAN 1.00 MM 80162	MAT. FALL DIAM. % FINE THAN 2.00 MM 80169
MAR. 22...	1030	2.0	1110	4	0	0	4	36	87	91
MAY 12...	0925	14.0	600	4	0	1	4	32	79	85
JULY 20...	1025	20.5	230	4	0	0	5	40	81	88

[illegible]

MISCELLANEOUS ANALYSES OF STREAMS IN MINNESOTA

05317000 COTTONWOOD RIVER NEAR NEW ULM, MINN.

SUSPENDED SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	OCTOBER			NOVEMBER			DECEMBER		
	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	24	--	--	193	--	--	40	--	--
2	25	242	19	127	--	--	46	--	--
3	24	--	--	114	--	--	96	--	--
4	25	--	--	107	--	--	100	72	19
5	24	--	--	95	--	--	64	--	--
6	22	--	--	73	74	16	95	--	--
7	20	--	--	67	--	--	90	--	--
8	20	--	--	44	--	--	84	--	--
9	20	71	3.4	74	--	--	74	--	--
10	20	--	--	72	--	--	72	--	--
11	19	--	--	67	--	--	72	61	12
12	20	92	5.0	64	80	14	72	--	--
13	19	--	--	62	--	--	71	--	--
14	14	--	--	58	--	--	71	--	--
15	10	--	--	55	--	--	70	147	28
16	19	100	5.1	45	--	--	67	--	--
17	20	--	--	105	--	--	63	--	--
18	24	--	--	137	--	--	59	145	23
19	22	--	--	143	--	--	56	--	--
20	24	--	--	163	69	30	53	--	--
21	36	--	--	156	--	--	52	--	--
22	35	--	--	137	--	--	51	--	--
23	29	86	6.7	124	--	--	50	--	--
24	29	--	--	112	--	--	49	--	--
25	35	--	--	136	--	--	47	85	11
26	39	--	--	137	225	63	45	--	--
27	60	--	--	116	--	--	43	--	--
28	59	--	--	101	--	--	41	--	--
29	61	--	--	92	62	20	39	--	--
30	96	272	71	82	--	--	37	--	--
31	139	--	--	--	--	--	35	--	--
DAY	JANUARY			FEBRUARY			MARCH		
	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	34	--	--	11	--	--	18	--	--
2	32	151	13	11	246	7.3	18	--	--
3	30	--	--	11	--	--	18	56	2.7
4	29	--	--	11	--	--	19	--	--
5	27	--	--	11	--	--	19	41	2.1
6	26	--	--	11	73	2.2	20	--	--
7	26	--	--	11	--	--	20	--	--
8	25	--	--	11	--	--	20	--	--
9	25	97	6.5	11	--	--	21	--	--
10	25	--	--	11	--	--	21	--	--
11	23	--	--	11	--	--	21	--	--
12	21	--	--	11	--	--	40	--	4.3
13	18	--	--	11	56	1.7	150	--	--
14	16	--	--	12	--	--	800	--	--
15	14	--	--	12	--	--	1710	--	--
16	14	112	4.2	12	--	--	2160	--	--
17	13	--	--	12	--	--	2990	--	--
18	12	--	--	13	--	--	2560	--	--
19	12	--	--	13	--	--	1900	1550	7950
20	12	--	--	14	35	1.3	1340	2720	9840
21	12	--	--	14	--	--	1170	2250	7110
22	11	--	--	15	--	--	1080	1080	3150
23	11	78	2.3	15	--	--	998	106	286
24	11	--	--	16	--	--	866	123	286
25	11	--	--	16	--	--	722	175	341
26	11	--	--	16	--	--	646	198	345
27	11	--	--	41	1.9	--	559	180	272
28	11	--	--	17	--	--	497	166	216
29	11	--	--	17	--	--	473	--	--
30	11	56	1.7	--	--	--	423	--	--
31	11	--	--	--	--	--	391	--	--

05317000 COTTONWOOD RIVER NEAR NEW ULM, MINN.

SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DAY	APRIL			MAY			JUNE		
	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	362	--	--	536	--	--	1270	175	600
2	340	--	--	760	--	--	1270	148	507
3	334	101	91	1230	168	624	1140	162	499
4	323	218	190	1560	349	1470	1000	180	486
5	310	--	--	1470	246	976	846	213	487
6	312	--	--	1280	208	719	707	219	418
7	321	--	--	1090	227	668	634	204	349
8	306	--	--	932	255	642	1250	200	675
9	292	--	--	806	276	601	1140	228	702
10	291	--	--	721	230	448	913	225	555
11	290	218	171	654	216	381	754	196	399
12	294	--	--	597	213	343	667	190	362
13	296	--	--	574	209	324	593	--	--
14	293	--	--	568	242	371	681	--	--
15	286	--	--	650	283	497	528	--	--
16	285	--	--	688	345	641	445	211	254
17	284	--	--	674	350	637	395	--	--
18	276	254	189	632	310	529	369	--	--
19	263	--	--	567	258	395	362	--	--
20	259	--	--	508	177	243	392	133	141
21	249	181	146	482	--	--	390	--	--
22	253	197	188	472	--	--	369	--	--
23	241	205	249	436	--	--	356	--	--
24	250	253	512	446	--	--	338	--	--
25	252	212	430	456	--	--	314	--	--
26	677	230	420	475	--	--	286	--	--
27	588	257	408	526	166	259	272	100	73
28	523	286	404	494	202	269	262	--	--
29	487	299	393	510	275	379	642	--	--
30	478	226	292	718	257	498	667	--	--
31	--	--	--	1010	232	633	--	--	--
DAY	JULY			AUGUST			SEPTEMBER		
	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	510	--	--	430	109	68	64	--	--
2	400	--	--	215	--	--	59	--	--
3	338	--	--	197	--	--	57	--	--
4	284	129	96	183	--	--	54	--	--
5	247	--	--	174	--	--	53	20	2.9
6	235	--	--	167	--	--	54	--	--
7	220	--	--	154	--	--	53	--	--
8	224	--	--	149	165	66	51	--	--
9	215	--	--	143	--	--	49	--	--
10	218	--	--	139	--	--	49	--	--
11	277	85	64	135	--	--	47	--	--
12	310	--	--	132	--	--	53	60	9.7
13	294	--	--	125	--	--	75	--	--
14	288	--	--	117	--	--	63	--	--
15	265	--	--	108	141	41	54	--	--
16	236	94	60	99	--	--	54	--	--
17	227	65	40	91	--	--	57	--	--
18	214	--	--	83	--	--	56	--	--
19	205	--	--	77	--	--	57	--	--
20	226	180	110	71	--	--	61	--	--
21	229	--	--	69	--	--	57	--	--
22	258	--	--	70	125	24	53	--	--
23	339	--	--	44	--	--	52	--	--
24	338	--	--	67	59	11	44	--	--
25	311	178	149	71	--	--	45	--	--
26	322	176	153	79	--	--	79	--	--
27	260	--	--	76	--	--	60	--	--
28	256	--	--	78	--	--	45	94	22
29	279	--	--	76	50	12	64	--	--
30	272	--	--	73	--	--	64	--	--
31	253	--	--	73	--	--	--	--	--

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 1971 TO SEPTEMBER 1972

DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)	DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)
04010500 PIGEON RIVER AT MIDDLE FALLS, NEAR GRAND PORTAGE, MINN.							
AUG. 31, 1971...	103	18	185	MAR. 28.....	194	0	85
OCT. 05.....	464	12	115	MAY 02.....	4940	2	<50
NOV. 17.....	1220	2.5	60	JUNE 06.....	852	17.5	62
DEC. 29.....	562	.5	--	JUNE 22.....	1270	16	--
JAN. 18, 1972...	314	0	80	AUG. 15.....	197	17	76
FEB. 23.....	183	.5	<50	SEPT. 19.....	114		
				OCT. 25.....	128	6	70
04014500 BAPTISM RIVER NEAR BEAVER BAY, MINN.							
AUG. 30, 1971...	31	19.0	180	MAY 01.....	2200	2.0	<50
OCT. 05.....	99	12.5	--	MAY 03.....	3510	2.0	<50
NOV. 09.....	206	1.0	55	JUNE 06.....	86	18.5	60
DEC. 13.....	86	0	75	JULY 11.....	53	17.5	98
JAN. 17, 1972...	44	0	85	AUG. 15.....	94	15.5	70
FEB. 22.....	37	1.0	80	SEPT. 19.....	92	12.0	70
MAR. 27.....	44	.5	80	OCT. 25.....	150	2.0	70
APR. 18.....	315	.5	--				
04015500 SECOND CREEK NEAR AURORA, MINN.							
SEPT. 15, 1971...	26	13.0	650	APR. 17.....	101	3.0	420
OCT. 13.....	38	6.0	640	APR. 24.....	65	4.5	380
NOV. 29.....	31	.01	630	MAY 18.....	34	17	520
JAN. 05, 1972...	17	20.0	700	JUNE 22.....	15	17.5	600
FEB. 02.....	15	.5	--	JULY 27.....	24	17.5	720
MAR. 08.....	20	0	660	AUG. 31.....	24	19	770
APR. 12.....	46	1.5	--	OCT. 05.....	14	11.5	625
04016000 PARTRIDGE RIVER NEAR AURORA, MINN.							
SEPT. 15, 1971...	44	15.5	520	APR. 17.....	171	4.0	390
OCT. 13.....	74	6.0	460	APR. 25.....	497	4.5	410
NOV. 29.....	172	.5	380	MAY 18.....	240	19	305
JAN. 05, 1972...	68	0	430	JUNE 22.....	39	17	370
FEB. 02.....	48	.5	--	JULY 27.....	65	20	710
MAR. 08.....	41	0	480	AUG. 31.....	166	23	255
APR. 12.....	86	20	360	OCT. 05.....	86	13.5	215

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)	DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)
04016500 ST. LOUIS RIVER NEAR AURORA, MINN.							
SEPT. 15, 1971...	72	15.5	460	APR. 12.....	119	2.0	--
OCT. 13.....	107	6.5	180	MAY 18.....	702	21	60
NOV. 29.....	376	.5	50	JUNE 22.....	104	18.5	205
JAN. 05, 1972...	90	0	.95	JULY 28.....	161	20.0	680
FEB. 02.....	62	.5	--	AUG. 31.....	540	22.0	83
MAR. 09.....	52	.5	300	OCT. 05.....	233	12	55
04018750 ST. LOUIS RIVER AT FORBES, MINN.							
SEPT. 16, 1971...	102	17.5	280	APR. 28.....	3210	5.5	100
OCT. 14.....	500	5.5	160	MAY 17.....	1540	16.0	90
DEC. 15.....	514	--	--	JUNE 23.....	57	17.0	170
JAN. 06, 1972...	215	0	--	AUG. 01.....	358	21.0	160
FEB. 08.....	169	.5	--	AUG. 30.....	1280	21.0	65
MAR. 10.....	144	.5	240	OCT. 06.....	472	11.0	125
APR. 24.....	2700	5.0	95				
04018900 EAST TWO RIVER NEAR IRON JUNCTION, MINN.							
OCT. 06, 1971...	78	13	--	APR. 21.....	200	4	--
OCT. 13.....	29	6	--	APR. 28.....	118	9	--
NOV. 02.....	177	5	--	MAY 12.....	47	15	--
NOV. 15.....	53	4	--	JUNE 06.....	13	19	--
DEC. 17.....	21	0	--	JUNE 16.....	14	20	--
JAN. 21, 1972...	11	0	--	JUNE 27.....	12	24	--
JAN. 31.....	7.9	0	400	JULY 18.....	16	22	--
FEB. 14.....	9.9	0	--	AUG. 08.....	33	17	--
MAR. 13.....	12	0	--	AUG. 29.....	25	18	--
APR. 17.....	300	1	--	SEPT. 19.....	20	14	--
APR. 18.....	258	--	--	OCT. 03.....	24	15	--
04019000 WEST TWO RIVER NEAR IRON JUNCTION, MINN.							
OCT. 06, 1971...	122	12	--	APR. 21.....	477	3	--
OCT. 13.....	46	6	--	APR. 28.....	267	8	--
NOV. 05.....	189	3	--	MAY 12.....	81	13	--
NOV. 15.....	64	4	--	JUNE 16.....	9.6	20	--
DEC. 17.....	24	0	--	JUNE 27.....	7.6	24	--
JAN. 21, 1972...	12	0	--	JULY 18.....	7.6	22	--
JAN. 31.....	8.5	0	--	AUG. 08.....	22	17	--
FEB. 11.....	9.9	0	--	AUG. 29.....	15	18	--
MAR. 13.....	14	0	--	SEPT. 19.....	16	14	--
APR. 17.....	278	1	--	OCT. 03.....	20	14	--
APR. 18.....	433	--	--				

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)	DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)
04019300 WEST SWAN RIVER NEAR SILICA, MINN.							
SEPT. 16, 1971...	0.6	11.5	190	APR. 17.....	319	4.5	250
OCT. 14.....	3.5	5	140	MAY 19.....	5.7	18	110
NOV. 26.....	5.8	1	100	JUNE 23.....	1.2	17.5	245
JAN. 04, 1972...	1.0	0	295	AUG. 01.....	.76	21	--
FEB. 01.....	1.2	.5	--	SEPT. 01.....	.82	15	162
MAR. 09.....	.58	0	260	OCT. 06.....	1.6	8	175
APR. 13.....	13	1	--				
04024000 ST. LOUIS RIVER AT SCANLON, MINN.							
SEPT. 14, 1971...	1460	19	270	MAY 17.....	6300	15	120
OCT. 19.....	2860	11	180	JUNE 21.....	1340	20.5	250
NOV. 24.....	6690	.5	120	JULY 26.....	3650	22	370
JAN. 06, 1972...	1280	0	210	AUG. 29.....	6000	21	204
MAR. 07.....	1610	0	170	OCT. 04.....	2820	11	135
APR. 11.....	1810	3	195				
05035500 ST. CLAIR LAKE OUTLET NEAR DETROIT LAKES, MINN.							
SEPT. 29, 1971...	6	12.5	675	APR. 18.....	19	7	490
OCT. 28.....	8.8	5.5	620	MAY 23.....	14	22	560
NOV. 30.....	8.6	2	790	JUNE 28.....	6.7	24	510
JAN. 10, 1972...	4.7	.5	950	AUG. 15.....	7.4	24	610
FEB. 09.....	5.2	0	910	SEPT. 14.....	6.4	15	670
MAR. 13.....	6.3	1	900	OCT. 18.....	2.9	15	770
05035600 PELICAN RIVER AT MUSKRAT LAKE OUTLET NEAR DETROIT LAKES, MINN.							
SEPT. 29, 1971...	28	13	430	APR. 18.....	91	6	400
OCT. 28.....	55	9	420	MAY 23.....	96	20.5	420
NOV. 30.....	60	1.5	470	JUNE 28.....	28	23	390
JAN. 11, 1972...	32	1	540	AUG. 15.....	20	24	420
FEB. 09.....	27	1	610	SEPT. 14.....	14	16.5	450
MAR. 13.....	24	1	610	OCT. 18.....	8.8	4	460
05037100 PELICAN RIVER AT SALLIE LAKE OUTLET NEAR DETROIT LAKES, MINN.							
SEPT. 29, 1971...	31	14	350	FEB. 10.....	34	1	500
OCT. 28.....	63	8	340	MAR. 14.....	30	2	480
NOV. 30.....	79	1	430	APR. 18.....	90	6	400
JAN. 11, 1972...	43	1	490	MAY 23.....	103	19.5	420

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)	DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)
05039100 PELICAN RIVER AT LAKE MELISSA OUTLET NEAR DETROIT LAKES, MINN.							
SEPT. 29, 1971...	31	14.5	380	MAR. 14.....	35	1.5	460
OCT. 28.....	65	7.5	360	APR. 18.....	103	6	380
NOV. 30.....	95	.5	400	MAY 23.....	133	19	400
JAN. 11, 1972...	51	1	460	JUNE 28.....	47	24	330
FEB. 10.....	40	1	430				
05040500 PELICAN RIVER NEAR FERGUS FALLS, MINN.							
SEPT. 29, 1971...	37	15.5	460	MAR. 21.....	268	0	--
OCT. 28.....	81	5.5	460	APR. 19.....	174	8	430
DEC. 01.....	142	0	480	MAY 24.....	293	19.5	420
JAN. 11, 1972...	116	0	490	JUNE 29.....	143	20.5	420
MAR. 14.....	121	0	480				
05046000 OTTER TAIL RIVER BELOW ORWELL DAM NEAR FERGUS FALLS, MINN.							
SEPT. 29, 1971...	209	15	--	APR. 19.....	863	8	390
OCT. 28.....	321	10.5	--	MAY 24.....	880	21	370
DEC. 01.....	522	2	400	JUNE 01.....	1310	27	370
FEB. 10, 1972...	482	0	410	JUNE 29.....	934	21	--
MAR. 14.....	632	1	405				
05050000 BOIS DE SIOUX RIVER NEAR WHITE ROCK, S. DAK.							
SEPT. 13, 1971...	10	20	1605	NOV. 19.....	3.9	1	1455
OCT. 21.....	.21	12	1810	DEC. 13.....	1.7	0	1820
05061000 BUFFALO RIVER NEAR HAWLEY, MINN.							
SEPT. 24, 1971...	45	10	800	MAR. 29.....	544	1	430
OCT. 27.....	130	10	810	APR. 11.....	275	3	530
NOV. 30.....	117	1	800	JUNE 27.....	56	20	600
JAN. 04, 1972...	34	0	820	AUG. 01.....	27	19.5	710
FEB. 08.....	28	0	600	SEPT. 07.....	30	12.5	640
MAR. 17.....	222	2	300	OCT. 19.....	15	.5	700
MAR. 22.....	664	.5	--				
05061500 SOUTH BRANCH BUFFALO RIVER AT SABIN, MINN.							
SEPT. 23, 1971...	7.6	11	950	MAR. 29.....	91	0	340
OCT. 27.....	38	10	1000	APR. 12.....	118	3	400
DEC. 07.....	21	<1	730	JUNE 27.....	3.9	22.5	850
JAN. 04, 1972...	6.1	0	870	AUG. 01.....	5.9	24	800
FEB. 09.....	1.0	0	1300	SEPT. 06.....	4.5	16.5	850
MAR. 17.....	1930	2	300	OCT. 12.....	5.3	15	800
MAR. 21.....	809	0	--				

