

1973

# 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 1973

1972

## OCTOBER

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
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## NOVEMBER

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## DECEMBER

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31						

1973

## JANUARY

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## FEBRUARY

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## MARCH

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## APRIL

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## MAY

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## JUNE

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## JULY

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## AUGUST

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## SEPTEMBER

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16	17	18	19	20	21	22
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30						

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Prepared in cooperation with

Minnesota Department of Natural Resources  
Through the Division of Waters, Soils  
and Minerals

Buffalo Creek Watershed District  
Nine Mile Creek Watershed District  
City of Apple Valley  
City of Egan  
City of Austin  
City of Rochester  
Morrison County Soil Conservation District  
Erie Mining Company  
Eveleth Taconite Company  
Hanna Mining Company  
United States Steel Corporation

Minnesota Department of Highways  
Metropolitan Sewer Board  
Pelican River Watershed District  
Corps of Engineers, U.S. Army  
U.S. Department of State  
U.S. Environmental Protection Agency

Copies of this report may be obtained from  
District Chief, Water Resources Division  
U.S. Geological Survey  
1033 Post Office Building  
St. Paul, Minnesota 55101

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# WATER RESOURCES DATA FOR MINNESOTA, 1973

Part 1. Surface-Water Records

Part 2. Water-Quality Records

## INTRODUCTION

Water resources data for the 1973 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 18 and 22.

## 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, R. G. Lappegaard, commissioner.

Metropolitan Sewer Board of the Twin Cities Area, Milton C. Hansey, chairman.

Pelican River Watershed District, Dr. T. A. Rogstad, chairman.

Assistance in the form of funds or services was given by the Corps of Engineers, U.S. Army, in collecting records for 38 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 below. See also table for converting English units to International System of units (SI) on page 26.

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.

Bed material is the shifting portion of fragmented material of which the streambed is composed.

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 computed.

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 ( $\text{CaCO}_3$ ).

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 ( $\mu\text{g/l}$ ,  $\text{UG/L}$ ) 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 6. 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 6.

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).

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 ( $\text{Al}^{+3}$ )*...	0.11119	Iodide ( $\text{I}^{-1}$ )*.....	0.00788
Ammonia as $\text{NH}_4^{+1}$ ...	.05544	Iron ( $\text{Fe}^{+3}$ )*.....	.05372
Barium ( $\text{Ba}^{+2}$ )*.....	.01456	Lead ( $\text{Pb}^{+2}$ )*.....	.00965
Bicarbonate ( $\text{HCO}_3^{-1}$ )	.01639	Lithium ( $\text{Li}^{+1}$ )*....	.14411
Bromide ( $\text{Br}^{-1}$ )*.....	.01251	Magnesium ( $\text{Mg}^{+2}$ )*..	.08226
Calcium ( $\text{Ca}^{+2}$ )*.....	.04990	Manganese ( $\text{Mn}^{+2}$ )*..	.03640
Carbonate ( $\text{CO}_3^{-2}$ )*...	.03333	Nickel ( $\text{Ni}^{+2}$ )*.....	.03406
Chloride ( $\text{Cl}^{-1}$ )*.....	.02821	Nitrate ( $\text{NO}_3^{-1}$ )*...	.01613
Chromium ( $\text{Cr}^{+6}$ )*.....	.11539	Nitrite ( $\text{NO}_2^{-1}$ )*...	.02174
Cobalt ( $\text{Co}^{+2}$ )*.....	.03394	Phosphate ( $\text{PO}_4^{-3}$ )*..	.03159
Copper ( $\text{Cu}^{+2}$ )*.....	.03148	Potassium ( $\text{K}^{+1}$ )*...	.02557
Cyanide ( $\text{CN}^{-1}$ )*.....	.03844	Sodium ( $\text{Na}^{+1}$ )*.....	.04350
Fluoride ( $\text{F}^{-1}$ )*.....	.05264	Strontium ( $\text{Sr}^{+2}$ )*..	.02283
Hydrogen ( $\text{H}^{+1}$ )*.....	.99209	Sulfate ( $\text{SO}_4^{-2}$ )*...	.02082
Hydroxide ( $\text{OH}^{-1}$ )*...	.05880	Zinc ( $\text{Zn}^{+2}$ )*.....	.03060

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

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

Range of concentration in 1000 mg/l	Di- vide by	Range of concentration in 1000 mg/l	Di- vide by	Range of concentration in 1000 mg/l	Di- vide by	Range of concentration 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.

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. See also table for converting English Units to International Units on p

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

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

#### SPECIAL NETWORKS AND PROGRAMS

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

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

Radioisotopes are isotope forms of an element that exhibit radioactivity. Isotopes are varieties of a chemical element that differ in atomic weight, but are very nearly alike in chemical properties. The difference arises because the atoms of the isotopic forms of an element differ in the number of neutrons in the nucleus. For example: Ordinary chlorine is a mixture of isotopes having atomic weights 35 and 37, with the natural mixture having atomic weight about 35.453. Many of the elements similarly exist as mixtures of isotopes, and a great many new isotopes have been produced in the operation of nuclear devices such as the cyclotron (Rose, 1966). There are 275 isotopes of the 81 stable elements in addition to over 800 radioactive isotopes.

Radioisotopes that are determined in this program are those of uranium in micrograms per liter, radium as radium-226 in picocuries per liter, gross beta radiation as strontium/yttrium-90 in picocuries per liter, and gross alpha radiation as micrograms of uranium equivalent per liter.

A picocurie (PC/L, pCi/l) is one millionth of the amount of radioactivity represented by a microcurie, which is the quantity of radiation represented by one millionth of a gram of radium-226. A picocurie of radium results in 2.22 disintegration per minute.

#### 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 has 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 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 series of 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.

Downstream order station numbers are not assigned to sites where only random water-quality samples are taken. These sites are classified as water-quality miscellaneous sites and as a means of location and identification a 15-digit number consisting of the latitude and longitude coordinates to the nearest second for each site plus a 2-digit sequential number are assigned. For example, the station number for a water-quality miscellaneous site with lat 42°28'47", long 071°41'04" would be 422847071410401.

#### WELL NUMBER

The well numbering system of the U.S. Geological Survey is based on the grid system of latitude and longitude. The well number consists of 15 digits. The first 6 digits denote the degrees, minutes, and seconds of latitude, the next 7 digits denote 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. In the event that the latitude-longitude coordinates for a surface-water miscellaneous sampling site and a well site are the same, assign sequential numbers "01," "02," etc. within the same sequence.

#### PART 1. 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 1973 water year was generally near normal. Streamflow was generally greater than normal throughout the State October through March. Streamflow in April was normal and remained pretty much normal through June with below normal flows occurring in July and August and returning to normal in September.

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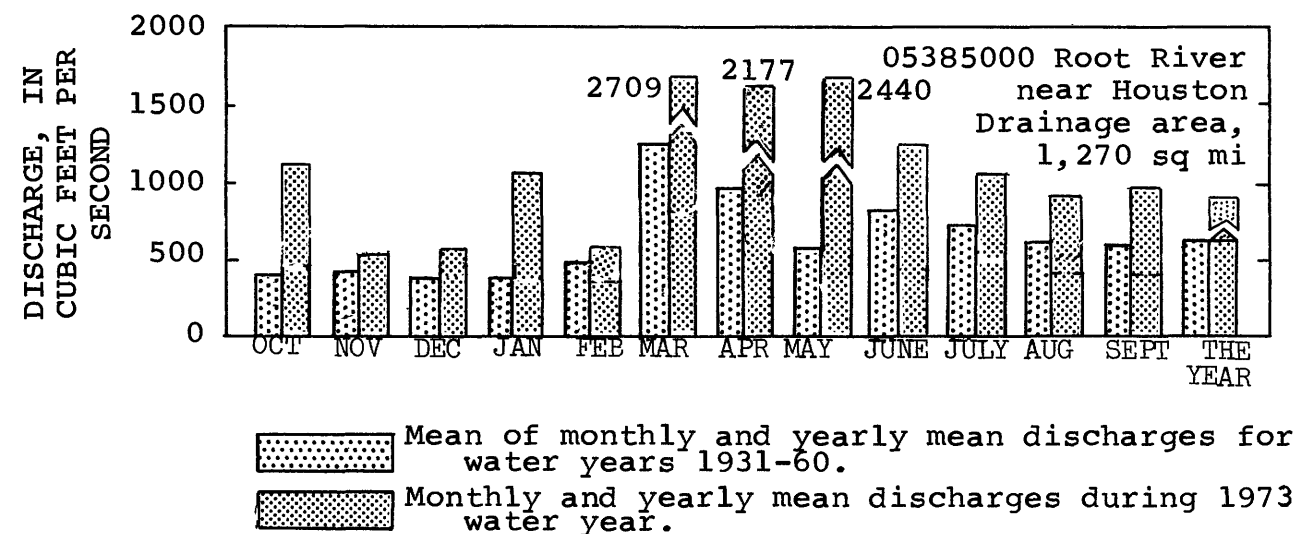
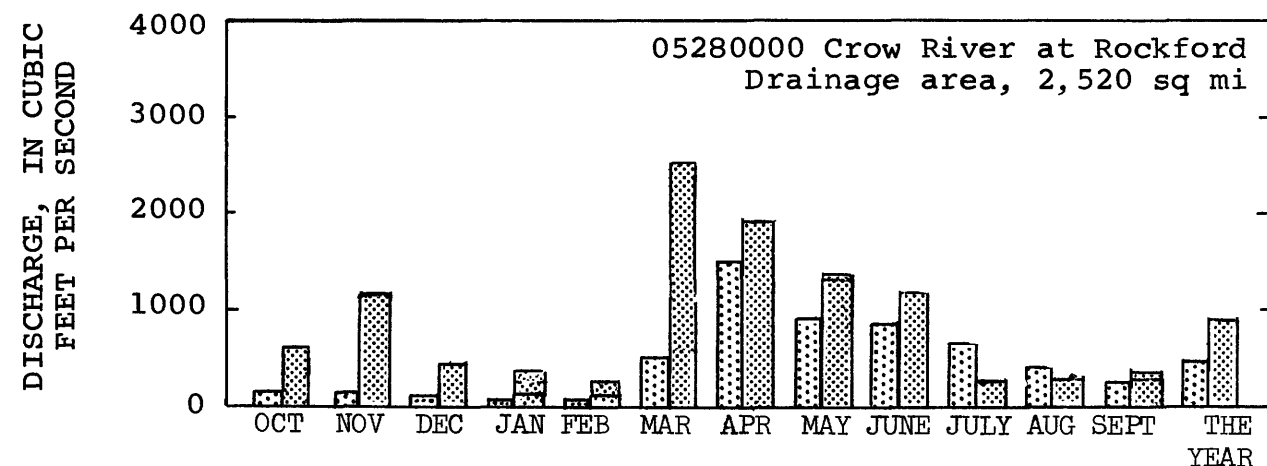
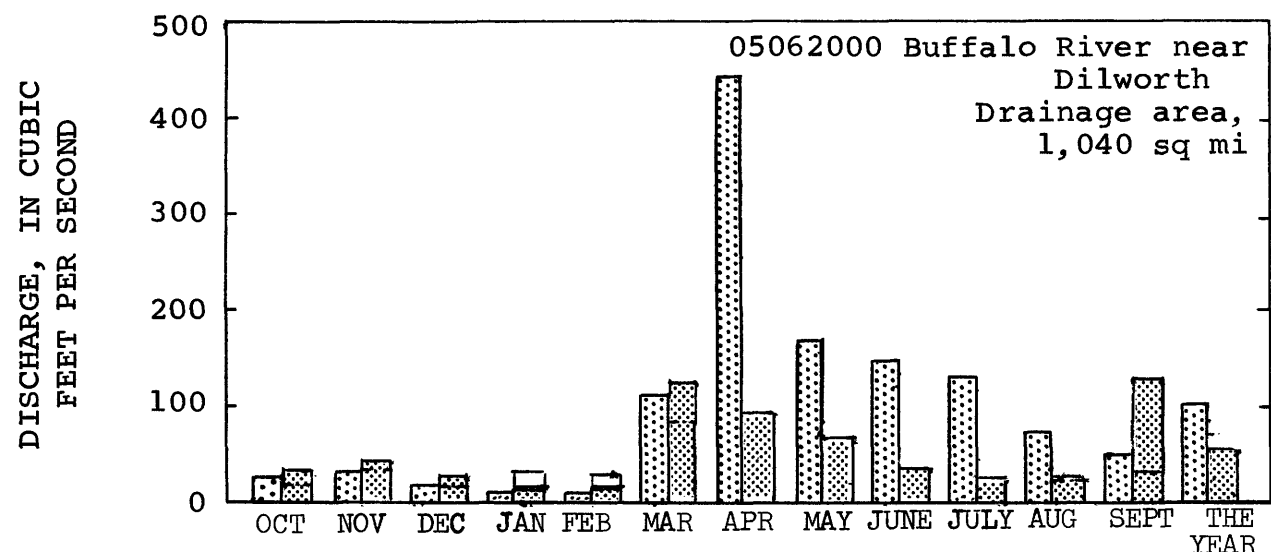
Table 4.--Factors for converting English units to International System (SI) units

The following factors may be used to convert the English units published herein to the International System of Units (SI). Subsequent reports will contain both the English and SI unit equivalents in the station manuscript descriptions until such time that all data will be published in SI units.

Multiply English units	By	To obtain SI units
Length		
inches (in)	25.4	millimetres (mm)
	.0254	metres (m)
feet (ft)	.3048	metres (m)
yards (yd)	.9144	metres (m)
rods	5.0292	metres (m)
miles (mi)	1.609	kilometres (km)
Area		
acres	4047	square metres (m <sup>2</sup> )
	.4047	*hectares (ha)
	.4047	square hectometre (hm <sup>2</sup> )
	.004047	square kilometres (km <sup>2</sup> )
square miles (mi <sup>2</sup> )	2.590	square kilometres (km <sup>2</sup> )
Volume		
gallons (gal)	3.785	**litres (l)
	3.785	cubic decimetres (dm <sup>3</sup> )
	3.785x10 <sup>-3</sup>	cubic metres (m <sup>3</sup> )
million gallons (10 <sup>6</sup> gal)	3785	cubic metres (m <sup>3</sup> )
	3.785x10 <sup>-3</sup>	cubic hectometres (hm <sup>3</sup> )
cubic feet (ft <sup>3</sup> )	28.32	cubic decimetres (dm <sup>3</sup> )
	.02832	cubic metres (m <sup>3</sup> )
cfs-day (ft <sup>3</sup> /s-day)	2447	cubic metres (m <sup>3</sup> )
	2.447x10 <sup>-3</sup>	cubic hectometres (hm <sup>3</sup> )
acre-feet (acre-ft)	1233	cubic metres (m <sup>3</sup> )
	1.233x10 <sup>-3</sup>	cubic hectometres (hm <sup>3</sup> )
	1.233x10 <sup>-6</sup>	cubic kilometres (km <sup>3</sup> )
Flow		
cubic feet per second (ft <sup>3</sup> /s)	28.32	litres per second (l/s)
	28.32	cubic decimetres per second (dm <sup>3</sup> /s)
	.02832	cubic metres per second (m <sup>3</sup> /s)
gallons per minute (gpm)	.06309	litres per second (l/s)
	.06309	cubic decimetres per second (dm <sup>3</sup> /s)
	6.309x10 <sup>-5</sup>	cubic metres per second (m <sup>3</sup> /s)
million gallons per day (mgd)	43.81	cubic decimetres per second (dm <sup>3</sup> /s)
	.04381	cubic metres per second (m <sup>3</sup> /s)
Mass		
ton (short)	.9072	tonne (t)

\*The unit hectare is approved for use with the International System (SI) for a limited time. See NBS Special Bulletin 330, p. 15, 1972 edition.

\*\*The unit litre is accepted for use with the International System (SI). See NBS Special Bulletin 330, p. 13, 1972 edition.



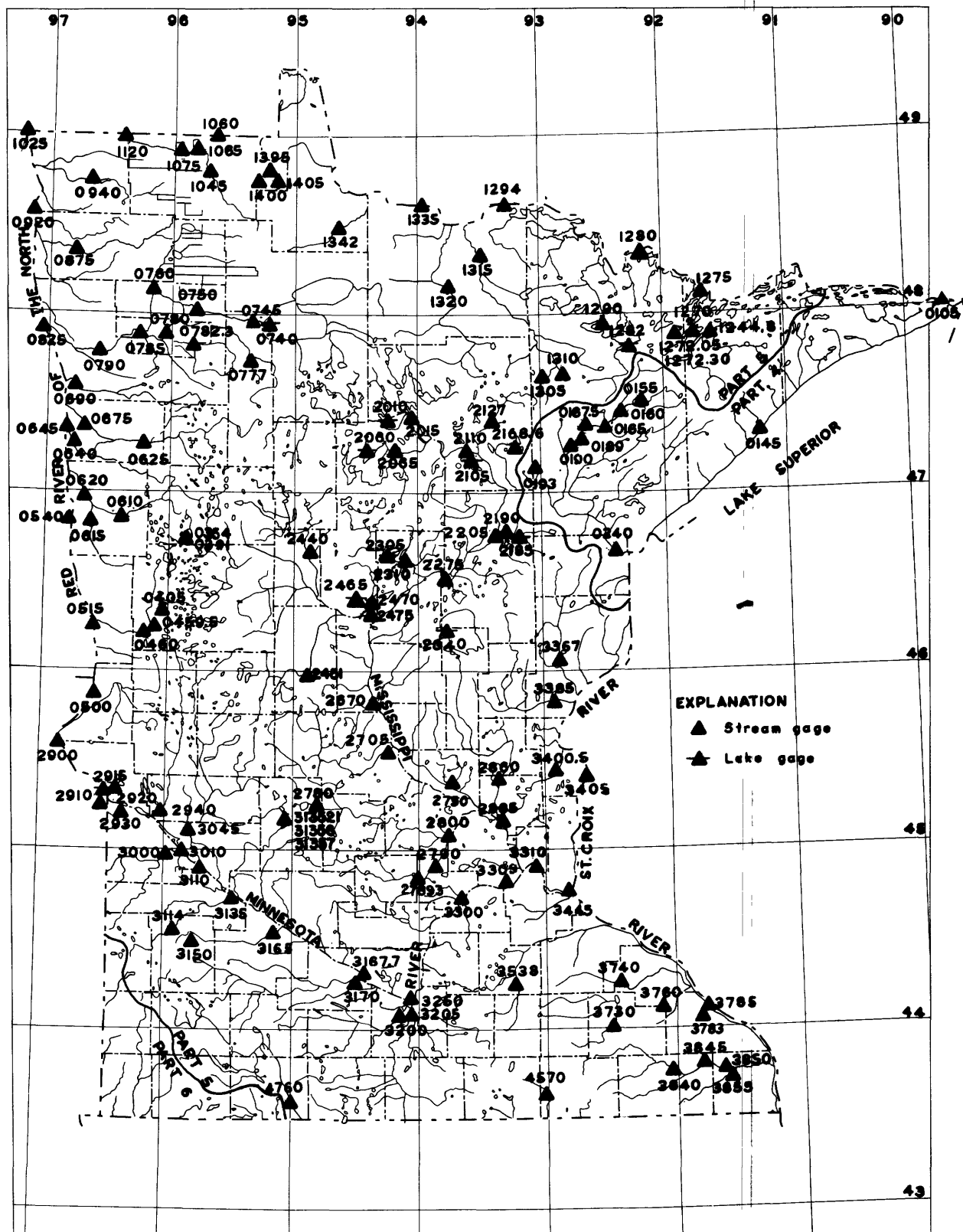


Figure 2.-- Map showing location of lake and stream gaging stations.



## **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 NE¼ sec.24, T.64 N., R.6 E., Cook County, on right bank 400 ft (122 m) upstream from Middle Falls, 2.5 mi (4.0 km) upstream from Grand Portage Port of Entry, 3.5 mi (5.6 km) upstream from mouth, and 4.7 mi (7.6 km) northeast of village of Grand Portage.

DRAINAGE AREA.--600 mi<sup>2</sup> (1,554 km<sup>2</sup>).

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 (240.664 m) above mean sea level, datum of 1929. Prior to Sept. 30, 1940, nonrecording gage at International Bridge, 5.8 mi (9.3 km) upstream at datum 100.24 ft (30.553 m) higher.

AVERAGE DISCHARGE.--50 years (1923-73), 502 ft<sup>3</sup>/s (14.22 m<sup>3</sup>/s), 11.36 in/yr (284 mm/yr).

EXTREMES.--Current year: Maximum discharge, 3,200 ft<sup>3</sup>/s (90.6 m<sup>3</sup>/s) Apr. 22 (gage height, 6.28 ft or 1.914 m); minimum, 54 ft<sup>3</sup>/s (1.53 m<sup>3</sup>/s) Dec. 14 (gage height, 0.25 ft or 0.076 m).

Period of record: Maximum discharge, 11,000 ft<sup>3</sup>/s (312 m<sup>3</sup>/s) May 5, 1934 (gage height, 7.6 ft or 2.32 m, site and datum then in use), from rating curve extended above 7,000 ft<sup>3</sup>/s (198 m<sup>3</sup>/s); minimum, 27 ft<sup>3</sup>/s (0.76 m<sup>3</sup>/s) Nov. 4, 1945 (gage height, -0.08 ft or -0.024 m).

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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	245	115	89	67	103	105	850	1,100	1,160	560	655	1,100
2	252	110	65	70	104	107	920	1,070	1,060	522	575	1,250
3	215	110	77	72	104	108	1,000	1,710	1,010	484	524	1,170
4	200	110	71	72	103	110	1,100	1,700	1,180	466	489	1,130
5	191	109	67	73	102	111	1,080	1,660	1,290	447	473	1,090
6	194	114	64	71	100	112	990	1,560	1,230	497	476	1,020
7	198	171	62	69	99	114	877	1,630	1,120	520	487	942
8	198	212	61	67	96	117	752	1,690	1,050	490	528	851
9	187	221	59	66	97	120	689	1,590	1,070	447	616	776
10	186	221	58	65	95	125	615	1,440	1,050	426	605	723
11	184	216	57	65	95	135	574	1,340	1,040	399	671	687
12	184	205	57	65	94	148	569	1,260	1,010	407	675	657
13	185	190	56	66	94	165	612	1,200	923	418	620	612
14	178	150	56	67	93	180	754	1,100	832	402	600	572
15	168	135	56	70	93	205	1,040	1,030	763	388	566	547
16	168	140	60	74	93	240	1,650	974	708	345	568	535
17	160	145	62	76	92	295	1,990	939	689	330	707	507
18	161	151	64	77	92	350	1,560	876	709	350	769	486
19	151	151	64	78	92	385	1,650	844	701	416	765	467
20	144	147	63	78	93	420	2,030	816	657	416	1,150	447
21	135	128	63	77	94	440	2,630	788	644	389	1,080	429
22	134	112	62	77	95	465	3,030	745	722	352	878	507
23	132	120	62	80	97	480	2,640	707	836	325	747	509
24	135	130	62	81	98	500	2,160	686	769	340	671	499
25	129	134	62	82	100	520	1,790	1,190	691	382	628	576
26	128	141	63	83	101	535	1,560	2,780	653	384	610	706
27	126	130	64	85	102	570	1,400	2,510	648	1,400	601	949
28	127	111	66	90	104	600	1,290	2,040	627	1,730	602	913
29	122	99	67	96	-----	650	1,190	1,650	615	1,310	587	795
30	122	93	66	99	-----	730	1,110	1,420	593	982	605	701
31	119	-----	65	101	-----	800	-----	1,280	-----	785	740	-----
TOTAL	5,130	4,325	1,992	2,359	2,727	9,942	40,502	42,127	26,050	17,111	20,268	22,153
MEAN	166	144	64.3	76.1	97.4	321	1,350	1,359	868	552	654	738
MAX	245	221	89	101	104	800	3,030	2,780	1,290	1,730	1,150	1,250
MIN	119	93	56	65	92	105	564	686	593	325	473	429
CFSM	.26	.24	.11	.13	.16	.54	2.25	2.27	1.45	.92	1.09	1.23
IN	.32	.27	.12	.15	.17	.62	2.51	2.61	1.62	1.06	1.26	1.37

CAL YR 1972 TOTAL 199,362 MEAN 545 MAX 4,680 MIN 56 CFSM .91 IN 12.36

WTR YR 1973 TOTAL 194,692 MEAN 533 MAX 3,030 MIN 56 CFSM .89 IN 12.07

PEAK DISCHARGE (BASE, 3,000 CFS).--Apr. 22 (0600) 3,200 cfs (6.28 ft).

## STREAMS TRIBUTARY TO LAKE SUPERIOR

31

04014500 Baptism River near Beaver Bay, Minn.

LOCATION.--Lat 47°20'15", long 91°12'00", in SE¼NE¼ sec.15, T.56 N., R.7 W., Lake County, on right bank 30 ft (9 m) upstream from bridge on U.S. Highway 61, 0.2 mi (0.3 km) upstream from mouth, 4 mi (6 km) northeast of Silver Bay, and 7 mi (11 km) northeast of village of Beaver Bay.

DRAINAGE AREA.--140 mi<sup>2</sup> (363 km<sup>2</sup>).

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 (185.919 m) above mean sea level (Corps of Engineers bench mark). Prior to Oct. 5, 1934, nonrecording gage at same site and datum.

AVERAGE DISCHARGE.--46 years, 168 ft<sup>3</sup>/s (4.758 m<sup>3</sup>/s), 16.30 in/yr (414 mm/yr).

EXTREMES.--Current year: Maximum discharge, 2,430 ft<sup>3</sup>/s (68.8 m<sup>3</sup>/s) May 25 (gage height, 4.09 ft or 1.247 m); maximum gage height, 4.65 ft (1.417 m) Mar. 14 (backwater from ice); minimum discharge, 12 ft<sup>3</sup>/s (0.34 m<sup>3</sup>/s) Dec. 17, 18, 19, 20; minimum gage height, 0.63 ft (0.192 m) Dec. 18, 19.

Period of record: Maximum discharge recorded, 9,350 ft<sup>3</sup>/s (265 m<sup>3</sup>/s) Aug. 9, 1939 (gage height, 8.11 ft or 2.472 m), from rating curve extended above 4,000 ft<sup>3</sup>/s (113 m<sup>3</sup>/s); maximum gage height, 11.06 ft (3.371 m) Apr. 12, 1965 (from floodmark, backwater from ice); minimum daily discharge, 0.4 ft<sup>3</sup>/s (0.011 m<sup>3</sup>/s) 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	260	103	49	18	22	16	424	351	337	292	216	543
2	216	169	44	18	22	16	408	646	311	227	150	608
3	192	238	38	17	22	16	386	561	618	169	105	416
4	178	187	33	16	22	17	408	516	1,000	125	80	386
5	164	178	29	16	22	17	416	448	712	101	62	317
6	192	279	26	16	22	17	406	424	498	85	101	244
7	173	416	24	15	22	18	400	525	386	72	140	178
8	154	393	22	15	21	20	330	534	534	60	244	137
9	137	330	20	15	21	22	292	469	472	52	337	110
10	137	292	19	15	20	25	249	800	408	50	317	93
11	201	260	18	16	20	40	244	722	358	43	266	75
12	201	221	17	17	20	80	201	598	292	244	192	65
13	173	164	16	18	19	130	187	480	216	285	150	55
14	154	120	15	16	19	350	244	379	173	192	130	50
15	137	99	15	19	19	620	534	330	144	128	103	49
16	125	90	14	20	18	500	790	304	157	95	464	59
17	112	84	13	21	18	408	598	266	790	74	525	55
18	103	82	12	21	17	330	543	238	516	122	393	50
19	89	80	12	22	17	298	552	216	358	110	379	45
20	89	80	13	22	17	272	800	196	317	91	365	40
21	115	86	14	22	17	244	960	182	416	69	279	39
22	150	105	16	22	16	196	890	169	386	52	201	115
23	150	227	17	24	16	147	684	161	344	52	150	108
24	128	120	17	23	16	120	525	192	311	115	118	95
25	118	99	17	23	16	249	416	1,650	266	137	99	154
26	120	83	18	24	15	298	358	2,070	627	157	93	337
27	122	69	18	23	15	311	324	1,240	981	205	85	534
28	118	62	19	23	15	386	298	840	741	221	77	393
29	108	58	18	22	-----	372	266	580	507	164	64	311
30	101	53	18	22	-----	379	244	416	365	133	71	232
31	101	-----	18	22	-----	408	-----	351	-----	249	91	-----
TOTAL	4,518	4,827	639	605	526	6,322	13,379	16,874	13,541	4,171	6,047	5,893
MEAN	146	161	20.6	19.5	18.8	204	446	544	451	135	195	196
MAX	260	416	49	24	22	620	960	2,070	1,000	292	525	608
MIN	89	53	12	15	15	16	187	161	144	43	62	39
CFSM	1.04	1.15	.15	.14	.13	1.46	3.19	3.89	3.22	.96	1.39	1.40
IN.	1.20	1.28	.17	.16	.14	1.68	3.55	4.48	3.60	1.11	1.61	1.57
CAL YR 1972	TOTAL 107,944	MEAN 295	MAX 6,860	MIN 12	CFSM 2.11	IN 28.68						
WTR YR 1973	TOTAL 77,342	MEAN 212	MAX 2,070	MIN 12	CFSM 1.51	IN 20.55						

PEAK DISCHARGE (BASE, 1,300 CFS).--May 25 (2330) 2,430 cfs (4.09 ft).