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)	DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)
05062000 BUFFALO RIVER NEAR DILWORTH, MINN.							
SEPT. 23, 1971...	66	10.5	800	MAR. 29.....	821	1	440
OCT. 27.....	230	10	800	APR. 12.....	420	3.5	580
DEC. 16.....	91	0	--	JUNE 27.....	59	22	700
JAN. 04, 1972...	40	0	830	AUG. 02.....	36	20.5	680
FEB. 09.....	29	0	600	SEPT. 06.....	31	16	660
MAR. 16.....	405	2.5	330	OCT. 12.....	20	10	750
05062500 WILD RICE RIVER AT TWIN VALLEY, MINN.							
SEPT. 22, 1971...	32	11	520	MAR. 30.....	588	1	380
OCT. 28.....	352	7	530	APR. 15.....	1730	2.5	370
NOV. 30.....	233	1	380	MAY 24.....	531	18	500
JAN. 03, 1972...	89	0	395	JUNE 28.....	94	23	460
FEB. 09.....	59	0	580	AUG. 02.....	82	19	540
MAR. 14.....	66	1	630	SEPT. 07.....	58	15.5	460
MAR. 21.....	1670	4	240	OCT. 13.....	109	8	530
MAR. 23.....	940	4	300				
05064000 WILD RICE RIVER AT HENDRUM, MINN.							
SEPT. 23, 1971...	46	9	610	MAR. 28.....	1630	0	340
OCT. 29.....	551	5	570	MAR. 31.....	874	1	380
DEC. 01.....	272	1	560	APR. 15.....	4450	3.5	340
JAN. 05, 1972...	102	0	585	MAY 25.....	654	--	--
FEB. 10.....	71	0	550	JUNE 29.....	115	23.5	485
MAR. 15.....	79	1	620	AUG. 03.....	119	20	530
MAR. 22.....	3330	2.5	250	SEPT. 08.....	64	13.5	510
MAR. 24.....	2810	3	260	OCT. 12.....	80	10	450
05067500 MARSH RIVER NEAR SHELLY, MINN.							
OCT. 29, 1971...	30	5	560	APR. 14.....	1720	2	280
DEC. 01.....	14	1	900	MAY 24.....	27	18	--
JAN. 05, 1972...	1.0	0	920	JUNE 29.....	.1	24.5	940
MAR. 14.....	1.7	1	890	AUG. 03.....	2.3	16	540
MAR. 21.....	1020	4	260	SEPT. 08.....	.02	11.5	600
MAR. 31.....	144	1	350	OCT. 12.....	.7	7.5	660

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCTANCE (MICRO- MHOS)	DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCTANCE (MICRO- MHOS)
05069000 SANDHILL RIVER AT CLIMAX, MINN.							
SEPT. 22, 1971...	20	10	675	MAR. 28.....	817	0	280
OCT. 29.....	202	5	620	MAR. 31.....	424	.5	340
DEC. 01.....	92	1	800	APR. 14.....	2020	1.5	300
JAN. 05, 1972...	30	0	820	JUNE 29.....	30	25	600
FEB. 10.....	20	0	700	AUG. 03.....	50	19	690
MAR. 16.....	152	1.5	380	SEPT. 08.....	18	12.5	630
MAR. 22.....	398	3	320	OCT. 12.....	21	8	650
MAR. 24.....	712	3	340				
05074500 RED LAKE RIVER NEAR RED LAKE, MINN.							
SEPT. 10, 1971...	302	19	--	APR. 03.....	567	2.5	340
OCT. 18.....	176	10	280	MAY 12.....	600	10	250
NOV. 22.....	469	.5	360	JULY 17.....	493	21.5	278
DEC. 17.....	784	1	320	AUG. 21.....	1020	23	265
JAN. 27, 1972...	833	0	205	SEPT. 21.....	815	15	290
MAR. 09.....	901	.5	230	NOV. 06.....	563	20	--
05075000 RED LAKE RIVER AT HIGH LANDING NEAR GOODRIDGE, MINN.							
SEPT. 10, 1971...	484	19	--	MAR. 08.....	1160	0	240
OCT. 18.....	766	11.5	340	APR. 20.....	1120	9	300
NOV. 24.....	623	1	330	MAY 12.....	871	11	230
NOV. 30.....	583	0	--	JUNE 20.....	1040	15.5	--
DEC. 16.....	737	1	120	JULY 18.....	614	20	325
FEB. 03, 1972...	865	0	315				
05076000 THIEF RIVER NEAR THIEF RIVER FALLS, MINN.							
SEPT. 14, 1971...	3.8	16	--	APR. 14.....	1250	.5	--
OCT. 19.....	894	10	480	APR. 18.....	2420	3	280
DEC. 07.....	24	1	--	MAY 11.....	176	13	--
DEC. 16.....	15	1	630	JUNE 20.....	666	15.5	410
FEB. 03, 1972...	1.9	0	710	JULY 18.....	2.4	24	680
MAR. 07.....	3.2	0	700	AUG. 22.....	2.8	17.5	650
MAR. 22.....	276	0	--	SEPT. 20.....	2.6	17	650
MAR. 28.....	406	2	--				
05077700 RUFFY BROOK NEAR GONVICK, MINN.							
NOV. 03, 1971...	69	11.5	660	MAR. 28.....	34	0	280
DEC. 03.....	9.4	2.5	430	APR. 15.....	157	0	--
JAN. 07, 1972...	7.0	1	550	MAY 26.....	22	3	--
FEB. 14.....	5.	0	520	AUG. 04.....	3.3	17.5	580
MAR. 20.....	34	0	480	SEPT. 12.....	2.8	13.5	540
MAR. 23.....	42	--	--	OCT. 10.....	3.6	13	620

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)	DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)
05078000 CLEARWATER RIVER AT PLUMMER, MINN.							
SEPT. 21, 1971...	49	10	530	APR. 14.....	1940	1	--
NOV. 02.....	1220	3	530	APR. 17.....	1930	5.5	300
DEC. 02.....	182	1	540	JUNE 30.....	83	25.5	470
JAN. 06, 1972...	64	0	530	AUG. 08.....	266	17	500
FEB. 11.....	83	0	510	SEPT. 11.....	66	17.5	500
MAR. 16.....	68	1	500	OCT. 11.....	75	10	500
05078230 LOST RIVER AT OKLEE, MINN.							
SEPT. 01, 1971...	18	9	650	APR. 14.....	1830	1	--
NOV. 02.....	76	3	590	APR. 17.....	1010	5	325
DEC. 02.....	57	5	660	APR. 20.....	490	9	410
JAN. 07, 1972...	13	0	670	JULY 05.....	13	23	540
FEB. 14.....	9.2	0	750	AUG. 04.....	20	17	600
MAR. 20.....	198	4	280	SEPT. 12.....	18	16	490
MAR. 21.....	771	0	275	OCT. 10.....	16	13	590
MAR. 24.....	662	0	255				
05078500 CLEARWATER RIVER AT RED LAKE FALLS, MINN.							
SEPT. 21, 1971...	80	10.5	660	FEB. 11.....	104	0	640
NOV. 02.....	3810	3	500	MAR. 15.....	131	1	580
NOV. 23.....	607	.5	630	MAR. 22.....	1970	0	290
DEC. 02.....	314	1	610	APR. 15.....	5800	1	--
JAN. 06, 1972...	103	0	620	JUNE 30.....	98	23.5	540
05079000 RED LAKE RIVER AT CROOKSTON, MINN.							
SEPT. 22, 1971...	392	12	400	MAR. 29.....	3570	3	280
NOV. 01.....	6260	3	430	APR. 15.....	12500	2	400
DEC. 01.....	1060	1	520	JUNE 30.....	922	24.5	340
JAN. 11, 1972...	885	.5	--	AUG. 07.....	1120	20	320
FEB. 10.....	865	0	400	SEPT. 08.....	1290	15	320
MAR. 15.....	972	2	390	OCT. 11.....	1060	9	345
MAR. 22.....	6070	0	255				
05087500 MIDDLE RIVER AT ARGYLE, MINN.							
SEPT. 15, 1971...	.02	15	--	APR. 04.....	37	2	290
OCT. 14.....	.16	8	620	APR. 14.....	264	1	--
NOV. 23.....	25	.5	870	APR. 18.....	705	4.5	260
DEC. 16.....	2.6	1	350	MAY 11.....	38	14	590
FEB. 02, 1972...	.18	0	840	JUNE 16.....	2.4	15.5	620
MAR. 23.....	59	0	--	JULY 18.....	.83	25	540
MAR. 30.....	50	2	260	NOV. 03.....	.03	2.5	590

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)	DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)
05094000 S. BRANCH TWO RIVERS AT LAKE BRONSON, MINN.							
SEPT. 09, 1971...	1.9	18	--	APR. 04.....	107	2	380
OCT. 14.....	1.7	10.5	500	APR. 19.....	1120	4	250
NOV. 19.....	26	1	430	MAY 11.....	36	12	315
DEC. 15.....	4.2	2	490	JUNE 15.....	4.0	15.5	494
FEB. 02, 1972...	2.4	1.5	590	JULY 19.....	6.2	19.5	450
MAR. 02.....	3.3	1	530	AUG. 22.....	1.2	23	420
MAR. 23.....	225	0	--	SEPT. 20.....	3.9	15	450
MAR. 28.....	216	2	480	NOV. 02.....	2.6	2	460
05104500 ROSEAU RIVER BELOW SOUTH FORK NEAR MALUNG, MINN.							
SEPT. 08, 1971...	1.9	19	--	MAY 09.....	166	8	240
OCT. 20.....	127	8	750	JUNE 14.....	37	18	320
NOV. 18.....	217	.5	210	JULY 25.....	7.0	17.5	382
DEC. 15.....	23	1	340	AUG. 24.....	4.8	17	320
FEB. 01, 1972...	6.7	0	550	SEPT. 19.....	1.2	12	370
MAR. 09.....	3.4	0	520	NOV. 02.....	2.7	1	510
APR. 18.....	1280	2.5	--				
05106000 SPRAGUE CREEK NEAR SPRAGUE, MANITOBA							
SEPT. 08, 1971...	9.8	18	--	APR. 19.....	429	4	160
OCT. 19.....	42	8.5	280	MAY 10.....	130	8	110
NOV. 18.....	103	1	210	JUNE 14.....	22	16.5	280
DEC. 15.....	6.0	1	410	JULY 20.....	2.6	16	440
FEB. 01, 1972...	1.8	0	590	AUG. 24.....	6.6	19	530
MAR. 23.....	70	.5	--	SEPT. 18.....	9.0	13	315
05107500 ROSEAU RIVER AT ROSS, MINN.							
SEPT. 09, 1971...	17	18	--	APR. 20.....	1750	5.5	210
OCT. 19.....	140	8.5	265	MAY 10.....	922	10	280
NOV. 18.....	431	1	270	JUNE 15.....	90	15.5	355
DEC. 14.....	36	1	300	JULY 20.....	8.7	21	420
FEB. 02, 1972...	10	0	610	SEPT. 19.....	14	14	440
MAR. 01.....	7.6	0	640	NOV. 02.....	31	1.5	390
05112000 ROSEAU RIVER BELOW STATE DITCH 51 NEAR CARIBOU, MINN.							
SEPT. 09, 1971...	28	18	--	JULY 19.....	48	20.5	405
OCT. 14.....	109	8	385	AUG. 23.....	11	17.5	390
APR. 19, 1972...	1340	6	225	SEPT. 19.....	20	14	420
MAY 10.....	1460	8.5	320	OCT. 25.....	28	4.5	405
JUNE 15.....	134	14.5	380				

MISCELLANEOUS ANALYSES OF STREAMS IN MINNESOTA

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)	DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)
05124480 KAWISHIWI RIVER NEAR ELY, MINN.							
SEPT. 02, 1971...	52	21.5	180	JUNE 08.....	311	21	<50
OCT. 13.....	43	10.5	<50	JULY 13.....	81	21	--
NOV. 10.....	445	3	<50	AUG. 25.....	303	21	<50
JAN. 20, 1972...	138	0	<50	SEPT. 26.....	178	13	<50
FEB. 24.....	79	1	<50	OCT. 26.....	115	4	--
MAR. 30.....	67	1	<50				
05127000 KAWISHIWI RIVER NEAR WINTON, MINN.							
MAY 31, 1971...	2520	10	--	MAY 03, 1972...	4100	4.5	--
OCT. 07.....	738	14	65	OCT. 26.....	854	6.5	50
05127205 BURNTSIDE RIVER NEAR ELY, MINN.							
SEPT. 01, 1971...	17	18.5	180	APR. 25.....	91	5.5	--
OCT. 06.....	12	10.5	105	APR. 27.....	128	7	--
NOV. 11.....	77	4.5	--	MAY 02.....	202	5	--
DEC. 15.....	80	2	<50	JUNE 07.....	81	22	<50
JAN. 25, 1972...	44	0	<50	JULY 11.....	29	23	60
FEB. 29.....	32	1	<50	AUG. 24.....	51	19	56
MAR. 29.....	26	.5	--	SEPT. 20.....	12	16	65
APR. 17.....	48	3	--	OCT. 27.....	8.8	8	80
APR. 20.....	57	7	--				
05127210 ARMSTRONG CREEK NEAR ELY, MINN.							
SEPT. 01, 1971...	1.0	17	--	APR. 25.....	28	1	--
OCT. 06.....	5.0	9.5	135	APR. 27.....	39	5	--
NOV. 10.....	5.5	.5	90	MAY 01.....	35	6.5	--
DEC. 15.....	1.7	0	125	JUNE 07.....	1.3	22.5	--
JAN. 24, 1972...	1.2	0	140	JULY 11.....	1.2	21	--
FEB. 29.....	.31	.5	125	AUG. 24.....	2.0	16	160
MAR. 29.....	1.1	0	210	SEPT. 25.....	.68	14	170
APR. 20.....	25	.5	--	OCT. 26.....	1.3	5.5	170
05127215 LONGSTORFF CREEK NEAR ELY, MINN.							
SEPT. 01, 1971...	1.6	18.5	--	APR. 20.....	27	.3	--
OCT. 06.....	4.8	9.5	120	APR. 25.....	34	.5	--
NOV. 10.....	10	2	60	MAY 01.....	65	5.5	--
DEC. 15.....	4.2	0	98	JUNE 07.....	1.0	22	90
JAN. 24, 1972...	2.5	0	85	JULY 11.....	1.1	20.5	135
FEB. 29.....	.80	1	50	AUG. 24.....	3.0	17	108
MAR. 29.....	2.1	.5	95	SEPT. 20.....	1.1	15	140
APR. 17.....	14	.5	--	OCT. 26.....	1.4	7	140

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)	DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)
05127219 SHAGAWA LAKE TRIBUTARY AT ELY, MINN.							
OCT. 06, 1971...	.27	11.5	460	APR. 25.....	.31	4	--
OCT. 18.....	.32	13	380	APR. 27.....	.26	7	--
NOV. 11.....	.24	4	340	JUNE 07.....	.02	24	--
DEC. 15.....	.67	1.5	420	JULY 11.....	.02	30	560
JAN. 19, 1972...	.15	0	--	AUG. 24.....	.07	12.5	610
JAN. 25.....	.07	0	--	SEPT. 20.....	.60	16	370
APR. 17.....	.97	2.5	--	OCT. 25.....	.02	7	605
APR. 20.....	.48	3	--				
05127220 BURGO CREEK NEAR ELY, MINN.							
SEPT. 01, 1971...	.17	14.5	180	APR. 25.....	21	5	--
OCT. 06.....	3.8	10	85	APR. 27.....	35	7.5	--
NOV. 10.....	3.6	1.5	<50	MAY 01.....	24	5.5	--
DEC. 15.....	1.4	0	70	JUNE 07.....	.02	23	120
JAN. 25, 1972...	.54	0	--	JULY 11.....	.08	16.5	122
FEB. 29.....	.13	.5	<50	AUG. 24.....	2.0	17	--
MAR. 29.....	.29	0	<50	SEPT. 20.....	.11	14	60
APR. 17.....	4.0	.5	--	OCT. 27.....	.62	6.5	72
APR. 20.....	27	.2	--				
05127230 SHAGAWA RIVER AT ELY, MINN.							
SEPT. 01, 1971...	26	21	--	APR. 25.....	133	4	--
OCT. 06.....	36	13	83	MAY 02.....	324	4	--
NOV. 09.....	123	3.5	65	JUNE 07.....	119	23	65
DEC. 16.....	122	1	65	JULY 11.....	41	23	70
JAN. 20, 1972...	66	0	60	AUG. 24.....	73	22	78
FEB. 28.....	54	1	50	SEPT. 20.....	28	16	60
MAR. 29.....	43	.5	50	OCT. 25.....	16	5	70
APR. 20.....	72	3	--				
05127500 BASSWOOD RIVER NEAR WINTON, MINN.							
OCT. 12, 1971...	768	14.5	60	AUG. 16.....	1440	20	52
JAN. 19, 1972...	1340	0	65				
05128000 NAMAKAN RIVER AT OUTLET OF LAC LA CROIX, ONTARIO							
AUG. 26, 1971...	2370	20	<50	SEPT. 14, 1972...	4130	17	<50

MISCELLANEOUS ANALYSES OF STREAMS IN MINNESOTA

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DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)	DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)
05129000 VERMILION RIVER BELOW VERMILION LAKE, NEAR TOWER, MINN.							
SEPT.				MAY			
03, 1971...	153	22.5	120	03.....	1030	5	50
OCT.				JUNE			
08.....	209	12	--	09.....	522	21	60
NOV.				JULY			
11.....	794	3.5	55	12.....	277	20.5	70
DEC.				AUG.			
16.....	575	1	70	17.....	359	22	65
JAN.				SEPT.			
21, 1972...	301	0	60	21.....	239	15	70
FEB.				OCT.			
25.....	216	2	50	25.....	190	3.5	62
MAR.							
31.....	168	.5	65				
05130500 STURGEON RIVER NEAR CHISHOLM, MINN.							
SEPT.				MAY			
03, 1971...	27	24.5	--	04.....	743	5	--
OCT.				JUNE			
14.....	56	7.5	115	09.....	80	23	70
NOV.				JULY			
12.....	201	2	65	12.....	144	21	100
DEC.				AUG.			
17.....	64	0	80	17.....	145	20.5	80
JAN.				SEPT.			
21, 1972...	26	0	110	22.....	168	9.5	80
FEB.				OCT.			
28.....	18	4.5	50	18.....	109	2	42
APR.							
03.....	43	0					
05131500 LITTLE FORK RIVER AT LITTLE FORK, MINN.							
SEPT.				APR.			
07, 1971...	238	20	--	04.....	310	0	--
OCT.				MAY			
12.....	984	9	110	08.....	5250	8	60
NOV.				JUNE			
16.....	2100	2	90	12.....	460	21	140
DEC.				JULY			
29.....	362	1	--	26.....	5130	18	135
JAN.				SEPT.			
28, 1972...	213	0	200	20.....	652	14.5	105
FEB.				OCT.			
28.....	136	0	270	31.....	624	2.5	120
05132000 BIG FORK RIVER AT BIG FALLS, MINN.							
SEPT.				APR.			
07, 1971...	262	18	--	24.....	4610	5	100
OCT.				MAY			
12.....	540	7.5	170	08.....	3250	7.5	100
NOV.				JUNE			
16.....	1740	2.5	150	12.....	369	20.5	230
DEC.				JULY			
13.....	602	1	--	26.....	2460	18	138
JAN.				AUG.			
24, 1972...	277	0	260	28.....	656	20	180
FEB.				SEPT.			
28.....	236	0	290	21.....	542	7	205
APR.							
20.....	5180	5	100				
05133500 RAINY RIVER AT MANITOU RAPIDS, MINN.							
OCT.				AUG.			
13, 1971...	11800	8.5	85	29.....	14000	20	100
JUNE				OCT.			
13, 1972...	11600	17.5	80	31.....	8270	3.5	120

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)	DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)
05134200 RAPID RIVER NEAR BAUDETTE, MINN.							
SEPT. 08, 1971...	74	16	--	MAY 09.....	634	8	90
OCT. 13.....	582	6.5	110	JUNE 13.....	142	18	235
NOV. 17.....	879	2	110	JULY 24.....	1500	17.5	130
DEC. 14.....	82	1	180	AUG. 25.....	67	18	190
JAN. 27, 1972...	19	0	420	AUG. 30.....	34	19	250
FEB. 29.....	11	0	435	SEPT. 19.....	78	12	165
APR. 17.....	3100	4	--	NOV. 01.....	119	1	165
APR. 19.....	2430	5	100				
05139500 WARROAD RIVER NEAR WARROAD, MINN.							
SEPT. 08, 1971:..	.31	16	--	MAY 09.....	88	9	240
OCT. 15.....	11	6.5	180	JUNE 14.....	21	17	320
NOV. 17.....	139	2	190	JULY 21.....	3.9	17	405
DEC. 14.....	11	1	290	AUG. 23.....	.43	19	380
JAN. 31, 1972...	4	0	510	AUG. 30.....	.87	20	--
MAR. 01.....	3.9	0	480	SEPT. 18.....	.29	13	400
APR. 05.....	12	2	380	NOV. 01.....	2.9	--	380
APR. 18.....	615	2.5	--				
05140000 BULLDOG RUN NEAR WARROAD, MINN.							
NOV. 17, 1972...	3.9	2	510	MAY 09.....	2.2	11	530
APR. 05, 1972...	2.0	2	360				
05140500 EAST BRANCH WARROAD RIVER NEAR WARROAD, MINN.							
SEPT. 08, 1971...	.49	17	--	APR. 05.....	4.7	2	--
OCT. 15.....	8.9	6.5	350	MAY 09.....	42	8	--
NOV. 17.....	50	2	230	JUNE 14.....	6.0	16	395
DEC. 14.....	4.6	1	420	JULY 21.....	.38	17	485
JAN. 31, 1972...	2.6	0	510	NOV. 01.....	1.5	1.5	500
FEB. 29.....	2.6	0	520				
05201500 MISSISSIPPI RIVER AT WINNIBIGOSHISH DAM NEAR DEER RIVER, MINN.							
JUNE 16, 1971...	106	22	--	MAY 03, 1972...	87	.5	--
OCT. 05.....	457	10	--	AUG. 02.....	699	21.5	255
NOV. 05.....	1070	2	280	SEPT. 06.....	577	16.5	--
DEC. 07.....	1100	1	270	OCT. 11.....	576	10	280

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-05211000 MISSISSIPPI RIVER AT GRAND RAPIDS, MINN.							
SEPT. 20, 1971...	238	17	310	APR. 21.....	1240	6	230
OCT. 15.....	1310	11	300	MAY 11.....	2380	12.5	200
NOV. 11.....	2280	2	240	MAY 22.....	2230	23	260
NOV. 19.....	2510	2	245	JULY 31.....	914	21	370
DEC. 21.....	2090	.5	280	SEPT. 05.....	1170	19.5	255
FEB. 08, 1972...	1990	1	--	OCT. 10.....	1630	11	275
MAR. 13.....	1910	2	300				
05212700 PRAIRIE RIVER NEAR TACONITE, MINN.							
SEPT. 17, 1971...	53	13	180	APR. 28.....	1390	8	70
OCT. 15.....	99	4.5	160	MAY 23.....	458	20	105
NOV. 30.....	265	.5	110	JUNE 23.....	109	23.5	115
JAN. 10, 1972...	86	0	160	AUG. 04.....	258	21.5	110
FEB. 03.....	60	.5	--	SEPT. 01.....	195	20	125
MAR. 13.....	77	0	275	OCT. 10.....	142	8.5	130
APR. 25.....	1470	4.5	62				
05216860 SWAN RIVER NEAR CALUMET, MINN.							
SEPT. 17, 1971...	25	13.5	230	APR. 14.....	77	3.5	--
OCT. 15.....	57	5	220	MAY 19.....	97	20.5	180
NOV. 26.....	109	2	190	JUNE 23.....	34	21.5	210
JAN. 04, 1972...	33	0	205	AUG. 04.....	36	19.5	190
FEB. 03.....	32	1	--	SEPT. 01.....	45	19.5	195
MAR. 10.....	41	1	220	OCT. 06.....	31	11	220
05220500 MISSISSIPPI RIVER BELOW SANDY RIVER NEAR LIBBY, MINN.							
SEPT. 13, 1971...	484	19	325	APR. 10.....	1980	1	--
OCT. 20.....	1870	10	--	MAY 15.....	6160	13.5	120
NOV. 22.....	5040	1	130	JULY 25.....	3380	22	110
JAN. 03, 1972...	2500	0	225	AUG. 28.....	3830	20	200
JAN. 31.....	2310	1	--	OCT. 02.....	2610	11	165
MAR. 06.....	2070	1	315				
05227500 MISSISSIPPI RIVER AT AITKIN, MINN.							
SEPT. 13, 1971...	649	20	360	MAY 16.....	5240	14.5	155
OCT. 18.....	1890	5.5	290	JUNE 20.....	2410	18.5	250
NOV. 23.....	4650	.5	175	JULY 25.....	3670	22	220
JAN. 07, 1972...	2260	0	270	AUG. 29.....	4520	20	158
FEB. 07.....	2000	.5	--	OCT. 03.....	2840	11.5	205
MAR. 16.....	1910	0	300				

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05231000 PINE RIVER AT CROSS LAKE, MINN.							
NOV. 05, 1971...	1680	.5	190	SEPT. 05.....	402	19	205
JUNE 12, 1972...	243	21.5	200	OCT. 12.....	266	10.5	220
AUG. 03.....	769	22	200				
05244000 CROW WING RIVER AT NIMROD, MINN.							
OCT. 26, 1971...	616	10	320	MAY 22.....	1070	16	350
NOV. 29.....	733	1	320	JUNE 26.....	432	24	300
JAN. 03, 1972...	371	0	310	JULY 31.....	486	25	310
FEB. 07.....	395	0	320	SEPT. 05.....	515	17	305
MAR. 13.....	415	1	320	OCT. 18.....	387	1	300
APR. 06.....	732	4.5	325				
05245100 LONG PRAIRIE RIVER AT LONG PRAIRIE, MINN.							
OCT. 11, 1971...	257	9.5	470	FEB. 20.....	77	0	460
NOV. 15.....	166	0	420	MAR. 21.....	576	3	360
DEC. 12.....	137	0	460	JUNE 21.....	91	16	--
JAN. 16, 1972...	111	0	460				
05247500 CROW WING RIVER NEAR PILLAGER, MINN.							
DEC. 03, 1971...	1730	0	414	MAY 25.....	3320	21	400
JAN. 05, 1972...	1160	0	--	SEPT. 06.....	2220	18	365
FEB. 09.....	982	0	--	OCT. 13.....	1280	11	350
05270500 SAUK RIVER NEAR ST. CLOUD, MINN.							
SEPT. 29, 1971...	134	15.5	400	APR. 17.....	1400	8	430
OCT. 27.....	430	13	420	MAY 23.....	791	22	515
NOV. 30.....	817	0	414	JUNE 26.....	412	23	460
JAN. 04, 1972...	330	0	438	AUG. 07.....	1350	19	440
FEB. 08.....	171	0	220	OCT. 10.....	431	11.5	440
MAR. 14.....	220	0	580				
05275000 ELK RIVER NEAR BIG LAKE, MINN.							
SEPT. 30, 1971...	123	14	325	APR. 17.....	696	9	280
OCT. 28.....	376	9	290	MAY 23.....	290	21	345
NOV. 29.....	781	0	300	JUNE 26.....	246	21	340
JAN. 03, 1972...	151	0	350	AUG. 03.....	1430	21	240
FEB. 07.....	109	0	295	OCT. 09.....	315	10	340
MAR. 13.....	160	0	--				

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05278000 MIDDLE FORK CROW RIVER NEAR SPICER, MINN.							
SEPT. 21, 1971...	36	12	--	APR. 26.....	216	8	360
OCT. 19.....	40	11	380	JULY 11.....	76	26	--
NOV. 16.....	85	3.5	--	AUG. 15.....	146	24.5	315
DEC. 09.....	180	1	240	SEPT. 19.....	95	18.5	325
JAN. 13, 1972...	136	.5	--	OCT. 19.....	56	5	380
FEB. 24.....	101	.5	390	NOV. 29.....	80	2	420
05279000 SOUTH FORK CROW RIVER NEAR MAYER, MINN.							
SEPT. 22, 1971...	48	17	--	APR. 25.....	1720	6	--
OCT. 19.....	73	12.5	875	JULY 12.....	240	23.5	--
NOV. 16.....	360	4.5	--	AUG. 16.....	395	26	810
JAN. 18, 1972...	100	0	--	SEPT. 20.....	165	21	800
FEB. 23.....	70	0	1000	OCT. 17.....	111	5	--
05280000 CROW RIVER AT ROCKFORD, MINN.							
SEPT. 28, 1971...	218	15	--	APR. 27.....	3500	11	570
OCT. 28.....	672	11	--	MAY 30.....	2280	16	--
NOV. 28.....	2120	.5	735	JUNE 29.....	1510	21.5	625
DEC. 28.....	837	0	--	JULY 27.....	2740	23	--
FEB. 14, 1972...	250	0	--	AUG. 30.....	1540	23	536
FEB. 28.....	243	0	700	SEPT. 27.....	978	10	--
MAR. 16.....	300	.5	--	OCT. 17.....	528	5	--
05286000 RUM RIVER NEAR ST. FRANCIS, MINN.							
SEPT. 30, 1971...	265	15.5	280	MAY 23.....	808	20.5	260
OCT. 28.....	809	11	230	JUNE 26.....	823	19.5	255
NOV. 29.....	1340	0	260	JULY 27.....	6160	21.5	100
JAN. 03, 1972...	495	0	250	JULY 29.....	9390	21.4	115
FEB. 07.....	330	0	300	AUG. 03.....	5080	21	190
APR. 17.....	1820	7	200	OCT. 09.....	928	9.5	300
05288500 MISSISSIPPI RIVER AT ANOKA, MINN.							
OCT. 13, 1971...	4920	11.5	330	JULY 07.....	6380	19	--
NOV. 09.....	24100	2	290	JULY 25.....	37200	22.5	--
DEC. 06.....	14000	4	210	AUG. 07.....	24400	19	410
MAR. 29, 1972...	34600	.5	310	SEPT. 11.....	12300	18.5	360
MAY 04.....	25900	11	360	OCT. 16.....	9600	9	380
JUNE 02.....	18100	21	--				

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05290000 LITTLE MINNESOTA RIVER NEAR PEEVER, S. DAK.							
SEPT. 13, 1971...	.8	21	1585	MAR. 28.....	169	.5	935
OCT. 21.....	3.2	9	1710	JUNE 14.....	46	23	1200
NOV. 19.....	30	1	1710	JULY 13.....	7.4	26	1375
DEC. 13.....	8.0	0	1300	SEPT. 21.....	.6	14.5	1400
JAN. 27, 1972...	.8	0	1400	NOV. 03.....	5.5	3	1420
FEB. 25.....	1.4	0	1200				
05291000 WHETSTONE R' VER NEAR BIG STONE CITY, S. DAK.							
SEPT. 13, 1971...	4.5	21	1250	MAR. 16.....	2900	0	--
OCT. 18.....	17	12	1450	MAR. 29.....	142	1	1090
NOV. 18.....	278	3	1360	MAY 09.....	154	11	1100
DEC. 09.....	48	0	--	JULY 13.....	84	23	825
JAN. 27, 1972...	13	0	--	SEPT. 21.....	7.9	16	1000
FEB. 24.....	11	0	1600	OCT. 27.....	17	7	1020
MAR. 15.....	1840	0	--				
05292000 MINNESOTA RIVER AT ORTONVILLE, MINN.							
SEPT. 14, 1971...	74	19	1200	FEB. 24.....	34	.5	1300
OCT. 18.....	10	14	1400	MAR. 29.....	936	4	1090
NOV. 18.....	38	3.5	1610	JULY 13.....	76	23	850
DEC. 13.....	61	1	1605	SEPT. 21.....	13	18	1050
JAN. 25, 1972...	37	0	1600	OCT. 27.....	1.8	9	1610
05293000 YELLOW BANK RIVER NEAR ODESSA, MINN.							
SEPT. 14, 1971...	2.7	16.5	1090	MAR. 14.....	879	0	450
OCT. 18.....	36	11	1045	MAR. 29.....	209	4	880
NOV. 18.....	432	4	1300	MAY 04.....	710	9	900
DEC. 14.....	63	5	1610	JULY 11.....	136	25	800
JAN. 27, 1972...	16	0	--	SEPT. 21.....	9	14.5	900
FEB. 23.....	14	0	1225	OCT. 24.....	19	3.5	900
05294000 POMME DE TERRE RIVER AT APPLETON, MINN.							
SEPT. 14, 1971...	45	18	1050	MAR. 30.....	678	2.5	670
OCT. 19.....	90	13	1035	MAY 04.....	450	9.5	780
JAN. 25, 1972...	41	0	685	SEPT. 22.....	96	12.5	1040
FEB. 23.....	26	0	1250	OCT. 24.....	86	4.5	790
MAR. 16.....	335	0	460				

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05300000 LAC QUI PARLE RIVER NEAR LAC QUI PARLE, MINN.							
OCT. 20, 1971...	16	9.5	1605	MAR. 15.....	829	0	--
NOV. 17.....	135	4	1605	MAR. 17.....	1160	0	545
DEC. 16.....	81	0	2120	APR. 03.....	273	2	--
JAN. 17, 1972	11	0	2220	JULY 10.....	128	25	860
FEB. 28.....	13	0	1710	SEPT. 19.....	20	23.5	1100
				OCT. 27.....	32	7.5	1200
05301000 MINNESOTA RIVER NEAR LAC QUI PARLE, MINN.							
SEPT. 16, 1971...	117	17	950	FEB. 22.....	124	0	1400
OCT. 20.....	166	12	985	MAR. 17.....	1520	.5	775
NOV. 17.....	489	4.5	1090	MAR. 22.....	4010	.5	820
DEC. 16.....	572	.5	1915	MAY 02.....	3520	10	780
JAN. 17, 1972...	263	1	1505	JULY 10.....	1250	22	850
05304500 CHIPPEWA RIVER NEAR MILAN, MINN.							
SEPT. 15, 1971...	70	16	850	FEB. 24.....	78	0	720
OCT. 19.....	250	13	765	MAR. 27.....	1610	.5	610
NOV. 23.....	559	1.5	1015	MAY 03.....	1740	9.5	700
DEC. 15.....	513	.5	1090	JUNE 09.....	1460	24.5	650
JAN. 26, 1972	108	0	1240	JULY 12.....	556	25	700
05311000 MINNESOTA RIVER AT MONTEVIDEO, MINN.							
SEPT. 15, 1971...	166	18	985	JAN. 17, 1972...	449	0	1230
OCT. 20.....	190	12	1270	FEB. 22.....	212	0	1505
NOV. 24.....	1610	1	1110				
05311400 SOUTH BRANCH YELLOW MEDICINE RIVER NEAR MINNEOTA, MINN.							
OCT. 06, 1971	.23	14	1505	FEB. 15.....	1.3	0	1800
NOV. 11.....	3.5	3	--	APR. 25.....	59	7	1400
DEC. 08.....	3.4	0	--	JULY 07.....	12	18	1150
JAN. 12, 1972...	2.4	0	--				
05313500 YELLOW MEDICINE RIVER NEAR GRANITE FALLS, MINN.							
AUG. 30, 1971...	8.56	20	--	JAN. 10, 1972...	16.4	0	--
OCT. 04.....	4.09	13	1380	FEB. 16.....	9.89	0	1505
NOV. 12.....	43.2	2	--	JULY 05.....	95.1	17	1200
DEC. 06.....	73.7	.5	--				
05315000 REDWOOD RIVER AT MARSHALL, MINN.							
SEPT. 01, 1971...	4.06	23	--	JAN. 12, 1972...	6.99	0	--
OCT. 06.....	2.73	13	1505	FEB. 15.....	4.00	0	2120
NOV. 11.....	7.53	3	--	APR. 25.....	85.2	11	1100
DEC. 07.....	10.1	.5	--	JULY 07.....	34.2	20	1100

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05316500 REDWOOD RIVER NEAR REDWOOD FALLS, MINN.							
DEC. 06, 1971...	31	0	--	APR. 24.....	364	6	1310
JAN. 10, 1972...	11	0	--	JULY 05.....	86	20	1200
FEB. 14.....	4.1	0	1550	OCT. 16.....	23	7.5	--
05316770 MINNESOTA RIVER AT NEW ULM, MINN.							
SEPT. 09, 1971...	252	20	--	APR. 04.....	6540	3.5	--
OCT. 12.....	278	10	805	MAY 11.....	7540	14	725
NOV. 30.....	1500	2	--	JUNE 15.....	10100	22.5	--
JAN. 06, 1972...	682	0	--	JULY 21.....	2380	24.5	--
FEB. 03.....	507	0	--	AUG. 24.....	2040	24	745
MAR. 03.....	365	0	--	SEPT. 28.....	866	15.5	840
MAR. 27.....	7700	2	--	NOV. 02.....	950	6	915
05317000 COTTONWOOD RIVER NEAR NEW ULM, MINN.							
SEPT. 09, 1971...	30	18	745	APR. 03.....	333	3	920
OCT. 12.....	25	8	715	MAY 12.....	600	14	--
NOV. 29.....	115	2.5	--	JUNE 16.....	445	23.5	--
DEC. 15.....	70	.5	1175	JULY 20.....	230	24.5	911
FEB. 02, 1972...	11	0	--	AUG. 24.....	65	18	960
MAR. 03.....	18	0	--	SEPT. 28.....	79	15	--
MAR. 15.....	1350	2	--	NOV. 02.....	193	6	1130
MAR. 22.....	1110	2	--				
05320000 BLUE EARTH RIVER NEAR RAPIDAN, MINN.							
SEPT. 10, 1971...	57	22.5	795	MAY 10.....	1630	12.5	--
OCT. 13.....	54	13	945	JUNE 14.....	2570	23	--
NOV. 24.....	284	4	--	JULY 19.....	694	23	--
DEC. 14.....	197	.5	950	JULY 24.....	2990	24	--
FEB. 02, 1972...	120	0	--	AUG. 22.....	176	26	602
MAR. 01.....	93	0	--	SEPT. 27.....	206	13	745
MAR. 21.....	2300	2	--	OCT. 31.....	496	6.5	935
05320500 LE SUEUR RIVER NEAR RAPIDAN, MINN.							
SEPT. 10, 1971...	30.7	22	645	MAR. 30.....	561	2.5	0
OCT. 13.....	19.2	13	745	MAY 10.....	569	13	700
NOV. 24.....	176	3.5	--	JUNE 15.....	199	19	--
DEC. 14.....	129	.5	650	AUG. 23.....	40.2	19	698
JAN. 27, 1972...	15.9	0	--	SEPT. 26.....	150	13	700
MAR. 01.....	32	0	540	NOV. 01.....	330	6	890