## STREAMS TRIBUTARY TO LAKE SUPERIOR

04015500 Second Creek near Aurora, Minn.

LOCATION.--Lat 47°31'25", long 92°11'35", in SW¼ sec.12, T.58 N., R.15 W., St. Louis County, on left bank 0.1 mi (0.2 km) downstream from First Creek, 0.4 mi (0.6 km) upstream from mouth, and 2.1 mi (3.4 km) east of Aurora.

DRAINAGE AREA.--26.3 mi<sup>2</sup> (68.1 km<sup>2</sup>).

PERIOD OF RECORD.--March 1955 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,410.36 ft (429.878 m) above mean sea level, datum of 1929 (levels by Erie Mining Company).

AVERAGE DISCHARGE.--18 years, 22.3 ft<sup>3</sup>/s (0.632 m<sup>3</sup>/s), 11.51 in/yr (292 mm/yr).

EXTREMES.--Current year: Maximum discharge, 109 ft<sup>3</sup>/s (3.09 m<sup>3</sup>/s) Aug. 8 (gage height, 4.78 ft or 1.457 m); maximum gage height, 5.19 ft (1.582 m) Mar. 14 (backwater from ice); minimum daily discharge, 5.5 ft<sup>3</sup>/s (0.16 m<sup>3</sup>/s) Feb. 21-28; minimum gage height, 3.51 ft (1.070 m) Nov. 15, 16, July 8, 9.  
Period of record: Maximum discharge, 254 ft<sup>3</sup>/s (7.19 m<sup>3</sup>/s) Apr. 22, 1961 (gage height, 5.64 ft or 1.719 m); maximum gage height, 5.75 ft (1.753 m) Mar. 28, 1957 (backwater from ice); minimum daily discharge, 1.5 ft<sup>3</sup>/s (0.042 m<sup>3</sup>/s) Jan. 26 to Feb. 4, 1963; minimum gage height, 3.10 ft (0.945 m) Feb. 2, 3, 4, 1963.

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

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

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	35	14	7.7	7.0	8.0	5.6	25	18	22	19	31	48
2	26	15	7.5	7.5	8.0	5.6	24	24	22	15	28	60
3	19	17	7.4	7.5	8.0	5.7	23	24	21	12	26	50
4	17	16	7.2	7.5	7.8	5.8	23	22	21	12	24	46
5	15	13	7.1	7.5	7.5	5.9	22	21	20	12	22	38
6	17	15	7.0	8.0	7.5	6.0	21	33	21	11	26	31
7	18	17	6.9	8.0	7.2	6.2	19	51	21	10	28	28
8	17	16	6.8	8.0	7.0	6.3	18	44	24	9.7	70	26
9	15	16	6.8	8.0	7.0	6.5	16	37	22	11	65	25
10	17	15	6.8	8.0	6.8	6.7	15	39	21	18	64	24
11	18	17	6.7	8.0	6.5	8.0	15	34	21	19	58	27
12	15	17	6.7	8.0	6.4	12	16	31	23	38	48	27
13	16	14	6.6	8.3	6.2	20	16	29	23	35	40	25
14	19	12	6.6	8.5	6.1	35	17	27	24	29	34	25
15	16	11	6.6	8.5	6.0	36	26	25	23	23	32	25
16	15	10	6.6	8.8	5.9	32	28	23	28	19	30	25
17	15	10	6.6	9.0	5.8	28	27	22	37	17	27	26
18	13	9.8	6.6	9.0	5.7	25	28	21	32	19	25	31
19	13	9.7	6.6	9.0	5.7	25	27	20	26	18	22	32
20	13	9.5	6.6	9.0	5.6	24	30	19	29	17	20	30
21	16	9.3	6.6	9.0	5.5	24	36	19	33	14	19	29
22	16	9.0	6.6	9.0	5.5	24	35	19	33	12	24	24
23	16	8.9	6.6	9.0	5.5	24	31	22	30	12	23	20
24	16	8.7	6.6	9.0	5.5	24	27	28	26	14	21	18
25	15	8.5	6.6	9.0	5.5	25	24	34	28	21	23	18
26	14	8.4	6.7	9.0	5.5	27	24	33	36	31	24	19
27	16	8.2	6.8	8.7	5.5	30	22	33	33	43	23	20
28	15	8.1	6.8	8.5	5.5	35	19	34	26	45	22	17
29	15	7.9	6.8	8.5	-----	31	17	30	24	37	22	15
30	14	7.8	6.9	8.5	-----	28	17	26	23	32	23	14
31	13	-----	7.0	8.3	-----	27	-----	23	-----	30	28	-----
TOTAL	515	358.8	211.4	259.6	178.7	604.3	688	865	773	654.7	972	843
MEAN	16.6	12.0	6.82	8.37	6.38	19.5	22.9	27.9	25.8	21.1	31.4	28.1
MAX	35	17	7.7	9.0	8.0	36	36	51	37	45	70	60
MIN	13	7.8	6.6	7.0	5.5	5.6	15	18	20	9.7	19	14
CF8M	.63	.46	.26	.32	.24	.74	.87	1.06	.98	.80	1.19	1.07
IN.	.73	.51	.30	.37	.25	.85	.97	1.22	1.09	.93	1.37	1.19

CAL YR 1972 TOTAL 8,206.2 MEAN 22.4 MAX 110 MIN 6.6 CF8M .85 IN 11.61  
WTR YR 1973 TOTAL 6,923.5 MEAN 19.0 MAX 70 MIN 5.5 CF8M .72 IN 9.79

PEAK DISCHARGE (BASE, 60 CFS)							
DATE	TIME	G.H.	DISCHARGE	DATE	TIME	G.H.	DISCHARGE
5-7	0030	4.28	60	9-2	0400	4.37	65
8-8	1600	4.78	109				

## 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 (305 m) downstream from Second Creek, 2.5 mi (4.0 km) east of Aurora, and 2.8 mi (4.5 km) upstream from mouth.

DRAINAGE AREA.--156 mi<sup>2</sup> (404 km<sup>2</sup>).

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

GAGE.--Water-stage recorder. Datum of gage is 1,402.30 ft (427.421 m) 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 (14 m) downstream at same datum.

AVERAGE DISCHARGE (adjusted for storage and diversion).--31 years, 128 ft<sup>3</sup>/s (3.625 m<sup>3</sup>/s), 11.14 in/yr (283 mm/yr).

EXTREMES.--Current year: Maximum discharge, 505 ft<sup>3</sup>/s (14.3 m<sup>3</sup>/s) May 12 (gage height, 4.25 ft or 1.295 m); minimum daily, 21 ft<sup>3</sup>/s (0.59 m<sup>3</sup>/s) Dec. 13-22; minimum gage height, 1.84 ft (0.561 m) Dec. 18, 19, 20. Period of record: Maximum discharge, 3,230 ft<sup>3</sup>/s (91.5 m<sup>3</sup>/s) May 10, 1950 (gage height, 7.86 ft or 2.396 m); minimum, 2.2 ft<sup>3</sup>/s (0.062 m<sup>3</sup>/s) Jan. 30, 31, 1961; minimum gage height, 0.88 ft (0.268 m) 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 (24.7 hm<sup>3</sup>) between elevations 1,410 ft (430 m), natural lake level, and 1,440 ft (439 m). 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	142	69	39	24	30	33	72	177	222	205	171	109
2	122	69	35	24	30	33	73	181	205	190	168	136
3	106	73	31	24	30	34	70	190	196	164	164	150
4	95	73	28	25	30	34	69	198	172	137	152	164
5	87	70	27	25	28	33	69	205	153	110	134	151
6	87	76	25	26	26	33	63	241	137	105	129	136
7	87	80	24	27	25	35	61	311	126	92	119	130
8	85	80	23	27	26	36	61	353	123	79	208	122
9	84	84	23	27	27	36	56	407	115	73	270	112
10	85	88	22	29	28	34	54	470	109	73	296	99
11	86	96	22	30	29	35	60	491	105	69	359	91
12	82	93	22	30	28	41	58	500	101	113	388	83
13	85	93	21	30	28	51	61	494	93	111	365	77
14	92	90	21	30	29	76	65	456	87	108	319	72
15	93	84	21	30	30	89	85	396	79	100	267	68
16	88	82	21	30	31	78	98	331	88	93	221	65
17	85	78	21	29	34	71	102	283	102	83	187	62
18	78	74	21	30	35	68	115	238	104	88	165	62
19	74	71	21	29	34	66	130	208	108	83	149	60
20	71	66	21	30	34	65	151	192	122	79	134	54
21	77	63	21	29	33	68	174	183	137	73	122	57
22	79	58	21	29	33	65	210	166	155	67	117	59
23	80	56	22	29	32	70	220	153	162	63	107	54
24	83	54	22	29	32	69	264	162	159	64	97	51
25	82	53	22	28	32	70	289	272	162	77	91	54
26	77	51	22	28	31	70	275	278	181	100	85	57
27	79	50	22	29	31	76	247	283	190	130	79	57
28	76	48	23	29	32	87	233	275	190	146	72	59
29	78	46	23	29	-----	85	220	296	196	149	67	61
30	71	43	23	29	-----	78	194	269	205	159	66	55
31	69	-----	24	30	-----	78	-----	233	-----	167	72	-----
TOTAL	2,665	2,111	734	874	848	1,797	3,899	8,892	4,284	3,358	5,340	2,567
MEAN	86.0	70.4	23.7	28.2	30.3	58.0	130	287	143	108	172	85.6
MAX	142	96	39	30	35	89	289	500	222	205	388	164
MIN	69	43	21	24	25	33	54	153	79	63	66	51
(f)	+25.6	+31.7	+1.82	-0.40	-0.40	+41.4	+84.0	+36.2	+48.4	+31.7	+39.6	+23.2
MEAN #	112	102	25.5	27.8	29.9	99.4	214	323	191	140	212	109
CFSM #	0.72	0.65	0.16	0.18	0.19	0.64	1.37	2.07	1.23	0.90	1.36	0.70
IN. #	0.82	0.73	0.19	0.21	0.20	0.73	1.53	2.39	1.37	1.03	1.57	0.78

CAL YR 1972 MEAN 119 MEAN # 144 MAX 1,240 MIN 21 CFSM # 0.92 IN. # 12.54  
WTR YR 1973 MEAN 102 MEAN # 132 MAX 500 MIN 21 CFSM # 0.85 IN. # 11.55

/ 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 SW¼ sec.22, T.58 N., R.15 W., St. Louis County, on left bank at upstream side of highway bridge, 0.8 mi (1.3 km) downstream from Partridge River and 1.5 mi (2.4 km) south of Aurora.

DRAINAGE AREA.--312 mi<sup>2</sup> (808 km<sup>2</sup>).

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

GAGE.--Water-stage recorder. Datum of gage is 1,371.24 ft (417.954 m) 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).--31 years, 248 ft<sup>3</sup>/s (7.023 m<sup>3</sup>/s), 10.79 in/yr (274 mm/yr).

EXTREMES.--Current year: Maximum discharge, 892 ft<sup>3</sup>/s (25.3 m<sup>3</sup>/s) May 12 (gage height, 3.47 ft or 1.058 m); minimum daily, 49 ft<sup>3</sup>/s (1.39 m<sup>3</sup>/s) Feb. 18 to Mar. 5; minimum gage height, 1.47 ft (0.448 m) Feb. 7-11. Period of record: Maximum discharge, 5,380 ft<sup>3</sup>/s (152 m<sup>3</sup>/s) May 14, 1950 (gage height, 8.37 ft or 2.551 m); minimum, 4.0 ft<sup>3</sup>/s (0.11 m<sup>3</sup>/s) Oct. 2, 3, 1948 (gage height, 0.30 ft or 0.091 m).

REMARKS.--Records good except those for winter period and those for period of no gage-height record, 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 (24.7 hm<sup>3</sup>) between elevations 1,410 ft (430 m), natural lake level, and 1,440 ft (439 m). 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	322	168	90	53	50	49	229	446	408	358	291	288
2	299	170	87	53	50	49	225	482	381	337	285	303
3	269	176	84	53	50	49	220	511	374	296	270	326
4	251	181	81	53	50	49	216	511	345	253	250	350
5	238	178	78	52	50	49	218	502	308	218	224	346
6	240	195	75	52	50	50	213	541	283	197	228	336
7	233	212	72	52	50	50	211	656	261	181	213	324
8	223	223	70	52	50	50	214	718	260	165	395	314
9	212	229	67	52	50	52	206	763	248	158	438	299
10	211	231	64	52	50	54	201	834	239	157	460	278
11	215	233	62	52	50	60	205	867	229	149	508	255
12	212	231	60	52	50	80	199	885	216	220	539	239
13	211	228	58	52	50	110	201	871	197	221	525	221
14	212	221	57	52	50	150	205	829	185	223	496	210
15	207	209	56	52	50	220	249	764	171	202	451	200
16	195	194	56	52	50	240	305	683	191	177	409	190
17	185	178	56	52	50	230	335	614	207	158	381	181
18	174	167	55	51	49	220	354	550	211	165	367	178
19	167	156	55	51	49	200	369	495	219	152	361	170
20	167	148	55	51	49	180	407	462	243	142	351	158
21	180	138	55	51	49	170	492	436	257	135	341	156
22	186	132	54	51	49	170	560	406	276	125	334	160
23	191	128	54	51	49	167	620	385	292	121	320	152
24	194	120	54	51	49	170	694	371	285	124	300	147
25	192	117	54	50	49	183	709	518	293	144	284	151
26	186	111	54	50	49	201	676	566	326	169	271	162
27	181	106	54	50	49	226	621	581	360	222	255	182
28	179	102	54	50	49	263	560	546	369	245	237	202
29	177	97	54	50	-----	271	507	537	373	259	217	221
30	169	93	54	50	-----	259	467	494	371	284	208	212
31	169	-----	54	50	-----	247	-----	437	-----	296	207	-----
TOTAL	6,447	5,072	1,933	1,595	1,389	4,518	10,888	18,261	8,378	6,253	10,416	6,911
MEAN	208	169	62.4	51.5	49.6	146	363	589	279	202	336	230
MAX	322	233	90	53	50	271	709	885	408	358	539	350
MIN	167	93	54	50	49	49	199	371	171	121	207	147
(f)	+25.6	+31.7	+1.82	-0.40	-0.40	+41.4	+84.0	+36.2	+48.4	+31.7	+39.6	+23.2
MEAN #	234	201	64.2	51.1	49.2	187	447	625	327	234	376	253
CFSM #	0.75	0.64	0.21	0.16	0.16	0.60	1.43	2.00	1.05	0.75	1.21	0.81
IN. #	0.86	0.72	0.24	0.19	0.16	0.69	1.60	2.31	1.17	0.86	1.39	0.91

CAL YR 1972 MEAN 264 MEAN # 289 MAX 1,970 MIN 48 CFSM # 0.93 IN. # 12.58  
WTR YR 1973 MEAN 225 MEAN # 255 MAX 885 MIN 49 CFSM # 0.82 IN. # 11.10

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

# Adjusted for change in contents and diversion.

NOTE.--No gage-height record Nov. 9 to Dec. 14.

## STREAMS TRIBUTARY TO LAKE SUPERIOR

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04018750 St. Louis River at Forbes, Minn.

LOCATION.--Lat 47°21'48", long 92°35'56", in NE¼SE¼ sec.3, T.56 N., R.18 W., St. Louis County, on right bank at downstream side of highway bridge, 0.5 mi (0.8 km) downstream from Eveleth Taconite Company dam, 0.6 mi (1.0 km) south of Forbes, 1.8 mi (2.9 km) upstream from Elbow Creek.

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

GAGE.--Water-stage recorder. Datum of gage is 1,293.11 ft (394.140 m) above mean sea level, datum of 1929. Prior to Oct. 28, 1964, nonrecording gage at same site and datum.

AVERAGE DISCHARGE.--9 years, 585 ft<sup>3</sup>/s (16.57 m<sup>3</sup>/s).

EXTREMES.--Current year: Maximum discharge, 1,980 ft<sup>3</sup>/s (56.1 m<sup>3</sup>/s) May 12 (gage height, 10.66 ft or 3.249 m); minimum daily, 25 ft<sup>3</sup>/s (0.71 m<sup>3</sup>/s) Mar. 6; minimum gage height, 5.14 ft (1.567 m) Nov. 26.  
Period of record: Maximum discharge, 5,610 ft<sup>3</sup>/s (159 m<sup>3</sup>/s) Apr. 16, 1971 (gage height, 16.20 ft or 4.938 m, result of release of storage behind ice jam at dam 0.5 mi or 0.8 km upstream); maximum daily discharge, 5,170 ft<sup>3</sup>/s (146 m<sup>3</sup>/s) Apr. 18, 1969; maximum gage height, 16.27 ft (4.960 m) Apr. 15, 1971 (backwater from ice); minimum discharge, 24 ft<sup>3</sup>/s (0.68 m<sup>3</sup>/s) Nov. 26, 1966; minimum gage height, 5.14 ft (1.567 m) Nov. 26, 1972.

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 mi (0.8 km) upstream. Diversion began Dec. 5, 1965.

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	615	369	150	130	121	88	673	1,010	820	807	686	478
2	600	391	210	130	120	100	661	1,060	780	722	610	673
3	547	428	200	110	119	110	599	1,020	740	766	669	698
4	506	436	190	120	117	100	584	1,110	710	696	629	705
5	478	442	180	140	114	45	508	1,070	700	627	591	833
6	512	461	170	130	113	25	570	1,220	692	513	435	637
7	479	514	165	130	112	50	553	1,800	561	507	593	626
8	452	558	160	130	110	90	534	1,820	698	459	614	648
9	435	562	150	130	108	95	465	1,710	515	446	902	680
10	424	360	145	130	106	100	477	1,900	520	328	968	562
11	437	673	140	130	104	130	378	1,960	501	269	939	565
12	453	577	135	130	103	200	466	1,970	512	442	944	532
13	308	500	130	130	101	300	390	1,950	415	456	961	436
14	385	571	129	130	100	500	450	1,880	434	498	911	427
15	415	441	130	130	98	900	489	1,800	403	470	950	421
16	403	657	130	130	96	800	611	1,690	345	307	872	395
17	384	512	130	130	94	700	591	1,550	497	380	801	309
18	376	428	130	130	92	650	715	1,380	559	407	737	332
19	374	407	130	130	91	600	699	1,300	407	397	702	331
20	355	201	130	130	90	570	855	1,130	525	213	675	306
21	356	431	130	130	89	550	1,100	1,080	579	334	579	288
22	382	172	130	130	88	550	1,220	979	546	334	588	281
23	400	298	130	130	87	550	1,250	897	614	207	570	282
24	401	490	130	130	87	550	1,300	739	627	285	478	157
25	394	370	130	130	87	600	1,350	1,050	633	377	488	277
26	388	193	130	130	87	650	1,360	1,190	737	411	491	307
27	385	266	130	128	87	700	1,270	1,140	837	350	397	326
28	378	350	130	127	87	800	1,240	1,080	790	560	410	290
29	377	180	130	126	-----	760	1,160	1,000	830	568	402	339
30	370	370	130	124	-----	740	974	940	831	578	379	371
31	367	-----	130	123	-----	711	-----	870	-----	611	379	-----
TOTAL	13,136	12,608	4,464	3,988	2,808	13,314	23,492	41,295	18,358	14,325	20,350	13,512
MEAN	424	420	144	129	100	429	783	1,332	612	462	656	450
MAX	615	673	210	140	121	900	1,360	1,970	837	807	968	833
MIN	308	172	129	110	87	25	378	739	345	207	379	157

CAL YR 1972 TOTAL 198,687 MEAN 543 MAX 3,660 MIN 73  
WTR YR 1973 TOTAL 181,650 MEAN 498 MAX 1,970 MIN 25

## STREAMS TRIBUTARY TO LAKE SUPERIOR

04018900 East Two River near Iron Junction, Minn.

LOCATION.--Lat 47°24'04", long 92°39'52", in NW¼NW¼ sec.29, T.57 N., R.18 W., St. Louis County, on right bank 30 ft (9 m) downstream from bridge on State Highway 37 and 2.2 mi (3.5 km) southwest of Iron Junction.

DRAINAGE AREA.--40.0 mi<sup>2</sup> (103.6 km<sup>2</sup>).

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 (407 m), from topographic map.

AVERAGE DISCHARGE.--7 years, 34.0 ft<sup>3</sup>/s (0.963 m<sup>3</sup>/s), 11.54 in/yr (293 mm/yr).

EXTREMES.--Current year: Maximum discharge, 198 ft<sup>3</sup>/s (5.61 m<sup>3</sup>/s) May 7 (gage height, 8.11 ft or 2.472 m); maximum gage height, 8.60 ft (2.621 m), backwater from ice; minimum daily discharge, 8.6 ft<sup>3</sup>/s (0.244 m<sup>3</sup>/s) Jan. 18-30; minimum gage height, 2.88 ft (0.878 m) June 16.

Period of record: Maximum discharge, 625 ft<sup>3</sup>/s (17.7 m<sup>3</sup>/s) Apr. 14, 1971 (gage height, 9.61 ft or 2.929 m); maximum gage height, 10.16 ft (3.097 m) Apr. 12, 1971; minimum daily discharge, 4.6 ft<sup>3</sup>/s (0.13 m<sup>3</sup>/s) 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	27	22	8.7	8.8	9.0	10	42	33	35	48	51	17
2	25	22	8.7	8.8	9.0	10	36	46	30	36	43	28
3	24	22	8.7	8.8	9.0	10	33	55	25	28	36	36
4	21	20	8.7	8.8	9.0	10	28	51	22	24	32	40
5	20	20	8.7	8.8	9.0	10	25	44	20	20	28	39
6	23	21	8.7	8.8	9.0	10	26	66	19	17	26	35
7	24	24	8.7	8.8	9.0	10	24	186	18	15	26	31
8	21	25	8.7	8.8	9.0	10	22	184	18	14	28	29
9	19	25	8.7	8.8	9.0	10	21	174	18	13	55	27
10	18	24	8.7	8.8	9.0	11	19	170	18	13	68	24
11	19	23	8.7	8.8	9.0	15	18	153	18	13	68	21
12	19	22	8.7	8.8	9.2	20	19	120	17	16	59	19
13	18	20	8.7	8.8	9.2	30	22	87	15	23	44	17
14	18	18	8.7	8.8	9.2	40	22	69	14	24	35	16
15	17	17	8.7	8.7	9.2	55	26	56	13	24	31	15
16	17	16	8.7	8.7	9.3	50	39	53	14	23	42	14
17	17	15	8.7	8.7	9.4	45	37	43	40	21	48	14
18	18	14	8.7	8.6	9.4	40	39	35	96	19	40	14
19	18	12	8.7	8.6	9.4	35	45	30	109	18	34	13
20	18	11	8.7	8.6	9.5	32	63	25	97	16	31	13
21	18	11	8.7	8.6	9.5	31	141	24	82	15	28	14
22	20	10	8.7	8.6	9.6	31	145	22	68	13	25	15
23	20	10	8.7	8.6	9.6	32	134	21	56	12	23	16
24	19	9.8	8.7	8.6	9.7	35	116	21	44	13	21	18
25	19	9.5	8.7	8.6	9.8	40	89	54	46	24	20	19
26	20	9.2	8.7	8.6	9.8	50	65	83	82	36	19	19
27	21	9.0	8.7	8.6	9.8	65	53	84	96	46	18	21
28	21	8.7	8.7	8.6	9.8	65	49	74	87	64	17	24
29	22	8.7	8.7	8.6	-----	58	41	60	71	66	17	24
30	22	8.7	8.7	8.6	-----	52	35	49	59	61	16	22
31	22	-----	8.7	8.7	-----	46	-----	40	-----	57	16	-----
TOTAL	625	487.6	269.7	269.8	260.4	968	1,474	2,212	1,347	832	1,045	654
MEAN	20.2	16.3	8.70	8.70	9.30	31.2	49.1	71.4	44.9	26.8	33.7	21.8
MAX	27	25	8.7	8.8	9.8	65	145	186	109	66	68	40
MIN	17	8.7	8.7	8.6	9.0	10	18	21	13	12	16	13
CFSM	.51	.41	.22	.22	.23	.78	1.23	1.79	1.12	.67	.84	.55
IN.	.58	.45	.25	.25	.24	.90	1.37	2.06	1.25	.77	.97	.61
CAL YR 1972	TOTAL 10,323.2	MEAN 28.2	MAX 300	MIN 7.9	CFSM .71	IN 9.60						
WTR YR 1973	TOTAL 10,444.5	MEAN 28.6	MAX 186	MIN 8.6	CFSM .72	IN 9.71						



04019000 West Two River near Iron Junction, Minn.

LOCATION.--Lat 47°24'05", long 92°42'10", in SW¼SW¼ sec.24, T.57 N., R.19 W., St. Louis County, on right bank 40 ft (12 m) upstream from bridge on State Highway 37, 5 mi (8 km) southwest of Iron Junction, and 9.2 mi (14.8 km) upstream from St. Louis River.

DRAINAGE AREA.--68.4 mi<sup>2</sup> (177.2 km<sup>2</sup>).

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 (402.961 m) above mean sea level, datum of 1929 (Minnesota Highway Department bench mark).

AVERAGE DISCHARGE.--17 years, 46.3 ft<sup>3</sup>/s (1.311 m<sup>3</sup>/s), 9.19 in/yr (233 mm/yr).

EXTREMES.--Current year: Maximum discharge, 199 ft<sup>3</sup>/s (5.64 m<sup>3</sup>/s) May 7 (gage height, 5.21 ft or 1.588 m); maximum gage height, 6.01 ft (1.832 m) March 18 (backwater from ice); minimum daily discharge, 7.2 ft<sup>3</sup>/s (0.20 m<sup>3</sup>/s) Dec. 16 to Jan. 22; minimum gage height, 2.49 ft (0.759 m) Nov. 22.  
Period of record: Maximum discharge, 916 ft<sup>3</sup>/s (25.9 m<sup>3</sup>/s) Apr. 17, 1954 (gage height, 9.85 ft or 3.002 m); minimum daily, 3.0 ft<sup>3</sup>/s (0.085 m<sup>3</sup>/s) Jan. 22 to Feb. 6, 1957; minimum gage height, 2.34 ft (0.713 m) 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 mi<sup>2</sup> (72.3 km<sup>2</sup>) of the drainage area and has an available capacity of 8,500 acre-ft (10.5 hm<sup>3</sup>) between elevations 1,370 ft (418 m), natural inlet, and 1,395 ft (425 m), 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	23	17	8.6	7.2	8.5	7.9	36	34	33	41	27	22
2	21	18	8.6	7.2	8.5	8.0	34	49	35	35	24	27
3	20	20	8.5	7.2	8.5	8.0	33	53	27	30	22	26
4	19	20	8.4	7.2	8.5	8.0	30	38	26	26	19	27
5	18	20	8.3	7.2	8.5	8.0	28	36	22	22	16	25
6	22	22	8.2	7.2	8.5	8.0	25	63	20	20	18	23
7	22	26	8.1	7.2	8.5	8.0	22	192	18	18	18	21
8	24	25	8.0	7.2	8.5	8.0	20	165	18	17	22	18
9	22	23	7.9	7.2	8.4	8.0	19	145	18	16	29	17
10	22	23	7.8	7.2	8.4	8.0	18	170	16	16	35	16
11	22	22	7.7	7.2	8.3	12	16	169	16	16	39	15
12	21	21	7.6	7.2	8.3	17	14	152	15	21	38	14
13	20	19	7.5	7.2	8.3	25	13	126	13	21	36	13
14	19	17	7.4	7.2	8.2	32	12	98	13	18	33	12
15	18	15	7.3	7.2	8.1	40	21	77	12	16	63	12
16	18	13	7.2	7.2	8.0	40	33	62	18	14	108	10
17	16	12	7.2	7.2	8.0	35	36	48	32	12	94	10
18	14	11	7.2	7.2	8.0	31	39	40	39	14	91	10
19	14	10	7.2	7.2	8.0	29	40	35	41	13	90	9.6
20	14	10	7.2	7.2	7.9	27	58	30	42	12	78	9.2
21	14	9.7	7.2	7.2	7.9	26	156	27	43	11	62	10
22	14	9.6	7.2	7.2	7.8	25	134	24	39	9.6	51	12
23	16	9.4	7.2	7.3	7.8	26	105	24	35	10	43	12
24	15	9.3	7.2	7.4	7.8	30	87	24	30	12	35	10
25	15	9.2	7.2	7.4	7.8	35	72	64	43	18	32	12
26	16	9.0	7.2	7.7	7.7	40	59	68	59	20	28	14
27	16	9.0	7.2	8.0	7.7	50	49	69	68	22	26	14
28	16	9.0	7.2	8.3	7.8	60	38	66	66	26	23	12
29	16	8.8	7.2	8.5	-----	54	40	55	61	26	21	12
30	15	8.8	7.2	8.5	-----	42	42	44	54	28	19	12
31	16	-----	7.2	8.5	-----	39	-----	38	-----	30	19	-----
TOTAL	558	455.8	235.1	230.0	228.2	794.9	1,329	2,285	972	610.6	1,259	456.8
MEAN	18.0	15.2	7.58	7.42	8.15	25.6	44.3	73.7	32.4	19.7	40.6	15.2
MAX	24	26	8.6	8.5	8.5	60	156	192	68	41	108	27
MIN	14	8.8	7.2	7.2	7.7	7.9	12	24	12	9.6	16	9.2
CFSM	.26	.22	.11	.11	.12	.37	.65	1.08	.47	.29	.59	.22
IN.	.30	.25	.13	.13	.12	.43	.72	1.24	.53	.33	.68	.25
CAL YR 1972	TOTAL	12,905.4	MEAN	35.3	MAX	500	MIN	5.9	CFSM	.52	IN	7.02
WTR YR 1973	TOTAL	9,414.4	MEAN	25.8	MAX	192	MIN	7.2	CFSM	.38	IN	5.12