MISCELLANEOUS ANALYSES OF STREAMS IN MINNESOTA

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)	DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)
05325000 MINNESOTA RIVER AT MANKATO, MINN.							
SEPT. 10, 1971...	448	19	855	MAR. 31.....	8600	2.5	600
OCT. 13.....	404	10	945	MAY 12.....	10450	16	800
NOV. 26.....	2860	1.5	--	JUNE 14.....	14040	23	--
JAN. 05, 1972...	972	0	--	JULY 20.....	4110	24	--
JAN. 28.....	722	0	--	AUG. 23.....	2420	24	745
FEB. 01.....	775	0	--	SEPT. 27.....	1230	15.5	900
MAR. 02.....	500	0	--	NOV. 01.....	1600	6.5	935
MAR. 21.....	11700	1.5	--				
05330000 MINNESOTA RIVER NEAR JORDAN, MINN.							
OCT. 20, 1971...	580	14	800	MAY 03.....	12400	12	850
NOV. 12.....	2850	5	--	MAY 31.....	9680	16	--
DEC. 07.....	3700	1	910	JULY 15.....	6320	24.5	--
JAN. 08, 1972...	1320	0	1300	AUG. 09.....	4470	20	890
FEB. 01.....	848	0	1500	SEPT. 12.....	1900	19.5	800
MAR. 01.....	611	0	1120	OCT. 24.....	1460	6	935
MAR. 22.....	16500	2	450				
05330900 NINE MILE CREEK AT BLOOMINGTON, MINN.							
SEPT. 17, 1971...	6.7	19	--	MAY 01.....	56	8	470
OCT. 15.....	13	10	650	JUNE 01.....	50	18	--
NOV. 08.....	27	4	550	JULY 06.....	12	16	470
DEC. 08.....	19	1.5	750	JULY 26.....	64	23.5	--
JAN. 12, 1972...	16	.5	825	AUG. 08.....	16	16	--
FEB. 23.....	13	.5	800	SEPT. 13.....	13	17	530
MAR. 16.....	94	.5	--	OCT. 17.....	7.1	6	745
APR. 13.....	25	5	775				
05336700 KETTLE RIVER BELOW SANDSTONE, MINN.							
SEPT. 27, 1971...	140	14	175	APR. 20.....	7690	4	65
OCT. 26.....	740	11	155	MAY 26.....	1090	19	515
DEC.	589	0	156	JUNE 30.....	464	20	130
JAN. 05, 1972...	215	0	150	AUG. 04.....	1120	18	130
FEB. 10.....	157	0	50	SEPT. 07.....	627	15.5	120
MAR. 10.....	183	0	200				
05338500 SNAKE RIVER NEAR PINE CITY, MINN.							
SEPT. 28, 1971...	84	13	225	MAY 26.....	791	22.5	150
OCT. 27.....	833	12.5	--	JUNE 30.....	341	25	250
DEC. 06.....	624	0	209	AUG. 04.....	3250	21	170
JAN. 06, 1972...	186	0	--	SEPT. 07.....	436	16.5	160
FEB. 10.....	136	0	--				

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)	DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)
05340050 SUNRISE RIVER NEAR LINDSTROM, MINN.							
SEPT. 27, 1971...	9.3	13.5	370	JULY 05.....	47	20	300
OCT. 27.....	49	13.5	365	AUG. 04.....	122	23	280
DEC. 07.....	156	1	340	SEPT. 07.....	80	16.5	290
JAN. 06, 1972...	76	0	345	OCT. 17.....	75	5.5	280
MAY 22.....	113	24	300				
05344500 MISSISSIPPI RIVER AT PRESCOTT, WIS.							
NOV. 09, 1971...	44500	5.0	--	JULY 19.....	17800	23.5	440
MAR. 30, 1972...	62200	2.0	220				
05353800 STRAIGHT RIVER NEAR FARIBAULT, MINN.							
SEPT. 13, 1971	28	19	785	MAR. 28.....	207	3	625
OCT. 15.....	26	9	845	MAY 08.....	253	11.5	650
NOV. 22.....	86	2.5	560	JUNE 12.....	117	21	--
NOV. 23.....	71	2.5	--	JULY 17.....	125	22	690
DEC. 13.....	50	.5	760	JULY 24.....	243	24.5	--
JAN. 24, 1972	19	0	--	AUG. 21.....	52	25.5	579
FEB. 29.....	16	0	650	SEPT. 25.....	135	16.5	675
MAR. 20.....	1320	1.5	360	OCT. 30.....	239	6	650
MAR. 23.....	530	2.0	--				
05373000 SOUTH FORK ZUMBRO RIVER NEAR ROCHESTER, MINN.							
SEPT. 14, 1971...	89	23.5	705	APR. 27.....	159	15	630
OCT. 15.....	71	17.5	780	MAY 30.....	147	20	620
NOV. 11.....	95	11	855	JULY 14.....	173	25.5	535
DEC. 06.....	113	7.5	740	AUG. 08.....	69	20.5	--
JAN. 10, 1972...	73	9.5	820	SEPT. 21.....	132	21	--
FEB. 15.....	54	4.3	925	SEPT. 29.....	915	13	--
MAR. 23.....	267	3.5	--	OCT. 23.....	488	6	510
05374000 ZUMBRO RIVER AT ZUMBRO FALLS, MINN.							
SEPT. 14, 1971...	175	16	515	APR. 24.....	959	9	530
OCT. 19.....	166	14.5	550	MAY 30.....	289	15	515
NOV. 11.....	430	7	655	JULY 14.....	183	20.5	540
DEC. 06.....	179	3.5	560	AUG. 16.....	145	20	--
JAN. 19, 1972...	131	.2	625	SEPT. 19.....	181	18	--
FEB. 15.....	150	1.0	605	OCT. 23.....	293	5.5	570
MAR. 16.....	1260	2.0	450				

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)	DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)
05376000 NORTH FORK WHITEWATER RIVER NEAR ELBA, MINN.							
SEPT. 19, 1971...	27	11	535	APR. 26.....	31	10	495
OCT. 13.....	26	10.5	510	JUNE 05.....	25	15	510
NOV. 16.....	27	8.5	510	JULY 13.....	24	15.5	505
DEC. 08.....	26	5	505	AUG. 16.....	22	20.5	460
JAN. 12, 1972	26	3.2	500	SEPT. 26.....	75	12	345
FEB. 24.....	23	2	495	NOV. 06.....	63	9.5	--
MAR. 22.....	78	3	400				
05378300 STRAIGHT VALLEY CREEK NEAR ROLLINGSTONE, MINN.							
OCT. 12, 1971...	1.11	8.5	550	APR. 26.....	1.37	14.5	530
NOV. 09.....	1.26	6.0	645	JUNE 02.....	1.04	20	535
DEC. 07.....	1.33	5.5	560	JULY 12.....	1.36	16.5	580
JAN. 12, 1972...	.90	5.0	545	OCT. 27.....	2.31	9	590
FEB. 24.....	1.04	3.0	540				
05378500 MISSISSIPPI RIVER AT WINONA, MINN.							
APR. 05, 1972...	73600	2.0	330	APR. 26.....	103000	9.5	330
05384000 ROOT RIVER NEAR LANESBORO, MINN.							
SEPT. 08, 1971...	145	21	565	APR. 25.....	297	8.5	480
OCT. 14.....	139	11.5	460	MAY 31.....	181	18.5	500
NOV. 08.....	157	1.0	595	JULY 11.....	407	21.5	375
DEC. 06.....	170	2.5	500	AUG. 09.....	234	17.5	--
JAN. 11, 1972...	135	0	500	SEPT. 19.....	206	21	--
FEB. 22.....	126	0	535	OCT. 25.....	1460	4.5	410
MAR. 20.....	934	5.0	--				
05-384500 RUSH CREEK NEAR RUSHFORD, MINN.							
NOV. 09, 1971...	38	5.5	555	MAY 31.....	37	17	465
DEC. 08.....	37	4.5	475	JULY 12.....	72	18	360
JAN. 10, 1972	37	2.0	460	AUG. 10.....	44	13	--
FEB. 23.....	38	2.0	465	SEPT. 20.....	46	16.5	--
MAR. 20.....	142	6	--	OCT. 26.....	68	6.5	500
APR. 25.....	41	14.2	450				

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)	DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)
05385000 ROOT RIVER NEAR HOUSTON, MINN.							
SEPT. 09, 1971...	388	19	685	APR. 25.....	592	2.2	480
OCT. 12.....	330	9.5	445	JUNE 02.....	397	20.5	505
NOV. 09.....	403	4.0	605	JULY 11.....	784	24	425
DEC. 07.....	389	2.5	505	AUG. 10.....	584	18	--
JAN. 11, 1972...	345	0	515	SEPT. 20.....	466	21	--
FEB. 23.....	322	0	520	OCT. 26.....	1930	7	450
MAR. 21.....	1640	5	--				
05385500 SOUTH FORK ROOT RIVER NEAR HOUSTON, MINN.							
SEPT. 09, 1971...	98	17.5	585	APR. 25.....	126	10.5	495
OCT. 12.....	97	9.5	490	JUNE 02.....	104	16	545
NOV. 23.....	100	2	500	JULY 12.....	148	19.5	450
DEC. 07.....	102	4.5	500	AUG. 11.....	129	16.0	--
JAN. 12, 1972...	90	0	490	SEPT. 20.....	114	20.0	--
FEB. 22.....	100	0	500	OCT. 26.....	200	6.5	500
MAR. 21.....	294	5	--				
05457000 CEDAR RIVER NEAR AUSTIN, MINN.							
SEPT. 01, 1971...	54	25	945	MAR. 28.....	145	4	700
OCT. 14.....	49	14	1045	MAY 08.....	200	12.5	750
NOV. 23.....	93	3	725	JUNE 12.....	106	23	--
DEC. 13.....	78	.5	675	JULY 17.....	230	23	450
JAN. 26, 1972...	33	.5	--	AUG. 21.....	71	29	607
FEB. 29.....	69	.5	--	SEPT. 25.....	364	17.5	440
MAR. 13.....	415	1	--	OCT. 30.....	214	7	765
05476000 WEST FORK DES MOINES RIVER AT JACKSON, MINN.							
AUG. 31, 1971...	37.4	21	--	FEB. 14.....	8.74	0	1505
OCT. 05.....	14.5	16	1040	APR. 24.....	465	7	650
NOV. 10.....	41.6	3	--	MAY 31.....	880	16.5	850
DEC. 07.....	68.7	.5	--	JULY 06.....	208	18	--
JAN. 11, 1972...	21.9	0	--				

LAT- I- TUDE	LONG- I- TUDE	SEQ. NO.	LOCAL IDENT- I- FIER	DATE OF SAMPLE	DIS- SOLVED SILICA (SI02) (MG/L) (00955)	DIS- SOLVED IRON (FE) (UG/L) (01046)	DIS- SOLVED MAN- GANESE (MN) (UG/L) (01056)	DIS- SOLVED CAL- CIUM (CA) (MG/L) (00915)	DIS- SOLVED MAG- NE- SIUM (MG) (MG/L) (00925)	DIS- SOLVED SODIUM (NA) (MG/L) (00930)
CARVER COUNTY										
44 53 10	093 54 20	01	116 26 04BC	71-12-10	13	880	110	100	49	30
COOK COUNTY										
48 05 30	090 42 04	01	065032788A HOSTON LODGE	72-09-06	16	90	30	25	8.4	3.8
48 05 41	090 40 25	01	0650323DC LOG HOME	72-09-06	18	30	30	31	13	6.0
COTTONWOOD COUNTY										
43 52 00	095 21 42	01	105 3R 25CBC HERON LK,MN	72-09-29	27	2700	360	140	33	6.8
CROW WING COUNTY										
43 43 06	091 16 12	01	1034203BBB BROWNSVILLE	71-10-27	14	10	0	51	30	2.0
DODGE COUNTY										
43 59 03	093 00 42	01	1061808DB CLAREMONT	71-10-22	21	2000	40	75	22	8.2
44 03 59	092 44 20	01	1071621DAA KASSON	71-10-22	20	40	20	96	43	12
44 05 24	092 59 24	01	1071809ADC CLAREMONT	71-10-26	26	20	0	85	26	4.4
FILLMORE COUNTY										
43 48 27	092 10 30	01	1041117DCD CHATFIELD	71-10-26	11	220	20	67	20	2.5
FREEBORN COUNTY										
43 32 54	093 21 51	01	1012116CBA GLENVILLE	71-11-03	32	20	150	100	31	3.7
43 34 58	093 22 01	01	1012104BBC ALBERT LEA	71-11-03	48	5300	50	94	35	16
GOODHUE COUNTY										
43 53 36	093 35 48	01	1051514CCC STEWARTVILLE	71-10-26	9.7	1200	50	66	20	3.4
44 15 38	092 43 34	01	1091610CBB ZUMBROTA	71-10-22	18	120	50	73	27	5.5
44 17 09	092 52 18	01	1101732ADA WANAMINGO	71-10-21	17	100	60	110	24	5.5
44 17 20	092 51 12	01	1101733AAB WANAMINGO	71-10-21	8.8	80	70	79	24	2.8
44 18 33	092 40 35	01	1101625AAC GOLF CLUB	71-10-07	18	40	0	85	27	3.6
44 19 39	092 54 05	01	1101718CCC KENYDN	71-10-05	20	210	30	91	30	6.0
HENNEPIN COUNTY										
45 03 23	093 38 09	01	118 23 06CAD	71-12-23	22	20	690	110	48	13
ITASCA COUNTY										
47 31 13	093 49 01	01	1472527DAA LEWIS NIEMELA	72-08-14	22	100	50	110	40	7.3
47 33 23	093 53 16	01	1472518ABA E. DAVIDSON	72-08-11	11	480	30	47	22	62
47 33 25	093 48 10	01	1472514ABA A. JOHNSON	72-08-14	29	30	170	63	15	29
47 34 02	093 48 33	01	1472511BDA W. ALDRICH	72-08-11	25	660	140	63	12	6.0
47 37 57	094 08 27	01	1482717CBC MILLS	72-08-11	22	2000	60	85	34	9.0
47 38 27	093 39 18	01	148251208D WILLIAM BALES	72-08-10	21	880	270	92	31	12
47 41 36	093 56 10	01	1492626DBB JOE DUGSUY	72-08-11	18	40	60	78	30	57
47 42 45	093 46 38	01	1492524ADB L. SCHAPER	72-08-10	26	200	80	30	8.3	3.9
47 43 48	094 16 00	01	1492808CCC HANSON	72-08-11	24	950	250	86	22	5.8
47 44 40	093 46 34	01	1492512AAA BERNARD OLSON	72-08-10	23	4100	200	95	100	53
47 45 37	093 58 06	01	1502634CCC	72-08-11	11	1500	230	67	14	16
47 49 30	094 06 27	01	1502709ACC R. JOHNSON	72-08-08	21	130	0	120	35	3.1
47 49 35	093 46 30	01	0622727DCD FLOYD COLE	72-08-07	21	770	150	150	72	52
47 49 45	093 07 45	01	0622227ADC H. JOHNSON	72-08-23	19	240	2600	100	37	35
47 50 16	093 27 03	01	0622430ABA R. WALL-EFFIE	72-08-09	21	640	180	73	23	12
48 27 44	093 33 38	01	0692516CDD WILLAN	72-08-21	24	110	240	79	23	66
JACKSON COUNTY										
43 32 22	096 29 36	01	1013719BDD L.VOGELAAR	72-09-07	25	6000	5100	420	170	86
		01	101 37 19 BDD SIOUX VALY	72-09-07	25	6000	5100	420	170	86
43 32 40	096 17 33	01	1013716CCD S.AHRENSTORFF	72-09-06	18	3000	250	200	67	79
43 47 29	095 11 28	01	104 36 20CCD WILDER,MN	72-09-29	28	130	1400	200	67	15
KANDIYOHI COUNTY										
45 06 54	095 00 00	01	119 34 18CBC	72-01-05	28	7000	140	140	54	14
			1193418CBC B. KLEMENTSON	72-01-05	28	7000	140	140	54	14