## STREAMS TRIBUTARY TO LAKE SUPERIOR

04019300 West Swan River near Silica, Minn.

LOCATION.--Lat 47°17'36", long 93°02'30", in SW¼NW¼ sec.32, T.56 N., R.21 W., St. Louis County, on right bank 10 ft (3 m) upstream from pilings of dismantled bridge and railroad bed of Great Northern Railroad, 2 mi (3 km) northwest of Silica, 9 mi (14 km) southwest of Hibbing and 20 mi (32 km) 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 (415 m), from topographic map. Prior to Aug. 2, 1963, reference point at same site and datum.

AVERAGE DISCHARGE.--10 years, 10.5 ft<sup>3</sup>/s (0.297 m<sup>3</sup>/s).

EXTREMES.--Current year: Maximum discharge, 79 ft<sup>3</sup>/s (2.24 m<sup>3</sup>/s) May 11 (gage height, 2.83 ft or 0.863 m); maximum gage height, 3.79 ft (1.155 m), backwater from ice; no flow Dec. 13-24.

Period of record: Maximum discharge, 428 ft<sup>3</sup>/s (12.1 m<sup>3</sup>/s) Apr. 12, 1971 (gage height, 5.09 ft or 1.551 m); maximum gage height, 5.17 ft (1.576 m) Mar. 28, 1968 (backwater from ice); no flow for several days in 1969, 1970, 1972, 1973.

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

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.2	2.2	.40	.80	.30	.20	8.0	6.7	5.5	3.5	8.0	2.0
2	1.9	3.1	.40	.90	.30	.20	6.9	13	4.5	3.2	5.4	2.3
3	1.7	3.1	.30	.90	.30	.50	6.6	17	6.6	2.4	3.6	2.4
4	1.5	3.1	.30	.90	.30	1.0	5.9	14	8.4	1.8	2.7	2.5
5	1.2	4.8	.30	.90	.30	2.0	5.4	11	5.5	1.4	2.1	2.4
6	1.6	5.1	.20	.90	.30	3.0	5.4	12	4.1	1.0	2.7	2.3
7	2.2	5.4	.20	.90	.30	5.0	4.9	55	4.1	.60	2.9	1.8
8	2.3	4.9	.20	.90	.30	7.0	4.4	66	4.8	.30	3.2	1.5
9	2.2	4.4	.20	.90	.20	10	3.7	41	5.1	.60	3.4	1.2
10	2.1	4.2	.10	.80	.20	15	3.0	52	3.7	1.9	3.4	1.1
11	2.1	3.9	.10	.80	.20	25	2.9	74	3.1	2.8	3.1	.90
12	2.2	3.7	.10	.80	.20	40	3.0	56	2.5	2.3	2.3	.80
13	2.1	3.1	0	.70	.20	55	3.0	29	2.2	1.7	1.8	.70
14	2.0	2.3	0	.70	.20	70	3.0	16	1.7	1.5	1.6	.60
15	1.8	1.7	0	.70	.20	77	6.0	12	1.4	1.2	1.4	.60
16	1.6	1.5	0	.60	.20	76	14	9.0	1.4	1.0	1.5	.50
17	1.5	1.5	0	.60	.20	70	14	7.3	1.5	.80	1.1	.40
18	1.4	1.5	0	.60	.20	60	13	6.4	2.0	1.0	1.0	.50
19	1.3	1.4	0	.50	.20	55	12	5.4	2.0	.90	1.4	.40
20	1.2	1.3	0	.50	.20	50	14	4.8	1.9	.70	10	.40
21	1.5	1.2	0	.50	.20	50	28	4.1	1.9	.60	15	.60
22	2.4	1.1	0	.40	.20	45	30	4.5	1.9	.50	6.7	1.7
23	3.8	1.0	0	.40	.20	40	22	6.7	2.6	.50	3.9	2.0
24	3.6	1.1	0	.40	.20	30	16	8.2	1.9	2.5	3.0	2.0
25	3.2	1.0	.30	.40	.20	25	12	47	3.5	12	2.6	2.4
26	3.1	.90	.50	.40	.20	20	10	68	9.0	16	2.4	3.0
27	3.1	.80	.60	.30	.20	17	8.4	40	12	23	2.2	3.6
28	3.1	.70	.70	.30	.20	14	7.1	19	9.9	30	1.9	3.1
29	2.5	.60	.70	.30	-----	12	6.2	12	6.6	21	1.7	2.6
30	2.3	.50	.80	.30	-----	10	5.8	7.5	4.8	17	1.7	2.0
31	2.3	-----	.80	.30	-----	9.0	-----	6.2	-----	12	1.7	-----
TOTAL	67.0	75.10	7.20	19.30	6.40	893.90	284.6	730.8	126.1	165.70	105.4	48.30
MEAN	2.16	2.50	.23	.62	.23	28.8	9.49	23.6	4.20	5.35	3.40	1.61
MAX	3.8	5.4	.80	.90	.30	77	30	74	12	30	15	3.6
MIN	1.2	.50	0	.30	.20	.20	2.9	4.1	1.4	.30	1.0	.40

CAL YR 1972 TOTAL 2,748.90 MEAN 7.51 MAX 302 MIN 0  
WTR YR 1973 TOTAL 2,529.80 MEAN 6.93 MAX 77 MIN 0

## STREAMS TRIBUTARY TO LAKE SUPERIOR

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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 (8 m) downstream from lower bridge on U.S. Highway 61 at Scanlon, 0.6 mi (1.0 km) downstream from Minnesota Power and Light Co powerplant, 3 mi (5 km) upstream from Thomson Reservoir, and 3.2 mi (5.1 km) upstream from Midway River.

DRAINAGE AREA.--3,430 mi<sup>2</sup> (8,880 km<sup>2</sup>), 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 (335.655 m) above mean sea level, datum of 1929. Oct. 5, 1909, to Sept. 5, 1914, nonrecording gage 3 mi (5 km) downstream and 50 ft (15 m) below powerplant at datum about 420 ft (128 m) lower. Sept. 6, 1914, to Aug. 4, 1953, powerplant record at Thomson hydroelectric plant.

AVERAGE DISCHARGE (UNADJUSTED).--65 years, 2,272 ft<sup>3</sup>/s (64.34 m<sup>3</sup>/s), 9.00 in/yr (229 mm/yr).

EXTREMES.--Current year: Maximum discharge, 10,300 ft<sup>3</sup>/s (292 m<sup>3</sup>/s) May 11 (gage height, 7.67 ft or 2.338 m); minimum, 557 ft<sup>3</sup>/s (15.8 m<sup>3</sup>/s) Dec. 8 (gage height, 2.56 ft or 0.780 m), result of freezeup.  
Period of record: Maximum discharge, 37,900 ft<sup>3</sup>/s (1,070 m<sup>3</sup>/s) May 9, 1950; maximum gage height, 15.8 ft (4.816 m) May 9, 1950, from Minnesota Highway Department (discharge uncertain); minimum discharge, 80 ft<sup>3</sup>/s (2.27 m<sup>3</sup>/s) Aug. 29, 1963; minimum daily, 109 ft<sup>3</sup>/s (3.09 m<sup>3</sup>/s) 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 or 410 hm<sup>3</sup>). 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3,980	2,600	1,600	1,600	1,600	1,700	3,600	2,990	4,000	2,460	2,000	1,840
2	3,300	3,120	1,300	1,600	1,700	1,700	3,430	3,150	3,900	2,380	2,000	2,330
3	3,040	5,140	1,100	1,600	1,700	1,700	3,330	3,840	3,740	2,160	1,980	4,020
4	2,990	5,220	1,000	1,600	1,600	1,700	3,040	3,820	3,410	2,000	1,800	5,660
5	3,040	4,520	950	1,600	1,600	1,700	2,890	3,480	3,130	1,900	1,610	5,160
6	2,720	4,400	1,400	1,600	1,600	1,700	2,630	3,280	2,460	1,740	2,300	4,080
7	2,650	4,580	1,200	1,600	1,500	1,700	2,510	5,200	2,280	1,610	2,440	3,120
8	2,590	4,560	850	1,600	1,300	1,700	2,400	8,170	2,370	1,350	2,130	2,540
9	2,210	4,400	1,200	1,600	1,300	1,700	2,270	7,720	2,960	1,350	2,590	2,310
10	2,270	4,120	1,300	1,600	1,300	1,800	2,070	8,080	3,280	1,220	2,600	2,540
11	2,420	4,300	1,600	1,600	1,600	2,000	1,770	9,820	2,740	1,280	2,630	2,280
12	2,430	3,820	1,300	1,600	1,700	2,200	1,890	9,340	2,650	1,410	2,330	1,960
13	2,440	3,800	1,600	1,600	1,700	2,900	1,940	8,050	2,280	1,300	3,030	1,670
14	2,420	3,040	1,400	1,700	1,500	4,180	1,630	6,880	2,090	1,280	2,820	1,280
15	2,080	2,380	1,300	1,700	1,400	5,100	1,810	5,920	1,710	1,350	2,520	961
16	2,110	2,570	1,100	1,700	1,200	4,980	2,280	5,180	1,790	1,410	3,540	1,130
17	2,110	2,440	1,000	1,700	1,500	4,340	3,150	4,420	1,720	1,480	3,840	1,200
18	2,300	2,550	1,500	1,700	1,600	3,560	3,280	3,800	1,770	1,380	3,620	1,140
19	2,270	2,630	1,500	1,700	1,600	3,220	3,220	3,520	2,020	1,190	2,990	1,110
20	2,200	2,570	1,500	1,700	1,600	3,010	3,480	3,060	2,020	1,280	2,520	1,190
21	2,430	2,440	1,500	1,700	1,600	2,870	5,680	2,960	1,840	1,360	2,480	1,260
22	2,650	2,190	1,500	1,700	1,600	2,820	7,750	2,670	1,940	1,310	2,210	1,720
23	2,740	2,230	1,500	1,700	1,600	2,790	6,910	2,650	2,130	1,280	2,040	1,470
24	2,760	2,540	1,500	1,700	1,700	3,220	5,960	2,770	2,040	1,380	1,930	1,550
25	2,440	2,310	1,500	1,700	1,700	3,390	5,340	3,480	2,040	1,280	1,840	1,650
26	2,330	2,370	1,500	1,700	1,700	3,600	4,780	5,440	2,360	1,330	1,760	1,760
27	2,440	2,120	1,500	1,700	1,800	4,080	4,380	6,260	2,800	1,570	1,530	2,390
28	2,490	1,970	1,500	1,700	1,700	4,400	3,840	5,720	3,030	1,650	1,550	2,850
29	2,440	1,610	1,600	1,600	-----	4,060	3,440	5,300	2,910	1,700	1,410	2,370
30	2,400	1,700	1,600	1,500	-----	4,060	3,100	4,660	2,620	1,960	1,260	1,980
31	2,510	-----	1,600	1,500	-----	3,860	-----	4,220	-----	2,000	1,370	-----
TOTAL	79,140	94,240	42,500	50,900	44,000	91,940	103,800	155,850	76,030	48,350	70,670	66,521
MEAN	2,553	3,141	1,371	1,642	1,571	2,966	3,460	5,027	2,534	1,560	2,280	2,217
MAX	3,980	5,220	1,600	1,700	1,800	5,100	7,750	9,820	4,000	2,460	3,840	5,660
MIN	2,080	1,610	850	1,500	1,200	1,700	1,630	2,650	1,710	1,190	1,260	961
(f)	-264	-106	-883	-1,144	-1,266	+356	+1,311	+1,117	+184	-241	+428	-30
MEAN #	2,289	3,035	538	498	305	3,322	4,771	6,144	2,718	1,319	2,708	2,187
CFSM #	0.67	0.88	0.16	0.15	0.09	0.97	1.39	1.79	0.79	0.38	0.79	0.64
IN. #	0.77	0.99	0.18	0.17	0.09	1.12	1.55	2.07	0.88	0.44	0.91	0.71
CAL YR 1972	MEAN	3,547	MAX	23,700	MIN	850	MEAN #	3,580	CFSM #	1.04	IN #	14.21
WTR YR 1973	MEAN	2,531	MAX	9,820	MIN	850	MEAN #	2,496	CFSM #	0.73	IN #	9.88

# 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

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

LOCATION.--Lat 46°47'22", long 95°52'00", on line between secs. 4 and 9, T.138 N., R.41 W., Becker County, on left wingwall of remains of old dam at outlet of Detroit Lake, 60 ft (18 m) upstream from bridge on County Highway 22 and 2.5 mi (4.0 km) Southwest of City of Detroit Lakes.