LAT- I- TUDE	LONG- I- TUDE	SEQ. NO.	DATE OF SAMPLE	DIS- SOLVED PO- TAS- SIUM (K) (MG/L) (00935)	BICAR- BONATE (HCO3) (MG/L) (00440)	CAR- BONATE (CO3) (MG/L) (00445)	ALKA- LINITY AS CACO3 (MG/L) (00410)	DIS- SOLVED SULFATE (SO4) (MG/L) (00945)	DIS- SOLVED CHLO- RIDE (CL) (MG/L) (00940)	DIS- SOLVED FLUO- RIDE (F) (MG/L) (00950)	DIS- SOLVED NITRITE PLUS NITRATE (N) (MG/L) (00631)	TOTAL PHOS- PHORUS (P) (MG/L) (00665)
CARVER COUNTY												
44 53 10	093 58 20	01	71-12-10	8.0	491	0	403	90	3.4	1.4	.05	.05
COOK COUNTY												
48 05 30	090 42 04	01	72-09-06	.9	109	0	89	14	.3	.2	.01	.01
48 05 41	090 40 25	01	72-09-06	5.0	153	0	126	13	3.3	.3	.01	.03
COTTONWOOD COUNTY												
43 52 00	095 21 42	01	72-09-29	1.2	287	0	235	250	1.6	.7	.00	.04
CROW WING COUNTY												
43 43 06	091 16 12	01	71-10-27	1.2	284	0	233	18	1.5	.1	.34	.07
DODGE COUNTY												
43 59 03	093 00 42	01	71-10-22	1.0	364	0	299	2.8	1.3	.3	.31	.16
44 03 59	092 44 20	01	71-10-22	6.0	376	0	308	70	37	.1	6.9	.03
44 05 24	092 59 24	01	71-10-26	8.2	275	0	226	32	17	.2	17	.14
FILLMORE COUNTY												
43 48 27	092 10 30	01	71-10-26	1.2	261	0	214	31	7.4	.2	.20	.05
FREEBORN COUNTY												
43 32 54	093 21 51	01	71-11-03	3.5	400	0	328	58	4.1	.3	.49	.12
43 34 58	093 22 01	01	71-11-03	1.8	486	0	399	17	1.1	.2	.03	.16
GOODHUE COUNTY												
43 53 36	093 35 48	01	71-10-26	1.8	295	0	242	11	.1	.2	.04	.05
44 15 38	092 43 34	01	71-10-22	1.4	319	0	262	25	19	.3	.98	.03
44 17 09	092 52 18	01	71-10-21	1.3	341	0	280	85	26	.2	.13	.08
44 17 20	092 51 12	01	71-10-21	3.3	328	0	269	50	1.6	.2	.17	.05
44 18 33	092 40 35	01	71-10-07	1.0	352	0	289	36	3.1	.3	1.3	.08
44 19 39	092 54 05	01	71-10-05	1.5	376	0	308	59	7.0	.1	.08	.05
HENNEPIN COUNTY												
45 03 23	093 38 09	01	71-12-23	4.4	581	0	477	26	1.7	.6	.26	.08
ITASCA COUNTY												
47 31 13	093 49 01	01	72-08-14	3.8	425	0	349	23	13	.5	19	.07
47 33 23	093 53 16	01	72-08-11	8.6	432	0	354	8.3	2.4	.8	.09	.02
47 33 25	093 48 10	01	72-08-14	4.9	322	0	264	14	4.9	.4	.35	.10
47 34 02	093 48 33	01	72-08-11	3.5	274	0	225	5.6	.9	.3	.04	.08
47 37 57	094 08 27	01	72-08-11	3.6	456	0	374	5.6	1.6	.3	.00	.11
47 38 27	093 39 18	01	72-08-10	3.2	482	0	395	3.5	1.0	.3	.00	.02
47 41 36	093 56 10	01	72-08-11	4.7	509	0	417	35	2.5	.4	.06	.10
47 42 45	093 46 38	01	72-08-10	2.3	150	0	123	2.7	1.3	.2	.00	.10
47 43 48	094 16 00	01	72-08-11	1.4	331	0	272	6.8	33	.3	.00	.13
47 44 40	093 46 34	01	72-08-10	4.0	718	0	589	68	72	.7	.27	1.9
47 45 37	093 58 06	01	72-08-11	1.5	247	0	203	15	38	.2	.01	.00
47 49 30	094 06 27	01	72-08-08	1.6	503	0	413	14	1.2	.2	.33	.01
47 49 35	093 46 30	01	72-08-07	5.5	555	0	455	310	2.0	.8	.01	.09
47 49 45	093 07 45	01	72-08-23	4.9	376	0	308	56	84	.3	.48	.02
47 50 16	093 27 03	01	72-08-09	2.6	353	0	290	9.2	1.0	.3	.02	.05
48 27 44	093 33 38	01	72-08-21	4.5	302	0	248	120	41	.4	.43	.02
JACKSON COUNTY												
43 32 22	096 29 36	01	72-09-07	3.8	366	0	300	1600	1.8	.7	.44	.04
43 32 40	096 17 33	01	72-09-06	3.8	366	0	300	1600	1.8	.7	.44	.04
43 47 29	095 11 28	01	72-09-29	9.2	410	0	336	620	5.7	.6	.08	.08
KANDIYOHU COUNTY												
45 06 54	095 00 00	01	72-01-05	5.8	581	0	477	140	1.3	.3	.01	.27
			72-01-05	5.8	581	0	477	140	1.3	.3	.01	.27

MISCELLANEOUS ANALYSES OF GROUND WATER IN MINNESOTA

LAT- I- TUDE	LONG- I- TUDE	SEQ. NO.	DATE OF SAMPLE	DIS- SOLVED BORON (B) (UG/L) (01020)	DIS- SOLVED SOLIDS (RESI- DUE AT 180 C) (MG/L) (70300)	DIS- SOLVED SOLIDS (SUM OF CONSTI- TUENTS) (MG/L) (70301)	HARD- NESS (CA+MG) (MG/L) (00900)	NON- CAR- BONATE HARD- NESS (MG/L) (00902)	SODIUM AD- SORP- TION RATIO (00931)	PERCENT SODIUM (00932)
CARVER COUNTY										
44 53 10	093 58 20	01	71-12-10	600	652	538	450	49	.6	12
COOK COUNTY										
48 05 30	090 42 04	01	72-09-06	40	120	122	97	8	.2	8
48 05 41	090 40 25	01	72-09-06	30	170	165	130	5	.2	9
COTTONWOOD COUNTY										
43 52 00	095 21 42	01	72-09-29	80	640	605	490	250	.1	3
CROW WING COUNTY										
43 43 06	091 16 12	01	71-10-27	10	244	259	250	18	.1	2
DODGE COUNTY										
43 59 03	093 00 42	01	71-10-22	40	358	314	280	0	.2	6
44 03 59	092 44 20	01	71-10-22	30	532	500	420	110	.3	6
44 05 24	092 59 24	01	71-10-26	30	412	409	320	94	.1	3
FILLMORE COUNTY										
43 48 27	092 10 30	01	71-10-26	30	256	270	250	36	.1	2
FREEBORN COUNTY										
43 32 54	093 21 51	01	71-11-03	40	484	432	380	49	.1	2
43 34 58	093 22 01	01	71-11-03	80	468	458	380	0	.4	8
GOODHUE COUNTY										
43 53 36	093 35 48	01	71-10-26	80	256	259	250	5	.1	3
44 15 38	092 43 34	01	71-10-22	20	378	331	290	32	.1	4
44 17 09	092 52 18	01	71-10-21	20	478	437	370	94	.1	3
44 17 20	092 51 12	01	71-10-21	90	360	332	300	27	.1	2
44 18 33	092 40 35	01	71-10-07	10	280	353	320	35	.1	2
44 19 39	092 54 05	01	71-10-05	30	396	400	350	42	.1	4
HENNEPIN COUNTY										
45 03 23	093 38 09	01	71-12-23	60	460	513	470	0	.3	6
ITASCA COUNTY										
47 31 13	093 49 01	01	72-08-14	40	560	513	440	91	.2	3
47 33 23	093 53 16	01	72-08-11	1200	376	377	210	0	1.9	38
47 33 25	093 48 10	01	72-08-14	170	344	320	220	0	.9	22
47 34 02	093 48 33	01	72-08-11	80	262	252	210	0	.2	6
47 37 57	094 08 27	01	72-08-11	60	402	387	350	0	.2	5
47 38 27	093 39 18	01	72-08-10	60	410	402	360	0	.3	7
47 41 36	093 56 10	01	72-08-11	260	512	477	320	0	1.4	28
47 42 45	093 46 38	01	72-08-10	40	168	149	110	0	.2	7
47 43 48	094 16 00	01	72-08-11	50	412	343	310	34	.1	4
47 44 40	093 46 34	01	72-08-10	260	844	775	650	60	.9	15
47 45 37	093 58 06	01	72-08-11	110	332	286	220	22	.5	13
47 49 30	094 06 27	01	72-08-08	20	452	445	440	31	.1	2
47 49 35	093 46 30	01	72-08-07	400	916	888	670	220	.9	14
47 49 45	093 07 45	01	72-08-23	150	612	526	400	94	.8	16
47 50 16	093 27 03	01	72-08-09	50	338	317	280	0	.3	9
48 27 44	093 33 38	01	72-08-21	290	532	509	290	44	1.7	33
JACKSON COUNTY										
43 32 22	096 29 36	01	72-09-07	410	2600	2500	1700	1400	.9	10
			72-09-07	410	2600	2500	1700	1400	.9	10
43 32 40	096 17 33	01	72-09-06	460	1240	1210	770	440	1.2	18
43 47 29	095 11 28	01	72-09-29	90	924	940	770	390	.2	4
KANDIYOHKI COUNTY										
45 06 54	095 00 00	01	72-01-05	190	668	676	570	95	.3	5
			72-01-05	190	668	676	570	95	.3	5

LAT- I- TUDE	LONG- I- TUDE	SEQ. NO.	DATE OF SAMPLE	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS) (00095)	PH (UNITS) (00400)	TEMPER- ATURE (DEG C) (00010)	COLOR (PLAT- INUM- COBALT UNITS) (00080)
CARYER COUNTY							
44 53 10	093 58 20	01	71-12-10	913	7.2	7.0	10
COOK COUNTY							
48 05 30	090 42 04	01	72-09-06	195	7.8	7.0	0
48 05 41	090 40 25	01	72-09-06	258	7.8	11.0	0
COTTONWOOD COUNTY							
43 52 00	095 21 42	01	72-09-29	874	7.2	15.0	30
CROW WING COUNTY							
43 43 06	091 16 12	01	71-10-27	452	7.4	12.0	2
DODGE COUNTY							
43 59 03	093 00 42	01	71-10-22	531	7.3	9.5	5
44 03 59	092 44 20	01	71-10-22	834	7.1	10.0	0
44 05 24	092 59 24	01	71-10-26	659	7.4	12.5	0
FILLMORE COUNTY							
43 48 27	092 10 30	01	71-10-26	460	7.3	9.5	0
FREEBORN COUNTY							
43 32 54	093 21 51	01	71-11-03	707	7.0	12.0	5
43 34 58	093 22 01	01	71-11-03	737	7.3	9.5	40
GOODHUE COUNTY							
43 53 36	093 35 48	01	71-10-26	458	7.3	10.0	0
44 15 38	092 43 34	01	71-10-22	543	7.3	9.0	0
44 17 09	092 52 18	01	71-10-21	724	7.2	14.0	0
44 17 20	092 51 12	01	71-10-21	545	7.1	11.0	0
44 18 33	092 40 35	01	71-10-07	588	7.2	9.0	5
44 19 39	092 54 05	01	71-10-05	667	7.2	13.0	5
HENNEPIN COUNTY							
45 03 23	093 38 09	01	71-12-23	865	7.3	9.1	3
ITASCA COUNTY							
47 31 13	093 49 01	01	72-08-14	842	7.1	13.0	40
47 33 23	093 53 16	01	72-08-11	655	7.6	13.5	10
47 33 25	093 48 10	01	72-08-14	522	7.4	14.5	20
47 34 02	093 48 33	01	72-08-11	421	7.2	13.0	30
47 37 57	094 08 27	01	72-08-11	666	7.5	10.5	30
47 38 27	093 39 18	01	72-08-10	697	7.3	10.0	20
47 41 36	093 56 10	01	72-08-11	796	7.7	8.0	20
47 42 45	093 46 38	01	72-08-10	224	7.6	9.0	20
47 43 48	094 16 00	01	72-08-11	611	7.3	15.5	100
47 44 40	093 46 34	01	72-08-10	1250	7.3	10.5	40
47 45 37	093 58 06	01	72-08-11	526	7.3	16.0	20
47 49 30	094 06 27	01	72-08-08	766	7.1	10.5	5
47 49 35	093 46 30	01	72-08-07	1280	7.5	11.0	3
47 49 45	093 07 45	01	72-08-23	932	7.3	13.0	5
47 58 16	093 27 03	01	72-08-09	548	7.1	9.5	10
48 27 44	093 33 38	01	72-08-21	809	7.5	13.0	5
JACKSON COUNTY							
43 32 22	096 29 36	01	72-09-07	2820	7.1	12.0	5
			72-09-07	2820	7.1	12.0	5
43 32 40	096 17 33	01	72-09-06	1630	7.2	12.0	2
43 47 29	095 11 28	01	72-09-29	1514	7.0	9.5	0
KANDIYOHKI COUNTY							
45 06 54	095 00 00	01	72-01-05	1040	7.3	--	5
			72-01-05	1040	7.3	--	5

LAT- I- TUDE	LONG- I- TUDE	SEQ. NO.	LOCAL IDENT- I- FIER	DATE OF SAMPLE	DIS- SOLVED SILICA (SI02) (MG/L) (00955)	DIS- SOLVED IRON (FE) (UG/L) (01046)	DIS- SOLVED MAN- GANESE (MN) (UG/L) (01056)	DIS- SOLVED CAL- CIUM (CA) (MG/L) (00915)	DIS- SOLVED MAG- NE- SIUM (MG) (MG/L) (00925)	DIS- SOLVED SODIUM (NA) (MG/L) (00930)
KOOCHICHING COUNTY										
47 55 12	093 56 35	01	1512602CDC ALDEN ELLISD	72-08-09	22	37000	420	140	71	84
47 56 32	093 45 21	01	0632723AB8 HOMER PEESDN	72-08-18	19	5000	510	110	34	50
47 58 32	093 08 49	01	0632204ADA J. ZELOWENSKE	72-08-22	24	1700	340	110	51	40
48 02 14	093 44 07	01	0642713ACB BOISE CASCADE	72-08-07	14	50	80	34	9.7	70
48 08 06	093 43 40	01	0652607DAB CARL LARSON	72-08-07	21	90	70	45	12	64
48 11 23	093 48 02	01	1542502ADA BIG FALLS	72-08-08	23	550	140	79	47	24
48 11 56	093 47 58	01	1552535DAD RANGER STATIO	72-08-07	22	340	340	79	33	16
48 12 50	094 01 00	01	1552630DAA O. SIMEUSON	72-08-08	22	7000	360	87	69	15
48 12 53	093 30 04	01	0662512CDC FOREST SERVIC	72-08-22	24	4400	210	130	55	39
48 21 35	093 37 12	01	0682625ABA CARL BERG	72-08-08	17	160	20	30	8.2	7.7
48 22 49	093 31 23	01	0682514CBA PRDMERBERGEIS	72-08-21	13	80	100	42	19	140
48 23 04	093 35 28	01	06825178CB BERTHA FAY	72-08-21	19	540	240	48	14	3.1
48 23 56	093 33 38	01	0682509BDA LITTLE FORK	72-08-21	26	2100	240	120	55	50
48 25 25	093 46 43	01	1572513AAB HERMAN HOY	72-08-08	16	60	90	160	74	10
48 26 24	093 43 22	01	0692629C8B BERT THORESDN	72-08-08	19	140	0	18	5.8	180
48 26 43	093 09 23	01	0692221DDB WALTER HANSON	72-09-19	25	3300	520	180	74	62
48 33 27	093 25 06	01	0702416ADA	72-09-20	27	910	370	160	74	41
48 34 09	093 18 46	01	0702308ADC J. D. LATCATR	72-09-20	21	60	30	100	49	10
48 38 17	094 08 24	01	1602731ADA ABANDDN HOME	72-07-07	7	40	0	4.0	3.3	33
48 41 16	094 24 23	01	1602908CCB L. ERICKSDN	72-07-07	25	120	230	120	52	17
48 49 17	093 32 36	01	0672527BAB L. BURMEISTER	72-08-22	17	160	17	79	42	14
LAKE COUNTY										
47 38 51	091 27 36	01	0600927CDD EDWIN STEINKE	72-09-13	18	110	20	23	8.0	4.6
47 56 09	091 46 12	01	0631117CCC JOHNSDN RESDR	72-09-12	15	30	30	110	10	26
47 58 36	091 26 49	01	0640935CAC BOB ELLIS	72-09-12	18	550	460	58	12	9.8
47 58 39	091 32 12	01	0640931BCA OREL BENNETT	72-09-12	11	120	10	50	4.2	1.7
LAKE OF THE WOODS COUNTY										
48 29 04	093 59 34	01	1582621CCB R. SHOWBERS	72-07-07	15	420	70	38	19	49
48 30 42	093 47 54	01	1582514AAA LOMAN STORE	72-07-07	22	110	60	33	13	120
48 32 03	094 35 40	01	1583102ACD GARY CHENEY	72-07-10	23	430	63	64	33	69
48 35 38	094 57 42	01	1593413ADB LOOKOUT TOWER	72-07-11	21	50	10	42	11	1.9
48 36 18	095 09 06	01	1593504ADD DEEP WELL	72-07-11	16	40	10	30	9.4	2.1
48 36 18	095 09 06	02	1593504ADD SHALLOW WELL	72-07-11	19	30	0	36	12	3.2
48 40 27	094 29 37	01	1603015CCC ALFERD ATWODD	72-07-12	21	2100	130	62	22	62
48 40 40	094 57 03	01	1603318BCC E. DOLLORHIDE	72-07-11	22	140	210	86	30	9.5
48 40 40	094 57 03	02		72-07-11	32	1700	70	80	29	10
48 42 49	094 37 39	02	1603104AAA BAUDETTE	72-07-05	19	1000	100	85	41	96
48 43 34	094 46 43	01	16132338BD CLIFFORD COLE	72-07-05	20	160	70	48	19	64
48 46 00	094 50 52	01	1613313BCC JAKE GERNIDGE	72-07-11	26	50	60	44	21	46
48 46 03	094 57 31	01	1613413ADA FORESTRY HOME	72-07-06	19	520	60	54	21	27
48 48 02	094 41 58	01	1613201AAB ROBERT BOYD	72-07-10	25	1200	270	63	28	38
48 49 18	094 57 45	01	1623425DAB AL BERGEN	72-07-12	21	80	100	76	30	7.6
48 49 45	094 46 34	01	1623228BAB ROY CYRUS	72-07-12	15	200	140	36	14	81
48 53 39	094 57 37	01	1633436DAA JAKE TERHACK	72-07-12	13	30	20	100	39	14
48 58 36	094 57 33	01	1643331CCB ART MATSON	72-08-17	26	1100	110	84	56	9.9
LINCOLN COUNTY										
44 15 42	096 12 06	01	109 45 12DAA LK BENTON	72-09-15	27	19000	120	440	230	190
MC LEOD COUNTY										
44 45 38	094 09 44	01	11528328AD	71-12-20	25	4000	140	110	46	41
44 46 08	094 08 58	01	1152813C8B	71-12-20	8.9	540	20	48	25	93
44 46 11	094 12 35	01	1152816C8B	71-12-20	31	5200	140	120	40	19
44 51 27	094 03 52	01	11627158DB LESTER PRAIRI	71-12-16	28	7900	330	100	31	.0
MEEKER COUNTY										
45 08 18	094 28 38	01	119 30 05CCD	72-01-04	26	4300	470	38	7.6	2.4
45 09 48	094 27 09	01	120 30 33BAC	72-01-04	8.9	1500	42	54	22	26
MILLE LACS COUNTY										
45 47 15	094 19 25	01	1272927BAD BOWLUS	72-09-14	15	470	310	67	22	7.8

LAT- I- TUDE	LONG- I- TUDE	SEQ. NO.	DATE OF SAMPLE	DIS- SOLVED PO- TAS- SIUM (K) (MG/L) (00935)	BICAR- BONATE (HCO3) (MG/L) (00440)	CAR- BONATE (CO3) (MG/L) (00445)	ALKA- LITY AS CACD3 (MG/L) (00410)	DIS- SOLVED SULFATE (SO4) (MG/L) (00945)	DIS- SOLVED CHLO- RIDE (CL) (MG/L) (00940)	DIS- SOLVED FLUO- RIDE (F) (MG/L) (00950)	DIS- SOLVED NITRITE PLUS NITRATE (N) (MG/L) (00631)	TOTAL PHOS- PHORUS (P) (MG/L) (00665)
KOOCHICHING COUNTY												
47 55 12	093 56 35	01	72-08-09	4.8	1020	0	837	6.7	5.1	.2	.02	1.5
47 56 32	093 45 21	01	72-08-18	4.6	300	0	246	250	9.7	.3	.01	.01
47 58 32	093 08 49	01	72-08-22	7.1	602	0	494	88	2.0	.5	.00	.03
48 02 14	093 44 07	01	72-08-07	3.9	235	0	193	64	14	1.1	.00	.02
48 08 06	093 43 40	01	72-08-07	2.9	218	0	179	99	17	.6	.02	.20
48 11 23	093 48 02	01	72-08-08	4.7	444	0	364	68	1.9	.4	.03	.04
48 11 56	093 47 58	01	72-08-07	4.7	433	0	355	7.8	2.0	.3	.01	.01
48 12 50	094 01 00	01	72-08-08	2.5	625	0	513	17	1.8	.5	.01	.06
48 12 53	093 30 04	01	72-08-22	7.0	458	0	376	230	5.9	.3	.00	.04
48 21 35	093 37 12	01	72-08-08	2.1	110	0	90	11	6.9	.1	3.9	.03
48 22 49	093 31 23	01	72-08-21	6.0	422	0	346	97	52	1.6	.16	.01
48 23 04	093 35 28	01	72-08-21	3.6	209	0	171	12	.8	.2	.00	.01
48 23 56	093 33 38	01	72-08-21	7.1	597	0	490	120	4.3	.4	.02	.01
48 25 25	093 46 43	01	72-08-08	7.4	576	0	472	230	11	.4	10	.02
48 26 24	093 43 22	01	72-08-08	3.9	369	0	303	93	26	.7	.03	.08
48 26 43	093 09 23	01	72-09-19	7.3	658	0	540	360	6.6	.4	.01	.05
48 33 27	093 25 06	01	72-09-20	10	638	0	523	250	9.5	.7	.00	.04
48 34 09	093 18 46	01	72-09-20	5.7	541	0	444	23	7.8	.4	.00	.03
48 38 17	094 08 24	01	72-07-07	4.3	107	7	99	4.1	2.9	.3	.08	.11
48 41 16	094 24 23	01	72-07-07	5.5	539	0	442	100	13	.4	2.5	.02
48 49 17	093 32 36	01	72-08-22	2.2	379	0	311	54	11	.5	.09	.04
LAKE COUNTY												
47 38 51	091 27 36	01	72-09-13	2.3	110	0	90	5.3	2.4	.3	.01	.06
47 56 09	091 46 12	01	72-09-12	2.6	294	0	241	31	63	.2	.60	.02
47 58 36	091 26 49	01	72-09-12	1.2	240	0	197	7.8	8.1	1.4	.00	.03
47 58 39	091 32 12	01	72-09-12	1.6	160	0	131	10	1.8	.2	.13	.02
LAKE OF THE WOODS COUNTY												
48 29 04	093 59 34	01	72-07-07	6.1	309	0	253	26	4.9	.3	.09	.02
48 30 42	093 47 54	01	72-07-07	5.4	355	0	291	78	24	.6	.04	.05
48 32 03	094 35 40	01	72-07-10	2.6	418	0	343	91	5.1	.4	.02	.01
48 35 38	094 57 42	01	72-07-11	.3	175	0	144	11	1.0	.1	.04	.03
48 36 18	095 09 06	01	72-07-11	.6	130	0	107	8.0	1.9	.0	.79	.04
48 36 18	095 09 06	02	72-07-11	.6	163	0	134	7.2	2.0	.1	.49	.04
48 40 27	094 29 37	01	72-07-12	4.2	360	0	295	82	7.4	.2	.02	.07
48 40 40	094 57 03	01	72-07-11	1.1	388	0	318	31	12	.2	.04	.01
48 40 40	094 57 03	02	72-07-11	2.9	425	0	349	4.1	1.4	.2	.02	.60
48 42 49	094 37 39	02	72-07-05	6.8	333	0	273	290	10	1.5	.01	.06
48 43 34	094 46 43	01	72-07-05	5.3	340	0	279	66	1.7	.4	.17	.04
48 46 00	094 50 52	01	72-07-11	4.2	340	0	279	13	9.0	.2	.46	.04
48 46 03	094 57 31	01	72-07-06	3.7	335	0	275	3.5	2.2	.2	.06	.01
48 48 02	094 41 58	01	72-07-10	2.2	405	0	332	30	4.0	.2	.04	.03
48 49 18	094 57 45	01	72-07-12	1.7	371	0	304	16	5.2	.2	.09	.05
48 49 45	094 46 34	01	72-07-12	4.3	332	0	272	23	25	.3	.06	.03
48 53 39	094 57 37	01	72-07-12	1.5	357	0	293	23	27	.0	26	.02
48 58 36	094 57 33	01	72-08-17	5.0	535	0	439	21	2.6	.3	.00	.03
LINCOLN COUNTY												
44 15 42	096 12 06	01	72-09-15	18	550	0	451	1900	5.8	.5	.00	--
MC LEOD COUNTY												
44 45 38	094 09 44	01	71-12-20	3.8	657	0	539	46	1.6	.5	.00	.70
44 46 08	094 08 58	01	71-12-20	4.2	447	0	367	59	15	.8	.00	.06
44 46 11	094 12 35	01	71-12-20	7.2	560	0	459	77	.9	.3	.03	.20
44 51 27	094 03 52	01	71-12-16	6.1	489	0	401	4.5	2.8	.3	.02	.15
MEEKER COUNTY												
45 08 18	094 28 38	01	72-01-04	1.7	154	0	126	33	3.7	.2	.04	.41
45 09 48	094 27 09	01	72-01-04	4.5	344	0	282	26	1.2	.3	.05	.03
MILLE LACS COUNTY												
45 47 15	094 19 25	01	72-09-14	4.3	290	0	238	19	7.7	.2	.03	.04

MISCELLANEOUS ANALYSES OF GROUND WATER IN MINNESOTA

LAT- I- TUDE	LONG- I- TUDE	SEQ. NO.	DATE OF SAMPLE	DIS- SOLVED BORON (B) (UG/L) (01020)	DIS- SOLVED (RESI- DUE AT 180 C) (MG/L) (70300)	DIS- SOLVED (SUM OF CONSTI- TUENTS) (MG/L) (70301)	HARD- NESS (CA, MG) (MG/L) (00900)	NON- CAR- BONATE HARD- NESS (MG/L) (00902)	SODIUM AD- SORP- TION RATIO (00931)	PERCENT SODIUM (00932)
KOOCHICHING COUNTY										
47 55 12	093 56 35	01	72-08-09	190	848	873	640	0	1.4	22
47 56 32	093 45 21	01	72-08-18	270	692	631	410	170	1.1	21
47 58 32	093 08 49	01	72-08-22	140	552	621	480	0	.8	15
48 02 14	093 44 07	01	72-08-07	210	334	327	120	0	2.7	54
48 08 06	093 43 40	01	72-08-07	210	366	369	160	0	2.2	46
48 11 23	093 48 02	01	72-08-08	100	576	467	390	27	.5	12
48 11 56	093 47 58	01	72-08-07	100	376	379	330	0	.4	9
48 12 50	094 01 00	01	72-08-08	60	556	530	500	0	.3	6
48 12 53	093 30 04	01	72-08-22	230	708	721	550	180	.7	13
48 21 35	093 37 12	01	72-08-08	120	188	155	110	18	.3	13
48 22 49	093 31 23	01	72-08-21	1400	608	580	180	0	4.5	62
48 23 04	093 35 28	01	72-08-21	20	216	204	180	6	.1	4
48 23 56	093 33 38	01	72-08-21	160	620	679	530	36	.9	17
48 25 25	093 46 43	01	72-08-08	60	944	837	700	230	.2	3
48 26 24	093 43 22	01	72-08-08	590	584	529	69	0	9.4	84
48 26 43	093 09 23	01	72-09-19	330	1070	1040	750	210	1.0	15
48 33 27	093 25 06	01	72-09-20	260	932	887	700	180	.7	11
48 34 09	093 18 46	01	72-09-20	40	464	483	450	8	.2	5
48 38 17	094 08 24	01	72-07-07	80	132	113	24	0	3.0	71
48 41 16	094 24 23	01	72-07-07	120	752	609	510	72	.3	7
48 49 17	093 32 36	01	72-08-22	60	452	407	370	59	.3	8
LAKE COUNTY										
47 38 51	091 27 36	01	72-09-13	20	132	118	90	0	.2	10
47 56 09	091 46 12	01	72-09-12	40	430	405	320	75	.6	15
47 58 36	091 26 49	01	72-09-12	100	244	235	190	0	.3	10
47 58 39	091 32 12	01	72-09-12	80	178	160	140	11	.1	3
LAKE OF THE WOODS COUNTY										
48 29 04	093 59 34	01	72-07-07	260	308	311	170	0	1.6	37
48 30 42	093 47 54	01	72-07-07	390	464	471	140	0	4.5	65
48 32 03	094 35 40	01	72-07-10	260	538	494	300	0	1.7	33
48 35 38	094 57 42	01	72-07-11	20	254	175	150	7	.1	3
48 36 18	095 09 06	01	72-07-11	10	208	135	110	7	.1	4
48 36 18	095 09 06	02	72-07-11	30	160	162	140	6	.1	5
48 40 27	094 29 37	01	72-07-12	450	440	441	250	0	1.7	35
48 40 40	094 57 03	01	72-07-11	40	456	383	340	20	.2	6
48 40 40	094 57 03	02	72-07-11	70	442	371	320	0	.2	6
48 42 49	094 37 39	02	72-07-05	380	764	715	380	110	2.1	35
48 43 34	094 46 43	01	72-07-05	390	410	393	200	0	2.0	40
48 46 00	094 50 52	01	72-07-11	170	318	333	200	0	1.4	33
48 46 03	094 57 31	01	72-07-06	90	300	296	220	0	.8	21
48 48 02	094 41 58	01	72-07-10	130	440	391	270	0	1.0	23
48 49 18	094 57 45	01	72-07-12	50	360	341	310	9	.2	5
48 49 45	094 46 34	01	72-07-12	180	366	363	150	0	2.9	54
48 53 39	094 57 37	01	72-07-12	290	512	509	410	120	.3	7
48 58 36	094 57 33	01	72-08-17	60	496	469	440	1	.2	5
LINCOLN COUNTY										
44 15 42	096 12 06	01	72-09-15	1200	3360	3100	2000	1600	1.8	17
MC LEOD COUNTY										
44 45 38	094 09 44	01	71-12-20	220	644	601	460	0	.8	16
44 46 08	094 08 58	01	71-12-20	640	500	475	220	0	2.7	47
44 46 11	094 12 35	01	71-12-20	240	632	576	460	5	.4	8
44 51 27	094 03 52	01	71-12-16	90	414	422	380	0	.0	0
MEEKER COUNTY										
45 08 18	094 28 38	01	72-01-04	30	222	193	130	0	.1	4
45 09 48	094 27 09	01	72-01-04	470	348	314	230	0	.8	20
MILLE LACS COUNTY										
45 47 15	094 19 25	01	72-09-14	70	300	287	260	20	.2	6

LAT- I- TUDE	LONG- I- TUDE	SEQ. NO.	DATE OF SAMPLE	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS) (00095)	PH (UNITS) (00400)	TEMPER- ATURE (DEG C) (00010)	COLOR (PLAT- INUM- COBALT UNITS) (00080)
KOOCHICHING COUNTY							
47 55 12	093 56 35	01	72-08-09	1450	7.0	11.0	50
47 56 32	093 45 21	01	72-08-18	951	7.2	14.0	5
47 58 32	093 08 49	01	72-08-22	1010	7.3	11.0	20
48 02 14	093 44 07	01	72-08-07	538	7.8	7.5	3
48 08 06	093 43 40	01	72-08-07	581	7.7	9.0	3
48 11 23	093 48 02	01	72-08-08	831	7.6	8.5	10
48 11 56	093 47 58	01	72-08-07	639	7.5	11.0	5
48 12 50	094 01 00	01	72-08-08	907	7.3	10.0	10
48 12 53	093 30 04	01	72-08-22	1080	7.2	13.0	20
48 21 35	093 37 12	01	72-08-08	259	7.6	12.5	20
48 22 49	093 31 23	01	72-08-21	972	7.7	19.5	10
48 23 04	093 35 28	01	72-08-21	340	7.3	7.0	20
48 23 56	093 33 38	01	72-08-21	1180	7.2	8.5	5
48 25 25	093 46 43	01	72-08-08	1300	7.0	13.0	5
48 26 24	093 43 22	01	72-08-08	832	7.7	11.5	5
48 26 43	093 09 23	01	72-09-19	1490	7.2	10.5	10
48 33 27	093 25 06	01	72-09-20	1320	7.0	13.5	5
48 34 09	093 18 46	01	72-09-20	870	6.8	11.0	5
48 38 17	094 08 24	01	72-07-07	185	9.3	5.5	30
48 41 16	094 24 23	01	72-07-07	988	7.2	7.5	10
48 49 17	093 32 36	01	72-08-22	705	7.1	13.5	30
LAKE COUNTY							
47 38 51	091 27 36	01	72-09-13	181	8.0	7.0	5
47 56 09	091 46 12	01	72-09-12	704	7.2	7.5	0
47 58 36	091 26 49	01	72-09-12	408	7.2	8.0	20
47 58 39	091 32 12	01	72-09-12	273	7.9	12.0	5
LAKE OF THE WOODS COUNTY							
48 29 04	093 59 34	01	72-07-07	513	8.0	8.0	20
48 30 42	093 47 54	01	72-07-07	751	7.8	10.0	5
48 32 03	094 35 40	01	72-07-10	787	7.6	11.0	10
48 35 38	094 57 42	01	72-07-11	288	7.7	11.0	5
48 36 18	095 09 06	01	72-07-11	226	7.5	10.0	5
48 36 18	095 09 06	02	72-07-11	270	7.8	6.5	5
48 40 27	094 29 37	01	72-07-12	698	7.8	8.0	30
48 40 40	094 57 03	01	72-07-11	648	7.3	16.0	10
48 40 40	094 57 03	02	72-07-11	615	7.4	7.0	30
48 42 49	094 37 39	02	72-07-05	1060	7.7	7.5	10
48 43 34	094 46 43	01	72-07-05	622	7.9	7.0	5
48 46 00	094 50 52	01	72-07-11	555	7.7	18.5	5
48 46 03	094 57 31	01	72-07-06	504	7.8	9.0	20
48 48 02	094 41 58	01	72-07-10	637	7.8	10.0	30
48 49 18	094 57 45	01	72-07-12	590	7.4	12.5	30
48 49 45	094 46 34	01	72-07-12	622	7.9	9.0	10
48 53 39	094 57 37	01	72-07-12	870	7.4	11.0	5
48 58 36	094 57 33	01	72-08-17	808	7.2	12.0	5
LINCOLN COUNTY							
44 15 42	096 12 06	01	72-09-15	3560	7.5	15.0	2
MC LEOD COUNTY							
44 45 38	094 09 44	01	71-12-20	991	7.2	11.0	40
44 46 08	094 08 58	01	71-12-20	800	7.4	--	20
44 46 11	094 12 35	01	71-12-20	932	7.0	--	20
44 51 27	094 03 52	01	71-12-16	720	7.3	--	5
MEEKER COUNTY							
45 08 18	094 28 38	01	72-01-04	300	7.2	--	3
45 09 48	094 27 09	01	72-01-04	702	7.3	--	7
MILLE LACS COUNTY							
45 47 15	094 19 25	01	72-09-14	477	6.9	11.0	10