PERIOD OF RECORD.--July 1968 to July 1971, October 1972 to September 1973.

GAGE.--Nonrecording gage read once daily. Datum of gage is 1,330.01 ft (405.39 m) above mean sea level, datum of 1929.

EXTREMES.--Current year: Maximum daily discharge, 92 ft<sup>3</sup>/s (2.61 m<sup>3</sup>/s) Sept. 27, 28; maximum gage height, 4.43 ft (1.350 m) Sept. 27, 28; minimum daily discharge, 3.0 ft<sup>3</sup>/s (0.085 m<sup>3</sup>/s) July 22.  
Period of record: Maximum discharge, 111 ft<sup>3</sup>/s (3.14 m<sup>3</sup>/s) Apr. 17, 1969 (gage height, 4.55 ft or 1.387 m); minimum daily, -4.6 ft<sup>3</sup>/s (0.13 m<sup>3</sup>/s) Oct. 9, 1969; no flow at times in 1968, 1969 and 1971.

REMARKS.--Records fair.

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

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	12	10	12	16	12	10	27	18	5.6	10	18	16
2	12	10	12	16	12	10	27	17	5.2	10	18	24
3	12	9.5	12	16	12	10	26	17	9.0	10	18	32
4	12	10	12	16	11	10	26	16	9.0	10	17	34
5	13	10	12	16	11	10	25	16	8.5	10	16	34
6	12	10	13	16	11	11	25	16	8.5	11	18	36
7	12	10	13	15	12	12	25	14	8.5	10	20	37
8	10	10	13	14	12	12	24	14	10	10	19	39
9	9.5	10	13	14	12	13	24	14	9.5	13	17	39
10	9.0	10	13	14	11	13	22	14	8.5	13	17	39
11	8.5	10	12	14	11	13	21	14	8.5	10	16	39
12	8.0	10	12	14	10	14	20	13	8.0	9.0	16	40
13	8.0	10	12	13	10	16	19	13	7.5	7.5	16	38
14	8.0	10	12	13	10	19	18	13	7.5	6.5	15	38
15	8.0	10	12	13	10	20	22	11	7.0	7.5	15	38
16	6.5	10	12	13	10	22	20	10	13	6.0	15	38
17	6.5	10	12	12	10	23	21	9.0	14	4.4	14	37
18	6.5	10	12	12	10	24	20	8.5	15	4.8	14	37
19	6.0	10	12	13	10	26	22	8.5	14	4.4	14	37
20	7.0	10	12	12	10	26	25	7.5	14	4.0	13	37
21	8.0	10	12	12	10	26	23	7.5	14	3.7	13	40
22	8.5	10	12	12	10	26	22	7.5	14	3.0	14	39
23	8.0	10	12	12	9.5	26	22	6.5	14	4.7	13	42
24	7.7	10	12	12	9.5	28	23	9.0	14	13	12	44
25	7.5	10	12	12	9.5	28	22	9.0	14	16	12	78
26	7.5	10	12	12	9.5	28	21	10	13	16	12	90
27	6.5	10	12	12	9.5	28	20	9.5	12	15	9.5	92
28	7.5	10	12	12	10	28	20	8.5	10	14	9.0	92
29	8.0	10	14	12	-----	28	19	7.0	10	17	8.5	90
30	9.0	10	15	12	-----	28	18	6.5	10	18	8.0	90
31	9.5	-----	16	12	-----	28	-----	6.5	-----	18	10	-----
TOTAL	274.2	259.5	386	414	294.5	616	669	351.0	315.8	309.5	447.0	1,406
MEAN	8.85	9.98	12.5	13.4	10.5	19.9	22.3	11.3	10.5	9.98	14.4	46.9
MAX	13	10	16	16	12	28	27	18	15	18	20	92
MIN	6.0	9.5	12	12	9.5	10	18	6.5	5.2	3.0	8.0	16
AC-FT	544	594	766	821	584	1,220	1,330	696	626	614	887	2,790
WTR YR 1973	TOTAL	5,782.5	MEAN	15.8	MAX	92	MIN	3.0	AC-FT	11,470		



## RED RIVER OF THE NORTH BASIN

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

LOCATION.--Lat 46°46'55", long 95°52'57", in SE¼ sec.8, T.138 N., R.41 W., Becker County, on downstream side of dam between Muskrat Lake and Sallie Lake at State Fish Hatchery, 3 mi (4.8 km) southwest of Detroit Lakes.

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

GAGE.--Two nonrecording gages. Datum of gage in the boat lock is 1,327.63 ft (404.66 m) above mean sea level, datum of 1929, and in the spillway the datum of gage is 1,328.98 ft (405.07 m) above mean sea level, datum of 1929.

EXTREMES.--Current year: Maximum daily discharge, 92 ft<sup>3</sup>/s (2.61 m<sup>3</sup>/s) Sept. 26; minimum daily, 3.87ft<sup>3</sup>/s (0.11 m<sup>3</sup>/s) July 22.  
Period of Record: Maximum daily discharge, 135 ft<sup>3</sup>/s (3.82 m<sup>3</sup>/s) Apr. 15, 1969; no flow several days in 1968 and 1969.

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

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

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	11	12	15	15	14	13	33	26	10	9.3	12	12
2	12	13	16	15	14	13	33	25	9.8	9.8	13	16
3	11	12	16	15	14	13	35	25	11	9.8	14	28
4	12	12	16	15	14	14	34	25	8.3	8.8	12	29
5	16	13	15	15	15	14	37	24	7.8	8.8	10	32
6	16	12	15	15	15	14	41	24	7.8	8.8	12	34
7	14	13	14	16	15	16	37	24	7.8	7.8	13	35
8	14	13	14	16	15	16	36	22	7.8	7.8	14	37
9	13	13	14	16	15	16	35	22	8.3	11	13	36
10	11	13	14	16	15	17	34	24	8.3	9.3	13	36
11	11	13	14	15	15	18	33	24	7.3	8.8	12	38
12	11	14	14	15	15	18	33	22	7.3	8.3	11	38
13	10	14	14	15	15	20	31	21	6.8	7.3	10	38
14	10	13	14	14	15	23	22	21	6.8	6.4	10	38
15	8.9	13	14	14	15	23	25	20	6.8	6.0	10	38
16	8.1	14	14	14	15	26	30	20	10	5.5	9.9	38
17	8.6	14	14	14	15	26	34	18	11	4.8	9.9	37
18	8.6	14	14	14	15	26	32	18	11	5.2	9.8	39
19	7.0	12	14	14	15	28	31	16	12	4.8	8.8	42
20	8.2	12	14	14	14	29	28	16	12	4.8	8.3	49
21	11	12	14	14	14	29	27	16	12	4.4	8.8	60
22	10	13	14	15	14	29	27	16	12	3.8	9.9	63
23	9.7	13	14	15	14	29	26	15	12	4.7	9.9	56
24	9.2	12	14	15	13	33	26	15	12	9.4	9.3	63
25	8.9	13	14	14	13	34	26	16	12	9.9	8.8	85
26	8.2	13	14	15	13	33	26	16	11	8.9	8.3	92
27	8.6	13	14	15	13	32	26	16	10	8.4	7.8	88
28	8.6	13	14	15	13	32	26	14	9.8	8.4	6.4	84
29	9.1	13	14	15	-----	32	27	13	9.8	9.1	5.5	82
30	12	14	15	15	-----	32	25	12	9.3	11	5.2	81
31	12	-----	15	14	-----	33	-----	10	-----	12	7.3	-----
TOTAL	328.7	388	445	459	402	731	916	596	287.8	243.1	312.9	1,444
MEAN	10.6	12.9	14.4	14.8	14.4	23.6	30.5	19.2	9.59	7.84	10.1	48.1
MAX	16	14	16	16	15	34	41	26	12	12	14	92
MIN	7.0	12	14	14	13	13	22	10	6.8	3.8	5.2	12
AC-FT	652	770	883	910	797	1,450	1,820	1,180	571	482	621	2,860
CAL YR 1972	TOTAL	12,287.0	MEAN	33.6	MAX	115	MIN	3.7	AC-FT	24,370		
WTR YR 1973	TOTAL	6,553.5	MEAN	18.0	MAX	92	MIN	3.8	AC-FT	13,000		

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

LOCATION.--Lat 46°45'27", long 95°53'57", in NW¼ sec.20, T.138 N., R.41 W., Becker County, on left bank near downstream end of culvert on County Highway 22, 250 ft (76 m) downstream from Sallie Lake, 800 ft (244 m) upstream from Minnesota Department of Conservation dam and 5 mi (8 km) southwest of city of Detroit Lakes.

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

GAGE.--Water-stage recorder. Datum of gage is 1,327.58 ft (404.65 m) above mean sea level, datum of 1929.

AVERAGE DISCHARGE.--5 years, 28.4 ft<sup>3</sup>/s (0.80 m<sup>3</sup>/s), 20,580 acre-ft/yr (25.4 hm<sup>3</sup>/yr).

EXTREMES.--Current year: Maximum discharge, 123 ft<sup>3</sup>/s (3.48 m<sup>3</sup>/s) Sept. 25 (gage height, 1.48 ft or 0.451 m); minimum, 3.8 ft<sup>3</sup>/s (0.11 m<sup>3</sup>/s) July 22 (gage height, 0.90 ft or 0.274 m).  
Period of record: Maximum discharge, 163 ft<sup>3</sup>/s (4.62 m<sup>3</sup>/s) Nov. 21, 1971 (gage height, 1.54 ft or 0.469 m); maximum gage height, 1.57 ft (0.479 m) Apr. 4, 5, May 14, 15; no flow for several days in 1969, 1970.

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

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	13	14	17	20	20	14	39	25	14	8.3	23	18
2	14	14	18	20	20	14	38	26	14	10	21	24
3	14	14	18	20	20	14	38	25	16	9.8	17	34
4	14	15	18	20	20	14	38	24	15	9.2	16	36
5	15	15	18	20	20	14	36	22	13	8.7	18	36
6	15	16	18	21	19	15	36	22	12	9.0	21	36
7	15	17	18	21	18	16	38	24	10	9.7	22	36
8	15	16	18	21	18	15	38	24	11	8.6	24	36
9	13	15	18	21	18	15	38	25	9.5	11	22	36
10	12	15	18	21	18	15	37	26	9.3	12	22	36
11	14	17	18	20	18	16	40	26	8.8	10	21	34
12	12	17	18	20	18	17	40	25	7.7	9.9	20	33
13	11	14	18	20	18	18	38	22	7.5	9.0	21	34
14	11	15	18	20	18	21	37	21	7.4	7.7	18	35
15	9.2	15	18	20	16	25	47	20	7.6	6.6	18	37
16	9.8	15	18	20	16	25	42	20	9.6	6.3	17	37
17	8.6	16	19	20	15	24	41	18	9.8	6.0	18	36
18	7.6	16	18	20	15	24	38	16	12	7.1	17	36
19	6.4	16	19	20	15	26	41	16	10	6.6	18	39
20	6.7	17	19	20	15	29	50	16	10	5.7	13	39
21	8.2	17	20	20	15	31	44	16	11	5.0	13	51
22	8.6	16	19	20	14	32	41	16	10	4.6	14	67
23	8.6	16	20	20	14	32	39	16	9.8	6.3	14	69
24	9.2	16	19	20	14	37	34	16	10	16	14	83
25	9.2	18	20	20	14	40	32	17	11	21	14	96
26	9.2	18	19	20	14	40	30	16	11	20	14	86
27	9.6	18	18	20	14	38	28	15	12	19	13	88
28	9.8	18	18	20	14	40	26	14	11	17	10	89
29	9.3	18	20	20	-----	41	25	14	9.2	17	9.8	91
30	12	17	20	20	-----	41	25	14	8.7	21	9.8	91
31	14	-----	20	20	-----	41	-----	14	-----	20	11	-----
TOTAL	344.0	481	575	625	468	784	1,114	609	317.9	338.1	523.6	1,499
MEAN	11.1	16.0	18.5	20.2	16.7	25.3	37.1	19.6	10.6	10.9	16.9	50.0
MAX	15	18	20	21	20	41	50	26	16	21	24	96
MIN	6.4	14	17	20	14	14	25	14	7.4	4.6	9.8	18
AC=FT	682	954	1,140	1,240	928	1,560	2,210	1,210	631	671	1,040	2,970
CAL YR 1972	TOTAL	13,800.5	MEAN	37.7	MAX	112	MIN	5.3	AC=FT	27,370		
WTR YR 1973	TOTAL	7,678.6	MEAN	21.0	MAX	96	MIN	4.6	AC=FT	15,230		

## 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 (302 m) downstream from bridge on U.S. Highway 52, 3 mi (4.8 km) northwest of Fergus Falls, and 7.5 mi (12 km) upstream from mouth.

DRAINAGE AREA.--482 mi<sup>2</sup> (1,248 km<sup>2</sup>).

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 (358.74 m) above mean sea level, datum of 1929 (levels by Minnesota Highway Department. June 19, 1909, to Dec. 31, 1912, nonrecording gage at site 1 mi (1.6 km) 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 (274 m) upstream at datum 3.00 ft (0.91 m) higher.

AVERAGE DISCHARGE.--34 years (1909-12, 1942-73), 59.0 ft<sup>3</sup>/s (1.67 m<sup>3</sup>/s), 56,510 acre-ft/yr (69.7 hm<sup>3</sup>/yr).

EXTREMES.--Current year: Maximum discharge, 163 ft<sup>3</sup>/s (4.62 m<sup>3</sup>/s) Mar. 25 (gage height, 3.97 ft or 1.210 m); maximum gage height, 5.62 ft (1.713 m) Mar. 4 (backwater from ice); minimum discharge, 14 ft<sup>3</sup>/s (0.40 m<sup>3</sup>/s) Aug. 20 (gage height, 3.05 ft or 0.930 m).

Period of record: Maximum discharge, 756 ft<sup>3</sup>/s (21.4 m<sup>3</sup>/s) Mar. 29, 1943 (gage height, 8.53 ft or 2.600 m, present datum); maximum gage height, 8.99 ft (2.740 m) 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	68	45	41	46	48	57	129	104	73	26	41	22
2	66	50	41	46	48	60	126	106	69	34	35	27
3	65	53	41	46	49	64	123	104	69	42	37	54
4	63	57	41	46	49	67	123	102	67	39	34	73
5	64	56	41	46	49	70	123	95	66	33	31	74
6	69	56	41	46	49	74	123	92	66	27	29	64
7	67	56	41	46	49	79	123	92	64	24	29	57
8	69	54	41	46	50	83	123	92	59	24	27	54
9	66	56	41	46	50	88	123	97	57	23	25	54
10	64	54	41	46	50	93	120	104	56	23	25	51
11	62	54	42	46	50	97	120	104	54	23	25	45
12	59	53	42	46	50	102	114	99	50	23	25	50
13	59	52	42	46	50	105	114	95	47	23	25	50
14	59	51	42	46	50	108	111	90	45	22	25	47
15	56	50	42	46	50	112	117	86	44	22	25	44
16	56	50	42	47	50	114	123	82	42	22	22	48
17	52	50	42	47	50	117	123	78	41	22	21	53
18	49	50	43	47	50	120	117	78	41	21	20	51
19	48	48	43	47	50	123	114	73	42	21	19	50
20	48	48	43	47	50	126	129	71	41	20	15	48
21	50	46	44	47	51	130	139	69	38	19	15	45
22	47	45	44	47	52	130	136	69	31	19	16	45
23	45	44	44	47	52	129	129	69	31	18	17	45
24	44	43	44	47	52	142	120	74	29	19	18	47
25	42	42	45	47	52	152	114	76	28	19	19	56
26	42	41	45	48	52	146	111	76	28	19	19	59
27	42	40	45	48	53	142	106	99	28	19	19	69
28	41	40	46	48	54	142	104	99	28	28	19	78
29	40	40	46	48	-----	136	104	88	27	51	19	69
30	42	41	46	48	-----	136	104	76	26	48	18	59
31	47	-----	46	48	-----	136	-----	73	-----	42	18	-----
TOTAL	1,691	1,465	1,378	1,448	1,409	3,380	3,585	2,714	1,387	815	732	1,588
MEAN	54.5	47.3	42.8	46.7	50.3	109	120	87.5	46.2	26.3	23.6	52.9
MAX	69	57	46	48	54	152	139	104	73	51	41	78
MIN	40	40	41	46	48	57	104	69	26	18	15	22
AC-FT	3,350	2,910	2,630	2,870	2,790	6,700	7,110	5,380	2,750	1,620	1,450	3,150

CAL YR 1972 TOTAL 49,053 MEAN 134 MAX 380 MIN 40 AC-FT 97,300  
WTR YR 1973 TOTAL 21,542 MEAN 59.0 MAX 152 MIN 15 AC-FT 42,730



05045950 Orwell Lake near Fergus Falls, Minn.

LOCATION.--Lat 46°12'55", long 96°10'40", in SW¼ sec.26, T.132 N., R.44 W., Otter Tail County, at dam on Otter Tail River at outlet of Orwell, 7 mi (11 km) southwest of Fergus Falls, Minn.

DRAINAGE AREA.--1,830 mi<sup>2</sup> (4,740 km<sup>2</sup>), 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 (305 m) above mean sea level, adjustment of 1912. Gage readings reduced to elevations above mean sea level.

EXTREMES.--Current year: Maximum contents, 14,000 acre-ft (17.3 hm<sup>3</sup>) Sept. 30 (elevation, 1,069.91 ft or 326.11 m); minimum, 1,030 acre-ft (1.27 hm<sup>3</sup>) Apr. 26 (elevation, 1,048.15 ft or 319.48 m).  
Period of record: Maximum contents, 16,920 acre-ft (20.9 hm<sup>3</sup>) June 17, 1962, May 23, 1966 (elevation, 1,072.38 ft or 326.86 m) minimum (after initial filling), 844 acre-ft (1.04 hm<sup>3</sup>) Aug. 26, 27, 1953 (elevation, 1,046.96 ft or 319.11 m).

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 (326 m) (maximum operating stage) is 14,100 acre-ft (17.4 hm<sup>3</sup>) of which 13,100 acre-ft (16.2 hm<sup>3</sup>) is controlled storage above elevation 1,048 ft (319 m) (minimum operating stage). Dead storage, 210 acre-ft (0.259 hm<sup>3</sup>). 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 1972 TO SEPTEMBER 1973

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30.....	1,068.92	12,920	-
Oct. 31.....	1,067.33	11,400	-1,520
Nov. 30.....	1,065.71	9,970	-1,430
Dec. 31.....	1,058.77	5,020	-4,950
CAL YR 1972.....	-	-	-1,690
Jan. 31.....	1,055.91	3,610	-1,410
Feb. 28.....	1,053.29	2,520	-1,090
Mar. 31.....	1,049.11	1,230	-1,290
Apr. 30.....	1,049.63	1,360	+130
May 31.....	1,050.24	1,520	+160
June 30.....	1,052.09	2,080	+560
July 31.....	1,061.28	6,600	+4,520
Aug. 31.....	1,065.34	9,670	+3,070
Sept. 30.....	1,069.90	13,990	+4,320
WTR YR 1973.....	-	-	+1,070

## 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 mi (1.1 km) downstream from Orwell Dam, 6.1 mi (9.8 km) downstream from Dayton Hollow Dam, 8 mi (13 km) south-west of Fergus Falls, and 11.1 mi (17.9 km) downstream from Pelican River.

DRAINAGE AREA.--1,830 mi<sup>2</sup> (4,740 km<sup>2</sup>), 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 (313.84 m) 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 (0.61 m) higher; Nov. 18, 1933, to Mar. 21, 1953, at site 6.1 mi (9.8 km) upstream at datum 40.30 ft (12.28 m) higher.

AVERAGE DISCHARGE.--43 years, 294 ft<sup>3</sup>/s (8.33 m<sup>3</sup>/s), 213,000 acre-ft/yr (263 hm<sup>3</sup>/yr).

EXTREMES.--Current year: Maximum discharge, 714 ft<sup>3</sup>/s (20.2 m<sup>3</sup>/s) Mar. 15 (gage height, 3.48 ft or 1,060 m); minimum, 53 ft<sup>3</sup>/s (1.50 m<sup>3</sup>/s) July 16 (gage height, 2.10 ft or 0.640 m), result of regulation.

Period of record: Maximum discharge, 1,710 ft<sup>3</sup>/s (48.4 m<sup>3</sup>/s) June 17, 1953 (gage height, 5.60 ft or 1.707 m, backwater from aquatic vegetation); minimum, 0.70 ft<sup>3</sup>/s (0.020 m<sup>3</sup>/s) Aug. 5, 1970 (gage height, 1.28 ft or 0.390 m), result of regulation.

REMARKS.--Records good. 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	412	408	434	364	374	382	520	401	417	185	139	84
2	434	395	434	362	372	379	519	401	393	190	138	84
3	465	395	435	362	369	375	512	395	379	195	137	87
4	464	395	431	362	369	378	510	378	361	199	139	87
5	462	393	429	358	368	398	477	373	344	201	146	87
6	462	395	428	356	368	417	468	362	340	203	145	76
7	462	395	424	353	368	538	470	367	344	205	148	73
8	462	393	419	352	368	616	476	367	337	204	149	73
9	456	393	418	356	367	594	455	370	327	203	149	75
10	450	390	418	355	367	567	444	373	324	175	186	76
11	447	390	413	352	365	550	450	378	278	161	210	76
12	440	391	403	351	363	539	449	384	254	165	210	78
13	440	392	397	346	361	531	448	395	258	169	210	78
14	440	394	395	345	361	597	444	395	262	168	200	78
15	452	391	393	340	360	672	442	384	263	167	178	78
16	435	390	391	340	361	667	443	342	263	147	174	78
17	408	390	389	339	358	606	438	328	269	122	136	132
18	423	390	387	337	352	558	431	334	273	122	113	184
19	434	390	385	340	350	532	417	340	272	122	113	168
20	433	390	383	344	351	503	405	339	225	123	100	169
21	429	390	379	343	346	479	401	346	198	123	83	169
22	429	388	378	345	339	452	418	345	201	123	84	169
23	429	384	378	345	338	453	439	345	200	125	84	165
24	429	384	379	373	338	478	457	356	203	128	84	206
25	429	385	377	398	337	523	406	362	207	130	84	246
26	429	364	373	396	340	519	350	384	212	133	83	246
27	429	384	370	395	340	523	328	379	219	133	84	246
28	429	384	368	391	367	577	317	385	222	133	84	246
29	425	364	367	381	-----	582	317	390	202	134	85	246
30	423	405	367	379	-----	542	350	395	183	136	85	248
31	423	-----	367	374	-----	524	-----	418	-----	137	86	-----
TOTAL	13,584	11,732	12,309	11,134	10,017	16,051	13,001	11,511	8,230	4,861	4,046	4,108
MEAN	438	391	397	359	358	518	433	371	274	157	131	137
MAX	465	408	435	398	374	672	520	418	417	205	210	248
MIN	408	384	367	337	337	375	317	328	183	122	83	73
AC=FT	26,940	23,270	24,410	22,060	19,870	31,840	25,790	22,830	16,320	9,640	8,030	8,150
CAL YR 1972	TOTAL	225,568	MEAN	616	MAX	1,360	MIN	76	AC=FT	447,400		
WTR YR 1973	TOTAL	120,584	MEAN	330	MAX	672	MIN	73	AC=FT	239,200		

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

LOCATION.--Lat 45°51'45", long 96°34'25", in SW¼SW¼ sec.27, T.128 N., R.47 W., Roberts County, on left bank just downstream from Big Slough Outlet, 300 ft (91 m) downstream from White Rock Dam, 4 mi (6 km) south of White Rock, and 5 mi (8 km) northwest of Wheaton, Minn.

DRAINAGE AREA.--1,160 mi<sup>2</sup> (3,004 km<sup>2</sup>), approximately.

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

GAGE.--Water-stage recorder. Datum of gage is 960.00 ft (292.61 m) 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 (0.03 m) lower. Jan. 15, 1943, to Sept. 30, 1963, water-stage recorder at same site at datum 0.11 ft (0.03 m) lower.

AVERAGE DISCHARGE.--32 years, 81.8 ft<sup>3</sup>/s (2.317 m<sup>3</sup>/s), 59,260 acre-ft/yr (73.1 hm<sup>3</sup>/yr).

EXTREMES.--Current year: Maximum discharge, 381 ft<sup>3</sup>/s (10.8 m<sup>3</sup>/s) Mar. 27 (gage height, 7.00 ft or 2.13 m); no flow for many days.

Period of record: Maximum discharge, 3,770 ft<sup>3</sup>/s (107 m<sup>3</sup>/s), occurred during period Apr. 19-21, 1969 (gage height, 15.07 ft or 4.59 m, from floodmark); no flow at times in most years.

REMARKS.--Records good except those for winter periods, which are fair. Flow regulated by Lake Traverse-Boise de Sioux Flood Control and Water Conservation project (available capacity for flood control, 137,000 acre-ft or 169 hm<sup>3</sup>).

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0	.20	.78	.76	6.3	12	295	2.2	57	.17	1.0	.10
2	0	.21	.75	.85	6.4	13	288	3.4	48	.13	5.0	.06
3	0	.29	.75	1.0	6.5	14	263	4.4	46	.10	1.5	.08
4	0	.36	.75	1.2	6.6	16	227	6.1	43	.02	.10	.06
5	.03	.40	.72	1.4	6.7	17	185	10	40	.13	.02	.01
6	.02	.45	.72	1.6	6.9	19	183	3.6	20	.20	0	0
7	.01	.48	.72	1.9	7.0	20	187	2.8	1.3	.20	0	0
8	.01	.50	.70	2.2	7.1	21	184	2.8	1.2	0	.04	0
9	.01	.52	.70	2.6	7.3	21	132	4.2	3.5	0	.04	.02
10	.02	.52	.68	3.1	7.4	22	72	2.6	.87	0	.01	.03
11	.02	.55	.68	3.5	7.5	22	76	1.8	.79	.09	.01	0
12	.03	.58	.68	4.2	7.6	22	69	1.5	.78	.04	.01	.01
13	.04	.58	.65	4.5	7.8	22	54	1.4	.94	.02	0	.01
14	.04	.60	.65	4.6	8.0	105	14	1.2	2.4	0	0	.01
15	.06	.62	.65	4.7	8.2	125	6.5	3.6	.90	0	.10	.12
16	.07	.62	.62	4.7	8.2	144	3.8	1.0	.52	0	.22	.09
17	.06	.65	.62	4.8	8.4	180	5.8	1.2	.57	.01	.16	.06
18	.07	.68	.61	4.9	8.6	142	10	1.1	4.7	0	.03	.02
19	.06	.68	.65	5.0	8.7	138	14	.88	6.3	0	0	.01
20	.07	.70	.65	5.1	8.9	155	20	.85	.31	0	0	.01
21	.07	.72	.65	5.2	9.0	167	10	1.0	.27	0	0	.07
22	.07	.72	.65	5.2	9.2	229	6.0	.85	.22	0	.06	.10
23	.09	.75	.68	5.3	9.4	294	3.6	.85	.21	.04	.06	.08
24	.11	.75	.65	5.4	9.6	295	3.8	3.6	.53	.01	.08	.10
25	.11	.78	.65	5.5	9.8	295	4.0	61	.46	.01	.08	.06
26	.13	.80	.65	5.6	10	294	4.1	138	.24	0	.05	.09
27	.15	.80	.65	5.7	10	327	4.4	76	.08	.01	.02	.09
28	.15	.81	.66	5.8	11	311	4.3	47	.03	0	0	.07
29	.16	.80	.67	6.0	-----	289	3.4	51	.01	.02	0	.04
30	.15	.78	.68	6.0	-----	290	2.4	51	.02	0	0	.02
31	.17	-----	.71	6.2	-----	293	-----	62	-----	.02	.07	-----
TOTAL	1.98	17.90	21.03	124.51	228.1	4,314	2,335.1	548.93	281.15	1.22	8.66	1.42
MEAN	.064	.60	.68	4.02	8.15	139	77.8	17.7	9.37	.039	.28	.047
MAX	.17	.81	.78	6.2	11	327	295	138	57	.20	5.0	.12
MIN	0	.20	.61	.76	6.3	12	2.4	.85	.01	0	0	0
AC-FT	3.9	36	42	247	452	8,560	4,630	1,090	558	2.4	17	2.8
CAL YR 1972	TOTAL 43,612.61		MEAN 119	MAX 755	MIN 0	AC-FT 86,510						
WTR YR 1973	TOTAL 7,884.00		MEAN 21.6	MAX 327	MIN 0	AC-FT 15,640						

LOCATION.--Lat 46°15'55", long 96°35'40", in NE¼ sec.8, T.132 N., R.47 W., Richland County, on left bank in Wahpeton, 800 ft (240 m) downstream from confluence of Bois de Sioux and Otter Tail Rivers and at mile 548.6 (kilometre 882.7).