MISCELLANEOUS ANALYSES OF GROUND WATER IN MINNESOTA

LAT- I- TUDE	LONG- I- TUDE	SEQ. NO.	LOCAL IDENT- I- FIER	DATE OF SAMPLE	DIS- SOLVED SILICA (SI02) (MG/L) (00955)	DIS- SOLVED IRON (FE) (UG/L) (01046)	DIS- SOLVED MANGANESE (MNE) (UG/L) (01056)	DIS- SOLVED CAL- CIUM (CA) (MG/L) (00915)	DIS- SOLVED MAG- NE- SIUM (MG) (MG/L) (00925)	DIS- SOLVED SODIUM (NA) (MG/L) (00930)
MOWER COUNTY										
43 35 15	092 47 54	01	1021631CDD ROSE CREEK	71-10-28	19	20	0	56	16	4.8
43 48 21	092 29 05	01	1041414CCD RACINE	71-10-26	21	30	0	64	18	6.3
MURRAY COUNTY										
43 32 54	095 05 53	01	36 13D L00N LK GOLF CRS	72-08-23	27	60	0	110	32	7.8
44 01 27	095 35 00	01	107 40 36DDA AVOCA,MN	72-09-28	16	15000	320	330	120	120
44 02 19	095 51 51	01	107 42 27000 HADLEY,MN	72-09-28	30	6100	250	150	50	12
44 11 44	095 48 31	01	108 41 06ABA BALATOM,M	72-09-28	27	11000	890	220	53	35
OTTER TAIL COUNTY										
46 22 54	095 09 18	01	1343636AAB L. MCGRANE	72-07-05	12	5400	390	85	23	6.7
PIPESTONE COUNTY										
44 00 28	096 05 18	01	106 44 1144B STOCKTON,MN	72-09-27	15	13000	1500	290	96	84
44 00 35	096 05 52	01	106 44 02DCD WOODSTOCK,M	72-09-25	30	150	650	240	57	24
POPE COUNTY										
47 35 02	093 32 19	01	0592520ABD K. BONNEVILLE	72-08-10	19	500	160	47	13	7.6
47 39 50	093 25 08	01	0607420DB C. PERKINS	72-08-25	12	1500	130	15	4.6	25
47 41 37	093 46 22	01	0602709DAC ARCHIE WASS	72-08-10	20	60	10	83	25	3.4
47 44 35	093 39 16	01	0612627CCA 816 FORK NO.1	72-08-09	16	20	10	38	24	27
RENNVILLE COUNTY										
44 48 32	094 37 28	01	1163131BCD	71-12-28	26	1400	150	160	70	56
44 49 10	094 40 05	01	1163226CCD	71-12-28	29	3000	80	61	29	88
RICE COUNTY										
44 17 56	093 16 57	01	1102030CCC FAIRBAULT	71-10-06	14	620	70	85	28	7.5
44 20 27	093 03 55	01	1101914AAB OLD CREAMERY	71-10-07	12	30	40	73	22	6.1
44 28 17	093 15 09	01	11220328AA NORTHFIELD	71-10-01	23	10	60	120	42	3.6
ROCK COUNTY										
43 30 45	096 15 06	01	R.H. AUKES STEEN,MN	72-08-25	32	320	1100	520	210	150
43 32 44	096 05 37	01	10145150DD L. NATTRESS	72-09-07	6.9	5500	20	160	38	99
43 34 25	096 05 34	01	KANARANZI,MN SCHOOL DST	72-08-24	28	20	0	100	45	13
43 42 32	096 06 41	01	WM. PERSINS LUVERNE,MN	72-08-25	24	2500	180	180	92	110
43 48 07	096 20 58	01	O. HOUJ JASPER,MN	72-08-26	13	120	40	160	58	30
ROSEAU COUNTY										
48 46 49	095 19 51	01	1613607ADA EO BRANDLT	72-07-06	19	1100	470	98	38	12
48 48 53	095 18 49	01	1623629DCD FLOYD STEWART	72-07-06	24	2700	60	73	42	9.1
48 49 40	095 09 45	01	1623528ABA PETER HEPPNER	72-07-06	25	940	100	72	30	14
ST. LOUIS COUNTY										
47 30 56	092 53 02	01	05820080DA BOWSERS	72-09-11	27	560	160	1.4	.3	64
47 31 44	092 54 06	01	0582005CCD A. KLOTZBACH	72-08-25	14	70	50	20	6.3	15
47 37 16	092 30 37	01	0591704/CB JOHN AMUNDSON	72-09-08	20	30	320	24	7.4	6.5
47 38 23	092 33 01	01	0601731CAA RUDY JOHNSON	72-09-11	16	90	160	21	7.1	3.6
47 38 31	092 23 19	01	0601633BCB ART JARVE	72-09-08	14	100	58	7.1	1.6	9.1
47 39 24	092 36 01	01	06018258CD RUSS JOHNSON	72-08-24	16	250	40	7.7	2.9	3.3
47 40 37	093 01 39	01	0602117DCC SANDY MARTY	72-08-23	16	80	260	49	12	27
47 40 50	092 37 58	01	06018160BD VO-ED CAMP	72-08-24	26	8700	520	20	4.2	4.3
47 42 52	092 01 34	01	0601305BAB JIM HEIKKILA	72-09-13	18	40	10	12	4.1	6.6
47 44 10	092 41 48	01	0611925DAD M. AROLA-COOK	72-08-24	23	180	360	62	38	29
47 45 03	092 47 36	01	0611920CAD KORTES	72-08-24	21	180	270	38	9.0	13
47 46 40	093 04 58	01	06121188BB HOWARD PIXLEY	72-08-23	17	280	230	55	17	23
47 48 16	092 18 39	01	0621636DAD GEORGE WELLES	72-09-08	10	1200	67	14	3.4	5.1
47 49 50	092 32 04	01	0621729ABB OSCAR ELIASON	72-08-24	16	1100	770	58	9.1	6.1
47 50 40	092 29 58	01	06217228BA W. BYSTROM	72-08-24	16	240	410	51	13	13
47 51 34	091 49 40	01	06212140BD NUGENT	72-09-08	15	100	770	19	6.0	4.6
47 51 40	092 52 15	01	0622015AAA ANTONI KALIO	72-08-23	23	1000	1200	160	93	66
47 53 01	092 24 57	01	0621606ADA KUBURKA	72-09-13	17	1900	990	46	4.3	3.2
47 54 28	092 28 12	01	06317260BC GLEN REICHEL	72-09-13	12	20	20	73	10	56

MISCELLANEOUS ANALYSES OF GROUND WATER IN MINNESOTA

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LAT- I- TUDE	LDNG- I- TUDE	SEQ. NO.	DATE OF SAMPLE	DIS- SOLVED PO- TAS- SIUM (K) (MG/L) (00935)	BICAR- BONATE (HCO3) (MG/L) (00440)	CAR- BONATE (CD3) (MG/L) (00445)	ALKA- LINITY AS CACO3 (MG/L) (00410)	DIS- SOLVED SULFATE (SO4) (MG/L) (00945)	DIS- SOLVED CHLO- RIDE (CL) (MG/L) (00940)	DIS- SOLVED FLUO- RIDE (F) (MG/L) (00950)	DIS- SOLVED NITRITE PLUS NITRATE (N) (MG/L) (00631)	TOTAL PHOS- PHORUS (P) (MG/L) (00665)
MOWER COUNTY												
43 35 15	092 47 54	01	71-10-28	.1	208	0	171	33	7.3	.3	3.0	.08
43 48 21	092 29 05	01	71-10-26	.5	210	0	172	29	6.9	.2	12	.08
MURRAY COUNTY												
43 32 54	095 05 53	01	72-08-23	2.0	390	0	320	75	7.1	.6	3.0	--
44 01 27	095 35 00	01	72-09-28	7.8	405	0	332	1200	2.3	.4	3.6	.15
44 02 19	095 51 51	01	72-09-28	8.4	520	0	427	190	19	.4	.00	.01
44 11 44	095 48 31	01	72-09-28	6.7	418	0	343	490	1.0	.6	.02	.01
OTTER TAIL COUNTY												
46 22 54	095 09 18	01	72-07-05	52	414	0	340	16	20	.1	.22	.87
PIPESTONE COUNTY												
44 00 28	096 05 18	01	72-09-27	5.5	395	0	324	940	3.6	.7	.08	.02
44 00 35	096 05 52	01	72-09-25	4.7	401	0	329	410	53	.8	22	.02
POPE COUNTY												
47 35 02	093 32 19	01	72-08-10	3.2	240	0	197	6.1	1.5	.3	.00	.04
47 39 50	093 25 08	01	72-08-25	9.9	51	0	42	18	18	.3	3.7	.10
47 41 37	093 46 22	01	72-08-10	1.6	390	0	320	8.1	1.9	.2	.21	.01
47 44 35	093 39 16	01	72-08-09	3.8	235	0	193	8.4	2.7	.3	.00	.11
RENNVILLE COUNTY												
44 48 32	094 37 28	01	71-12-28	6.1	529	0	434	350	4.2	.5	.00	.07
44 49 10	094 40 05	01	71-12-28	3.1	550	0	451	4.8	6.2	.6	.00	.22
RICE COUNTY												
44 17 56	093 16 57	01	71-10-06	3.3	393	0	322	25	1.1	.1	.06	.06
44 20 27	093 03 55	01	71-10-07	1.8	310	0	254	30	2.5	.4	.01	.08
44 28 17	093 15 09	01	71-10-01	1.0	511	0	419	35	5.5	.3	.84	.82
ROCK COUNTY												
43 30 45	096 15 06	01	72-08-25	18	505	0	414	1800	33	.4	36	--
43 32 44	096 05 37	01	72-09-07	14	381	0	313	440	34	.6	.12	.02
43 36 25	096 05 34	01	72-08-24	3.6	464	0	381	39	32	.6	2.9	--
43 42 32	096 06 41	01	72-08-25	14	339	0	278	770	5.2	.3	.63	--
43 48 07	096 20 58	01	72-08-26	1.1	362	0	297	130	83	.4	45	--
ROSEAU COUNTY												
48 46 49	095 19 51	01	72-07-06	2.4	459	0	376	15	12	.2	1.3	.01
48 48 53	095 18 49	01	72-07-06	3.0	449	0	368	6.9	1.6	.2	.00	.10
48 49 40	095 09 45	01	72-07-06	3.3	395	0	324	7.1	1.7	.3	.00	.06
ST. LOUIS COUNTY												
47 30 56	092 53 02	01	72-09-11	2.3	119	0	98	10	38	.1	.06	.12
47 31 44	092 54 06	01	72-08-25	1.9	81	0	66	13	9.6	.2	3.8	.03
47 37 16	092 30 37	01	72-09-08	1.8	111	0	91	7.4	4.6	.5	.01	.02
47 38 23	092 33 01	01	72-09-11	4.5	96	0	79	6.6	6.7	.1	.01	.03
47 38 31	092 23 19	01	72-09-08	1.6	31	0	25	8.6	4.3	.1	1.2	.02
47 39 24	092 36 01	01	72-08-24	1.7	30	0	25	9.3	1.4	.1	.76	.02
47 40 37	093 01 39	01	72-08-23	3.7	277	0	227	8.3	1.5	.5	.07	.05
47 40 50	092 37 58	01	72-08-24	1.1	94	0	77	8.0	1.5	.3	.00	.12
47 42 52	092 01 34	01	72-09-13	.7	40	0	33	8.3	5.9	.1	2.7	.05
47 44 10	092 41 48	01	72-08-24	2.8	421	0	345	8.9	14	.4	.69	.03
47 45 03	092 47 36	01	72-08-24	2.4	181	0	148	9.3	3.1	.3	.02	.07
47 46 40	093 04 58	01	72-08-23	3.4	275	0	226	40	1.8	.4	.02	.21
47 48 16	092 18 39	01	72-09-08	7.7	40	0	33	9.3	15	.4	.29	.03
47 49 50	092 32 04	01	72-08-24	2.3	224	0	184	14	.6	.2	.02	.03
47 50 40	092 29 58	01	72-08-24	2.7	244	0	200	14	1.9	.3	.00	.05
47 51 34	091 49 40	01	72-09-08	.9	71	0	58	11	7.0	.2	2.9	.02
47 51 40	092 52 15	01	72-08-23	7.6	934	0	766	22	70	.4	.01	.03
47 53 01	092 24 57	01	72-09-13	3.4	172	0	141	8.2	4.2	.2	.02	.03
47 54 28	092 28 12	01	72-09-13	2.8	125	0	103	67	120	.6	.09	.02

MISCELLANEOUS ANALYSES OF GROUND WATER IN MINNESOTA

LAT- I- TUDE	LONG- I- TUDE	SEQ. NO.	DATE OF SAMPLE	DIS- SOLVED BORON (B) (UG/L) (01020)	DIS- SOLVED SOLIDS (RESI- DUE AT 180 C) (MG/L) (70300)	DIS- SOLVED SOLIDS (SUM OF CONSTITU- ENTS) (MG/L) (70301)	HARD- NESS (CA+MG) (MG/L) (00900)	NON- CAR- BONATE HARD- NESS (MG/L) (00902)	SODIUM AD- SORP- TION RATIO (00931)	PERCENT SODIUM (00932)
MOWER COUNTY										
43 35 15	092 47 54	01	71-10-28	10	246	252	210	35	.1	5
43 48 21	092 29 05	01	71-10-26	20	300	302	230	62	.2	6
MURRAY COUNTY										
43 32 54	095 05 53	01	72-08-23	80	492	467	410	86	.2	4
44 01 27	095 35 00	01	72-09-28	810	2120	2030	1300	990	1.4	16
44 02 19	095 51 51	01	72-09-28	210	768	722	580	150	.2	4
44 11 44	095 48 31	01	72-09-28	220	1060	1050	770	420	.6	9
OTTER TAIL COUNTY										
46 22 54	095 09 18	01	72-07-05	80	452	425	310	0	.2	4
PIPESTONE COUNTY										
44 00 28	096 05 18	01	72-09-27	370	1820	1640	1100	790	1.1	14
44 00 35	096 05 52	01	72-09-25	130	1220	1120	830	500	.4	6
POPE COUNTY										
47 35 02	093 32 19	01	72-08-10	40	250	216	170	0	.3	9
47 39 50	093 25 08	01	72-08-25	100	196	146	56	15	1.4	44
47 41 37	093 46 22	01	72-08-10	30	380	336	310	0	.1	2
47 44 35	093 39 16	01	72-08-09	90	270	236	190	1	.8	23
RENVILLE COUNTY										
44 48 32	094 37 28	01	71-12-28	330	932	935	690	250	.9	15
44 49 10	094 40 05	01	71-12-28	300	472	496	270	0	2.3	41
RICE COUNTY										
44 17 56	093 16 57	01	71-10-06	70	378	358	330	5	.2	5
44 20 27	093 03 55	01	71-10-07	60	254	300	270	19	.2	5
44 28 17	093 15 09	01	71-10-01	30	520	486	470	53	.1	2
ROCK COUNTY										
43 30 45	096 15 06	01	72-08-25	630	3340	3170	2200	1700	1.4	13
43 32 44	096 05 37	01	72-09-07	350	968	986	560	240	1.8	27
43 34 25	096 05 34	01	72-08-24	40	556	502	430	54	.3	6
43 42 32	096 06 41	01	72-08-25	1500	1500	1370	830	550	1.7	22
43 48 07	096 20 58	01	72-08-26	20	948	853	640	340	.5	9
ROSEAU COUNTY										
48 46 49	095 19 51	01	72-07-06	40	446	430	400	25	.3	6
48 48 53	095 18 49	01	72-07-06	30	372	383	350	0	.2	5
48 49 40	095 09 45	01	72-07-06	80	352	349	300	0	.4	9
ST. LOUIS COUNTY										
47 30 56	092 53 02	01	72-09-11	120	232	203	5	0	13	95
47 31 44	092 56 06	01	72-08-25	70	190	137	76	9	.8	29
47 37 16	092 30 37	01	72-09-08	20	138	127	90	0	.3	13
47 38 23	092 33 01	01	72-09-11	0	126	113	82	3	.2	8
47 38 31	092 23 19	01	72-09-08	40	69	67	24	0	.8	43
47 39 24	092 36 01	01	72-08-24	10	81	61	31	7	.3	18
47 40 37	093 01 39	01	72-08-23	80	280	255	170	0	.9	25
47 40 50	092 37 58	01	72-08-24	40	144	121	67	0	.2	12
47 42 52	092 01 34	01	72-09-13	20	114	87	47	14	.4	23
47 44 10	092 41 48	01	72-08-24	60	420	389	310	0	.7	17
47 45 03	092 47 36	01	72-08-24	60	220	185	130	0	.5	17
47 46 40	093 04 58	01	72-08-23	60	322	293	210	0	.7	19
47 48 16	092 18 39	01	72-09-08	160	137	87	49	16	.3	16
47 49 50	092 32 04	01	72-08-24	60	254	218	180	0	.2	7
47 50 40	092 29 58	01	72-08-24	50	268	233	180	0	.4	13
47 51 34	091 49 40	01	72-09-08	30	120	112	72	14	.2	12
47 51 40	092 52 15	01	72-08-23	360	776	904	780	16	1.0	15
47 53 01	092 24 57	01	72-09-13	20	212	174	130	0	.1	5
47 54 28	092 28 12	01	72-09-13	180	456	403	220	120	1.6	35

LAT- I- TUDE	LONG- I- TUDE	SEQ. NO.	DATE OF SAMPLE	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS) (00095)	PH (UNITS) (00400)	TEMPER- ATURE (DEG C) (00010)	COLOR (PLAT- INUM- COBALT UNITS) (00000)
MOWER COUNTY							
43 35 15	092 47 54	01	71-10-28	414	7.0	9.0	0
43 48 21	092 29 05	01	71-10-26	469	7.5	8.0	0
MURRAY COUNTY							
43 32 54	095 05 53	01	72-08-23	735	7.3	18.0	0
44 01 27	095 35 00	01	72-09-28	2410	7.1	14.0	20
44 02 19	095 51 51	01	72-09-28	1111	7.0	14.0	40
44 11 44	095 48 31	01	72-09-28	1420	7.1	9.5	10
OTTER TAIL COUNTY							
46 22 54	095 09 18	01	72-07-05	734	7.2	14.0	100
PIPESTONE COUNTY							
44 00 28	096 05 18	01	72-09-27	2030	7.1	12.0	40
44 00 35	096 05 52	01	72-09-25	1570	7.1	13.0	0
POPE COUNTY							
47 35 02	093 32 19	01	72-08-10	359	7.7	9.5	20
47 39 50	093 25 08	01	72-08-25	210	5.7	10.0	100
47 41 37	093 46 22	01	72-08-10	584	7.3	11.0	10
47 44 35	093 39 16	01	72-08-09	359	8.2	13.0	10
RENNVILLE COUNTY							
44 48 32	094 37 28	01	71-12-28	1300	7.4	--	7
44 49 10	094 40 05	01	71-12-28	798	7.5	--	50
RICE COUNTY							
44 17 56	093 16 57	01	71-10-06	626	7.0	10.0	5
44 20 27	093 03 55	01	71-10-07	518	7.3	9.0	5
44 28 17	093 15 09	01	71-10-01	805	7.0	9.0	5
ROCK COUNTY							
43 30 45	096 15 06	01	72-08-25	3580	7.0	11.0	3
43 32 44	096 05 37	01	72-09-07	1380	7.1	13.0	20
43 34 25	096 05 34	01	72-08-24	843	7.3	11.0	0
43 42 32	096 06 41	01	72-08-25	1810	7.3	11.0	2
43 48 07	096 20 58	01	72-08-26	1360	7.1	11.0	0
ROSEAU COUNTY							
48 46 49	095 19 51	01	72-07-06	747	7.3	6.0	40
48 48 53	095 18 49	01	72-07-06	654	7.5	10.0	20
48 49 40	095 09 45	01	72-07-06	590	7.5	8.5	30
ST. LOUIS COUNTY							
47 30 56	092 53 02	01	72-09-11	283	6.2	13.0	300
47 31 44	092 54 06	01	72-08-25	229	5.7	12.5	5
47 37 16	092 30 37	01	72-09-08	201	7.1	7.0	0
47 38 23	092 33 01	01	72-09-11	178	7.7	7.5	2
47 38 31	092 23 19	01	72-09-08	92	6.1	15.0	5
47 39 24	092 36 01	01	72-08-24	83	6.0	15.0	0
47 40 37	093 01 39	01	72-08-23	432	7.6	18.0	10
47 40 50	092 37 58	01	72-08-24	158	6.3	12.0	400
47 42 52	092 01 34	01	72-09-13	128	6.2	11.5	0
47 44 10	092 41 48	01	72-08-24	684	7.0	12.0	10
47 45 03	092 47 36	01	72-08-24	301	7.3	7.0	5
47 46 40	093 04 58	01	72-08-23	486	7.8	11.0	5
47 48 16	092 18 39	01	72-09-08	82	6.5	8.0	300
47 49 50	092 32 04	01	72-08-24	368	7.0	6.0	20
47 50 40	092 29 58	01	72-08-24	402	7.6	7.5	5
47 51 34	091 49 40	01	72-09-08	188	6.1	10.0	0
47 51 40	092 52 15	01	72-08-23	1510	7.3	15.5	5
47 53 01	092 24 57	01	72-09-13	282	7.1	14.0	50
47 54 28	092 28 12	01	72-09-13	740	7.5	13.5	0

MISCELLANEOUS ANALYSES OF GROUND WATER IN MINNESOTA

LAT- I- TUOE	LONG- I- TUOE	SEQ. NO.	LOCAL IDENT- I- FIER	DATE OF SAMPLE	DIS- SOLVED SILICA (5102) (MG/L) (00955)	DIS- SOLVED IRON (FE) (MG/L) (01046)	DIS- SOLVED MAN- GANESE (Mn) (UG/L) (01056)	DIS- SOLVED CAL- CIUM (CA) (MG/L) (00915)	DIS- SOLVED MAG- NE- SIUM (MG) (MG/L) (00925)	DIS- SOLVED SODIUM (NA) (MG/L) (00930)
ST. LOUIS COUNTY										
47 55 01	091 57 42	01	0631326BAB PARK	72-09-13	15	50	0	11	2.4	2.9
47 55 03	092 56 30	01	0632030ACD JACK GOOD	72-08-23	20	5000	1300	170	66	70
47 55 25	091 52 42	01	0631221CAB DON BOWEN	72-09-07	22	790	180	22	12	4.2
47 55 52	091 56 12	01	0631324BA BURNSTIDE LK	72-09-07	1.7	90	0	4.3	1.1	1.4
47 57 57	093 00 26	01	0632110ABA DAN PERSICH	72-08-23	20	2000	870	90	36	31
48 04 07	092 49 45	01	06519310CA CITY OF DRR.	72-09-19	18	50	40	41	18	12
48 05 10	092 29 10	01	06517268CC VEXNOU TUFTE	72-09-18	7.6	10000	310	8.3	2.3	3.0
48 06 01	092 50 27	01	06520240AB BILL JOHNSON	72-09-19	15	60	80	51	23	100
48 06 50	093 04 30	01	0652117CCB JAMES PORTER	72-08-22	19	90	280	86	40	64
48 06 50	093 04 30	02		72-08-22	21	60	17	74	35	7.5
48 07 36	092 31 21	01	06517090AB G. MCCORMICK	72-09-18	21	11000	350	55	25	12
48 13 33	092 55 22	01	0662008AAA H. KRAMBECA	72-09-19	23	9700	190	17	5.5	5.1
STEARNS COUNTY										
45 27 11	095 00 10	01	123 34 19CBD	72-01-05	28	1300	33	66	21	17
STEELE COUNTY										
43 57 43	093 16 31	01	1062030ABC HOPE CREAMERY	71-10-06	19	1100	90	90	26	13
44 01 35	093 11 07	01	10720350AD OWATONNA	71-10-08	25	3100	160	83	27	5.4
44 04 50	093 13 55	01	1072016ABA OWATONNA	71-10-06	9.8	120	50	65	20	4.8
44 07 47	093 18 25	01	10821260AD LAREN HOFFMAN	71-10-05	32	5400	540	140	39	58
WADENA COUNTY										
46 22 55	094 49 56	01	1343334BAA G. BERG	72-07-05	25	780	120	53	17	5.6
46 24 20	094 49 00	01	1343323BCC H. VOGEL	72-07-05	18	30	50	120	32	5.0
46 24 26	095 00 48	01	1343419ABD B. FISHER	72-07-05	17	80	150	86	25	13
46 26 16	094 55 01	01	1343412BAD R. SOMMARS	72-07-05	15	2100	360	81	22	3.3
46 28 23	095 04 18	01	13535270AD 4 MI N WADENA	72-07-05	19	1700	550	83	20	5.2
WINONA COUNTY										
44 05 36	091 44 55	01	1070802DCC MINNESOTA CTY	71-10-28	21	20	0	100	35	10
44 08 33	091 50 33	01	10809240AB MINNESOTA CTY	71-10-27	17	160	10	65	29	2.8
WRIGHT COUNTY										
45 07 12	093 49 40	01	119 25 16ADA	71-12-09	27	1300	130	43	39	13
45 13 26	093 39 16	01	120 24 12BAD E. ZACHMAN	71-12-17	14	7000	660	85	26	6.1
45 14 27	094 07 34	01	12127310BC	71-12-23	25	1800	380	84	30	7.7

LAT- I- TUOE	LONG- I- TUOE	SEQ. NO.	LOCAL IDENT- I- FIER	DATE OF SAMPLE	DIS- SOLVED CAD- MIUM (CO) (UG/L) (01025)	HEXA- VALENT CHRO- MIUM (CP6) (UG/L) (01032)	DIS- SOLVED COBALT (CO) (UG/L) (01035)	DIS- SOLVED COPPER (CU) (UG/L) (01040)	DIS- SOLVED LEAD (PB) (UG/L) (01049)	DIS- SOLVED NICKEL (NI) (UG/L) (01065)
ISANTI COUNTY										
45 34 10	093 14 00	00	036 23 32ACB CAMBRIDGE 4	72-07-25	0	0	0	2	6	1
PINE COUNTY										
46 11 25	092 46 46	01	043 19 20CAA1 ASKOV 1	72-07-25	2	0	3	100	22	22
RAMSEY COUNTY										
44 57 51	093 07 28	01	029 23 25000 BN PR	72-07-24	0	0	0	3	2	3
WASHINGTON COUNTY										
45 01 53	092 46 38	01	029 20 028CA NSP CO.	72-07-26	0	0	0	5	4	2
WRIGHT COUNTY										
45 03 18	094 04 06	02	118 27 03ACC2 HOWARD LK2	72-07-24	0	0	1	1	3	2

MISCELLANEOUS ANALYSES OF GROUND WATER IN MINNESOTA

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LAT- I- TUDE	LONG- I- TUDE	SEQ. NO.	DATE OF SAMPLE	DIS- SOLVED PO- TAS- SIUM (K) (MG/L) (00935)	BICAR- BONATE (HCO3) (MG/L) (00440)	CAR- BONATE (CO3) (MG/L) (00445)	ALKA- LINITY AS CACO3 (MG/L) (00410)	DIS- SOLVED SULFATE (SO4) (MG/L) (00945)	DIS- SOLVED CHLO- RIDE (CL) (MG/L) (00940)	DIS- SOLVED FLUO- RIDE (F) (MG/L) (00950)	DIS- SOLVED NITRITE PLUS NITRATE (N) (MG/L) (00631)	TOTAL PHOS- PHORUS (P) (MG/L) (00665)
ST. LOUIS COUNTY												
47 55 01	091 57 42	01	72-09-13	5.7	45	0	37	8.2	5.2	.1	.08	.02
47 55 03	092 56 30	01	72-08-23	6.9	551	0	452	380	2.5	.3	.01	.05
47 55 25	091 52 42	01	72-09-07	22	120	0	98	8.2	30	.2	.04	.05
47 55 52	091 56 12	01	72-09-07	22	11	0	9	5.5	24	.2	.02	.02
47 57 57	093 00 26	01	72-08-23	6.5	510	0	418	32	1.5	.6	.06	.06
48 04 07	092 49 45	01	72-09-19	5.8	182	0	149	13	29	.3	.51	.03
48 05 10	092 29 10	01	72-09-18	1.7	32	0	26	10	2.4	.1	.00	.07
48 06 01	092 50 27	01	72-09-19	3.4	150	0	123	140	130	.5	.03	.02
48 06 50	093 04 30	01	72-08-22	3.5	532	0	436	17	48	.3	.00	.02
48 06 50	093 04 30	02	72-08-22	.8	394	0	323	7.6	5.8	.3	1.9	.04
48 07 36	092 31 21	01	72-09-18	6.5	249	0	204	48	18	.3	.00	.06
48 13 33	092 55 22	01	72-09-19	3.5	86	0	70	10	1.5	.1	.00	.02
STEARNS COUNTY												
45 27 11	095 00 10	01	72-01-05	2.2	369	0	303	2.9	1.1	.4	.02	.09
STEELE COUNTY												
43 57 43	093 16 31	01	71-10-06	2.0	426	0	349	18	.3	.1	.13	.06
44 01 35	093 11 07	01	71-10-08	1.5	388	0	318	9.8	1.4	.4	.00	.13
44 04 50	093 13 55	01	71-10-06	2.2	274	0	225	28	1.1	.1	2.6	.05
44 07 47	093 18 25	01	71-10-05	7.5	616	0	505	160	2.7	.1	.04	.06
WADENA COUNTY												
46 22 55	094 49 56	01	72-07-05	1.6	268	0	220	7.7	2.0	.1	.47	.11
46 24 20	094 49 00	01	72-07-05	1.8	358	0	294	20	28	.1	26	.10
46 24 26	095 00 48	01	72-07-05	3.1	265	0	217	37	26	.1	15	.05
46 26 16	094 55 01	01	72-07-05	1.5	253	0	208	16	17	.1	13	.06
46 28 23	095 04 18	01	72-07-05	1.3	354	0	290	7.1	1.8	.2	.53	.07
WINONA COUNTY												
44 05 36	091 44 55	01	71-10-28	1.4	377	0	309	33	12	.1	16	.07
44 08 33	091 50 33	01	71-10-27	.3	313	0	257	25	.4	.2	.10	.05
WRIGHT COUNTY												
45 07 12	093 49 40	01	71-12-09	3.9	388	0	318	1.0	1.1	.3	.01	.26
45 13 26	093 39 16	01	71-12-17	2.8	373	0	306	25	1.6	.2	.04	.11
45 14 27	094 07 34	01	71-12-23	2.4	413	0	339	3.8	1.2	.3	.05	.06

LAT- I- TUDE	LONG- I- TUDE	SEQ. NO.	DATE OF SAMPLE	DIS- SOLVED STRON- TIUM (SR) (UG/L) (01080)	DIS- SOLVED VANA- DIUM (V) (UG/L) (01085)	DIS- SOLVED ZINC (ZN) (UG/L) (01090)	DIS- SOLVED LITHIUM (LI) (UG/L) (01130)	DIS- SOLVED SFLF- NIUM (SF) (UG/L) (01145)	TEMPER- ATURE (DFG C) (00010)
ISANTI COUNTY									
45 34 10	093 14 00	00	72-07-25	50	1.0	40	0	0	9.0
PINE COUNTY									
46 11 25	092 46 46	01	72-07-25	20	37	30	0	0	--
RAMSEY COUNTY									
44 57 51	093 07 28	01	72-07-24	90	.0	30	20	0	12.0
WASHINGTON COUNTY									
45 01 53	092 46 38	01	72-07-26	50	.1	10	10	0	--
WRIGHT COUNTY									
45 03 14	094 04 06	02	72-07-24	330	.6	10	10	0	10.0

MISCELLANEOUS ANALYSES OF GROUND WATER IN MINNESOTA

LAT- I- TUDE	LONG- I- TUDE	SEQ. NO.	DATE OF SAMPLE	DIS- SOLVED BORON (B) (UG/L) (01020)	DIS- SOLVED SOLIDS (RESI- DUE AT 180 C) (MG/L) (70300)	DIS- SOLVED SOLIDS (SUM OF CDNSTI- TUENTS) (MG/L) (70301)	HARD- NESS (CA, MG) (MG/L) (00900)	NON- CAR- BONATE HARD- NESS (MG/L) (00902)	SODIUM AD- SORP- TION RATIO (00931)	PERCENT SODIUM (00932)
ST. LOUIS COUNTY										
47 55 01	091 57 42	01	72-09-13	10	82	73	37	0	.2	12
47 55 03	092 56 30	01	72-08-23	210	1050	993	700	240	1.2	18
47 55 25	091 52 42	01	72-09-07	40	186	181	100	6	.2	6
47 55 52	091 56 12	01	72-09-07	20	72	66	15	6	.2	7
47 57 57	093 00 26	01	72-08-23	100	496	472	370	0	.7	15
48 04 07	092 49 45	01	72-09-19	40	238	229	180	27	.4	12
48 05 10	092 29 10	01	72-09-18	50	75	62	30	4	.2	17
48 06 01	092 50 27	01	72-09-19	330	572	537	220	99	2.9	49
48 06 50	093 04 30	01	72-08-22	290	596	540	380	0	1.4	27
48 06 50	093 04 30	02	72-08-22	60	384	354	330	6	.2	5
48 07 36	092 31 21	01	72-09-18	30	384	320	240	36	.3	10
48 13 33	092 55 22	01	72-09-19	20	120	118	65	0	.3	14
STEARNS COUNTY										
45 27 11	095 00 10	01	72-01-05	110	324	322	250	0	.5	13
STEELE COUNTY										
43 57 43	093 16 31	01	71-10-06	100	400	380	330	0	.3	8
44 01 35	093 11 07	01	71-10-08	40	298	348	320	0	.1	4
44 04 50	093 13 55	01	71-10-06	50	280	277	240	20	.1	4
44 07 47	093 18 25	01	71-10-05	460	744	749	510	5	1.1	20
WADENA COUNTY										
46 22 55	094 49 56	01	72-07-05	20	260	247	200	0	.2	6
46 24 20	094 49 00	01	72-07-05	30	528	516	430	140	.1	2
46 24 26	095 00 48	01	72-07-05	130	402	404	320	100	.3	8
46 26 16	094 55 01	01	72-07-05	30	362	340	290	85	.1	2
46 28 23	095 04 18	01	72-07-05	60	340	316	290	0	.1	4
WINONA COUNTY										
44 05 36	091 44 55	01	71-10-28	30	468	469	390	85	.2	5
44 08 33	091 50 33	01	71-10-27	10	286	294	280	25	.1	2
WRIGHT COUNTY										
45 07 12	093 49 40	01	71-12-09	120	316	321	270	0	.3	9
45 13 26	093 39 16	01	71-12-17	30	364	352	320	13	.1	4
45 14 27	094 07 34	01	71-12-23	0	354	360	330	0	.2	5

LAT- I- TUDE	LONG- I- TUDE	SEQ. NO.	LOCAL IDENT- I- FIER	DATE OF SAMPLE	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS) (00095)	TEMPER- ATURE (DEG C) (00010)	PH (UNITS) (00400)	DIS- SOLVED SOLIDS (RESI- DUE AT 180 C) (MG/L) (70300)	TOTAL NITRO- GEN (MG/L) (00600)	ORGANIC NITRO- GEN (MG/L) (00605)
BECKER COUNTY										
46 45 31	095 53 50	01	LAKE SALLIE WELL HA	72-03-14	492	5.5	7.6	290	1.3	.36

LAT- I- TUDE	LONG- I- TUDE	SEQ. NO.	DATE OF SAMPLE	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS) (00095)	PH (UNITS) (00400)	TEMPER- ATURE (DEG C) (00010)	COLOR (PLAT- INUM- COBALT UNITS) (00080)
ST. LOUIS COUNTY							
47 55 01	091 57 42	01	72-09-13	92	6.2	13.0	2
47 55 03	092 56 30	01	72-08-23	1420	7.3	9.0	5
47 55 25	091 52 42	01	72-09-07	215	6.0	16.0	30
47 55 52	091 56 12	01	72-09-07	32	6.1	12.0	10
47 57 57	093 00 26	01	72-08-23	795	7.6	7.5	5
48 04 07	092 49 45	01	72-09-19	401	6.4	8.0	0
48 05 10	092 29 10	01	72-09-18	58	5.4	10.0	200
48 06 01	092 50 27	01	72-09-19	952	7.8	13.0	0
48 06 50	093 04 30	01	72-08-22	956	7.2	15.0	10
48 06 50	093 04 30	02	72-08-22	621	7.3	12.0	10
48 07 36	092 31 21	01	72-09-18	520	6.4	9.0	5
48 13 33	092 55 22	01	72-09-19	151	6.3	10.0	200
STEARNS COUNTY							
45 27 11	095 00 10	01	72-01-05	543	7.4	--	20
STEELE COUNTY							
43 57 43	093 16 31	01	71-10-06	654	7.1	9.0	--
44 01 35	093 11 07	01	71-10-08	579	7.1	9.0	30
44 04 50	093 13 55	01	71-10-06	472	7.2	10.0	5
44 07 47	093 18 25	01	71-10-05	1140	7.0	10.0	5
WADENA COUNTY							
46 22 55	094 49 56	01	72-07-05	414	7.7	9.0	20
46 24 20	094 49 00	01	72-07-05	860	7.2	14.5	5
46 24 26	095 00 48	01	72-07-05	676	7.6	9.0	5
46 26 16	094 55 01	01	72-07-05	572	7.4	11.0	70
46 28 23	095 04 18	01	72-07-05	540	7.1	11.0	50
WINONA COUNTY							
44 05 36	091 44 55	01	71-10-28	764	7.2	12.0	0
44 08 33	091 50 33	01	71-10-27	502	7.7	10.0	0
WRIGHT COUNTY							
45 07 12	093 49 40	01	71-12-09	544	7.5	9.0	5
45 13 26	093 39 16	01	71-12-17	602	7.4	6.5	5
45 14 27	094 07 34	01	71-12-23	605	7.2	--	5

LAT-I-TUDE	LONG-I-TUDE	SFO. NO.	DATE OF SAMPLE	DIS-SOLVED AMMONIA NITRO-GEN (N) (MG/L) (00608)	AMMONIA NITRO-GEN (N) (MG/L) (00610)	DIS-SOLVED NITRITE (N) (MG/L) (00613)	DIS-SOLVED NITRATE (N) (MG/L) (00618)	TOTAL KJEL-DAHL NITRO-GEN (N) (MG/L) (00625)	DIS-SOLVED NITRITE PLUS NITRATE (N) (MG/L) (00631)	DIS-SOLVED ORTHO PHOS-PHATE (P04) (MG/L) (00660)
BECKER COUNTY										
46 45 31	095 53 50	01	72-03-14	.94	.94	.00	.01	1.3	.01	.09
LAT-I-TUDE	LONG-I-TUDE	SFO. NO.	DATE OF SAMPLE	DIS-SOLVED PHOS-PHORUS (P) (MG/L) (00664)		DIS-SOLVED PHOS-PHORUS (P) (MG/L) (00671)				
BECKER COUNTY										
46 45 31	095 53 50	.01	72-03-14	.12		.03				

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the 1990s, the number of people in the UK who are employed in the public sector has increased by 1.5 million, from 2.5 million in 1980 to 4 million in 1995. The public sector has become a major employer in the UK, and its growth has been a major factor in the overall growth of the economy.

The public sector has also become a major provider of social services, and its growth has been a major factor in the overall growth of the economy. The public sector has become a major provider of social services, and its growth has been a major factor in the overall growth of the economy.

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