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

GAGE.--Water-stage recorder and concrete and wooden dam. Datum of gage is 942.97 ft (287.417 m) above mean sea level. Prior to Aug. 6, 1943, U.S. Weather Bureau nonrecording gage 800 ft (240 m) upstream, converted to present datum. Aug. 6, 1943, to Oct. 27, 1950, nonrecording gage at present site and datum.

AVERAGE DISCHARGE.--30 years (1943-73), 532 ft<sup>3</sup>/s (15.07 m<sup>3</sup>/s) 385,400 acre-ft/yr (475.2 hm<sup>3</sup>/yr); median of yearly mean discharges, 470 ft<sup>3</sup>/s (13.3 m<sup>3</sup>/s) 341,000 acre-ft/yr (420 hm<sup>3</sup>/yr).

EXTREMES.--Current year: Maximum discharge, 1,220 ft<sup>3</sup>/s (34.6 m<sup>3</sup>/s) Mar. 15, gage height 6.08 ft (1.853 m); maximum gage height 6.41 ft (1.954 m) Mar. 13, backwater from ice; minimum, 44 ft<sup>3</sup>/s (1.25 m<sup>3</sup>/s) Sept. 10, gage height, 2.55 ft (0.777 m).  
Period of record: Maximum discharge, 9,200 ft<sup>3</sup>/s (261 m<sup>3</sup>/s) Apr. 10, 1969, gage height, 16.34 ft (4.980 m); minimum, 8 ft<sup>3</sup>/s (0.23 m<sup>3</sup>/s) Aug. 25, 1961, gage height, 2.26 ft (0.689 m); minimum gage height, 1.76 ft (0.536 m) Sept. 8, 9, 1969 (gates open).  
A stage of 17.0 ft (5.182 m), discharge, 10,500 cfs (297 m<sup>3</sup>/s) occurred in the spring of 1897 and has not been exceeded since.

REMARKS.--Records good. Flow regulated by Orwell Reservoir, capacity, 14,100 acre-ft (17.4 hm<sup>3</sup>) at elevation 1,070 ft (326.136 m) above mean sea level, adjustment of 1912; Lake Traverse, capacity, 137,000 acre-ft (169 hm<sup>3</sup>), available for flood control; numerous other controlled lakes and ponds, and several powerplants. Records of chemical analyses for water year 1973 are published in Part 2 of this report.

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	395	423	410	361	364	361	869	352	466	208	115	129
2	394	373	430	360	363	395	857	394	440	229	112	104
3	407	396	410	358	360	408	844	403	457	202	109	91
4	401	393	380	355	358	406	825	394	434	201	106	86
5	408	393	410	351	357	399	793	376	403	204	118	82
6	465	384	420	349	355	420	724	355	380	202	133	84
7	451	389	415	347	352	462	691	361	381	199	133	80
8	451	387	412	346	350	504	698	358	372	205	133	74
9	468	387	408	345	349	622	689	358	355	213	121	64
10	448	387	406	345	345	818	647	361	335	231	124	56
11	408	387	402	350	345	890	564	364	333	185	157	51
12	440	387	400	350	349	890	551	364	300	147	199	54
13	454	387	398	350	348	1,080	551	370	265	146	208	56
14	453	380	394	345	340	1,040	534	370	262	154	208	57
15	455	334	395	345	336	1,180	506	361	259	164	217	63
16	447	370	393	344	350	1,200	484	352	260	155	178	66
17	440	350	390	342	383	1,110	471	328	269	127	169	64
18	449	340	388	340	409	979	466	295	279	94	127	91
19	417	335	387	335	394	902	449	301	276	86	110	143
20	474	335	385	330	393	819	448	304	244	84	106	135
21	401	335	380	335	360	774	394	301	246	86	103	146
22	433	330	378	340	360	777	403	310	209	94	84	152
23	431	434	375	340	380	788	406	310	210	109	76	150
24	429	447	374	340	365	891	418	352	206	142	76	163
25	428	345	370	370	350	891	433	370	211	121	77	164
26	425	300	370	378	350	906	400	361	211	109	87	203
27	422	290	364	380	350	906	349	469	216	106	80	214
28	426	240	367	370	350	921	334	519	230	115	69	206
29	428	275	365	370	-----	956	316	471	274	133	68	191
30	440	300	365	367	-----	939	319	449	219	121	71	211
31	443	-----	364	365	-----	899	-----	449	-----	115	106	-----
TOTAL	13,521	10,855	12,111	10,903	10,065	24,533	16,433	11,482	9,042	4,687	3,780	3,430
MEAN	436	362	391	352	359	791	548	370	301	151	122	114
MAX	465	447	430	380	409	1,200	869	519	440	231	217	214
MIN	394	275	364	330	336	361	316	295	206	84	68	51
AC=FT	24,820	21,530	24,020	21,630	19,960	48,660	32,590	22,770	17,930	9,300	7,500	6,800
CAL YR 1972	TOTAL 513,776	MEAN 857	MAX 3,310	MIN 275	AC-FT 622,400							

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

LOCATION.--Lat 46°51'40", long 96°47'00", in NW¼NE¼ sec.18, T.139 N., R.48 W., Cass County, at city waterplant on 4th St. S. in Fargo, 25 mi (40 km) upstream from mouth of Sheyenne River and at mile 453.0 (kilometre 728.9).

DRAINAGE AREA.--6,800 mi<sup>2</sup> (17,600 km<sup>2</sup>), 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 (262.68 m) above mean sea level. Oct. 1, 1960, to Sept. 30, 1962, water-stage recorder at present site at datum 5.6 ft (1.71 m) higher. See WSP 1728 or 1913 for history of changes prior to Oct. 1, 1960.

AVERAGE DISCHARGE (UNADJUSTED).--72 years, 539 ft<sup>3</sup>/s (15.26 m<sup>3</sup>/s), 390,500 acre-ft/yr (481.5 hm<sup>3</sup>/yr); median of yearly mean discharges, 440 ft<sup>3</sup>/s (12.5 m<sup>3</sup>/s) 319,000 acre-ft/yr (393 hm<sup>3</sup>/yr).

EXTREMES.--Current year: Maximum discharge, 1,950 ft<sup>3</sup>/s (55.2 m<sup>3</sup>/s) Mar. 15, gage height, 16.41 ft (5.002 m), backwater from ice; minimum daily discharge, 41 ft<sup>3</sup>/s (1.16 m<sup>3</sup>/s) Aug. 31, gage height, 13.46 ft (4.103 m). Period of record: Maximum discharge, 25,300 ft<sup>3</sup>/s (716 m<sup>3</sup>/s) Apr. 15, 1969, gage height, 37.34 ft (11.381 m); 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 (11.92 m) present datum, discharge, 25,000 cfs (708 m) at site 1.5 mi (2.4 km) downstream.

REMARKS.--Records good. Flow regulated by Orwell Reservoir, capacity, 14,100 acre-ft (17.4 hm<sup>3</sup>/yr) at elevation 1,070 ft (326.136 m) above mean sea level, adjustment of 1912; Lake Traverse, capacity, 137,000 acre-ft (169 hm<sup>3</sup>/s), available for flood control; other controlled lakes and ponds and several powerplants. Some small diversions for municipal supply. Figures of daily discharge do not include diversion by cities of Fargo and Moorhead. Records of chemical analyses and water temperatures for the water year 1973 are published in Part 2 of this report.

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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	386	456	240	398	430	480	923	316	430	169	122	60
2	380	462	250	395	430	490	870	299	436	177	122	90
3	380	449	320	392	430	490	836	310	456	190	114	120
4	380	416	420	390	430	490	812	344	456	232	111	144
5	374	398	418	386	425	500	780	386	442	236	114	137
6	404	398	416	384	420	500	764	374	416	232	122	122
7	423	410	415	382	418	510	732	368	386	225	125	107
8	442	398	414	380	416	525	692	344	380	215	122	101
9	449	380	413	380	415	565	644	356	356	205	125	88
10	449	368	412	380	410	700	595	356	332	195	125	76
11	462	368	410	379	408	860	552	339	310	190	125	68
12	468	368	410	378	405	950	582	339	293	177	125	65
13	462	362	409	378	400	1,040	510	339	272	169	129	62
14	449	362	409	377	400	1,340	482	339	257	152	144	52
15	462	304	408	377	400	1,830	482	339	241	133	169	48
16	462	272	408	377	400	1,800	482	332	240	114	177	46
17	462	330	407	376	410	1,630	456	332	239	111	199	44
18	462	350	406	376	450	1,600	430	316	237	152	181	48
19	462	348	406	375	470	1,490	423	304	236	122	165	48
20	442	345	405	373	490	1,460	430	272	232	114	144	48
21	436	343	404	371	490	1,340	410	251	232	98	130	88
22	442	340	403	373	490	1,140	404	293	232	98	122	114
23	456	345	402	375	490	1,020	386	277	222	101	98	137
24	456	343	402	377	490	1,020	362	293	190	101	88	288
25	456	340	401	378	480	959	362	310	165	114	75	246
26	456	338	401	380	480	941	368	322	165	133	70	222
27	456	335	400	380	480	941	386	356	165	137	62	222
28	442	332	400	400	480	941	380	344	156	133	46	227
29	442	290	400	400	-----	932	368	423	156	137	46	241
30	442	241	400	410	-----	914	332	456	165	122	44	246
31	449	-----	400	420	-----	923	-----	449	-----	122	41	-----
TOTAL	13,593	10,791	12,209	11,897	12,337	30,321	16,235	10,478	8,495	4,806	3,582	3,605
MEAN	438	360	394	384	441	978	541	338	283	155	116	120
MAX	468	462	420	420	490	1,830	923	456	456	236	199	288
MIN	374	241	240	371	400	480	332	251	156	98	41	44
AC=FT	26,940	21,400	24,220	23,600	24,470	60,140	32,200	20,780	16,850	9,530	7,100	7,150
(+)	990	916	978	1,010	900	978	988	1,320	1,390	1,570	1,370	1,010
MEAN*	454	375	410	400	457	994	558	359	306	181	138	137
AC=FT*	27,950	22,320	25,200	24,610	25,370	61,120	33,190	22,100	18,240	11,100	8,470	8,160

## OBSERVED

CAL YR 1972 TOTAL 389,717 MEAN 1,065 MAX 7,080 MIN 240 AC=FT 773,000  
WTR YR 1973 TOTAL 138,349 MEAN 379 MAX 1,830 MIN 41 AC=FT 274,400

## ADJUSTED

MEAN 1,077 AC=FT 780,300  
MEAN 398 AC=FT 288,400

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

\* Adjusted for diversion by Fargo and Moorhead.

05061000 Buffalo River near Hawley, Minn.

LOCATION.--Lat. 46°51'00", long 96°19'45", near center of SE¼ sec.14, T.139 N., R.45 W., Clay County, near left downstream end of bridge on farm lane, 2 mi (3 km) southwest of Hawley.

DRAINAGE AREA.--322 mi<sup>2</sup> (834 km<sup>2</sup>).

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

GAGE.--Water-stage recorder. Datum of gage is 1,111.91 ft (338.91 m) above mean sea level, datum of 1929. Prior to Jan. 29, 1953, nonrecording gage at bridge 1,800 ft (549 m) upstream at datum 3.17 ft (0.97 m) lower.

AVERAGE DISCHARGE.--28 years, 71.8 ft<sup>3</sup>/s (2.033 m<sup>3</sup>/s), 50,020 acre-ft/yr (61.7 hm<sup>3</sup>/yr).

EXTREMES.--Current year: Maximum discharge, 172 ft<sup>3</sup>/s (4.87 m<sup>3</sup>/s) Mar. 18 (gage height, 4.88 ft or 1.487 m); maximum gage height, 5.55 ft (1.692 m) Mar. 5 (backwater from ice); minimum daily discharge, 12 ft<sup>3</sup>/s (0.34 m<sup>3</sup>/s) Jan. 14-27.

Period of record: Maximum discharge, 1,880 ft<sup>3</sup>/s (53.2 m<sup>3</sup>/s) Apr. 9, 1969 (gage height, 9.07 ft or 2.765 m); maximum gage height, 9.31 ft (2.838 m) Aug. 5, 1955; minimum discharge, 4.8 ft<sup>3</sup>/s (0.14 m<sup>3</sup>/s) Aug. 27, 1969; minimum gage height, 2.55 ft (0.777 m) Sept. 5, 1961.

Maximum stage known, about 11.3 ft (3.44 m), present datum, spring of 1921, from information by local resident.

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

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

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	19	21	17	14	13	22	58	43	27	24	24	43
2	18	20	16	14	13	24	57	45	27	23	23	99
3	18	20	16	13	13	26	55	41	27	21	22	126
4	17	21	16	13	13	29	55	36	29	20	23	124
5	17	21	16	13	13	31	55	36	34	20	20	120
6	17	21	16	13	13	35	51	37	32	19	20	124
7	18	21	16	13	13	38	49	37	30	18	21	140
8	18	22	16	13	13	42	48	35	30	18	21	162
9	18	21	16	13	13	48	47	36	28	23	21	169
10	17	21	16	13	13	54	46	37	30	27	20	164
11	18	22	16	13	13	65	44	46	28	24	20	156
12	17	21	16	13	13	75	43	54	26	22	19	146
13	18	20	16	13	13	95	43	52	25	22	20	139
14	17	24	16	12	13	113	43	47	23	21	20	132
15	17	24	16	12	13	135	48	44	23	19	21	124
16	17	24	16	12	13	128	53	41	25	18	20	114
17	16	23	16	12	13	115	49	39	31	17	20	105
18	16	22	15	12	14	124	48	36	36	16	19	97
19	15	22	15	12	14	115	48	36	37	18	18	95
20	16	21	15	12	14	87	52	35	34	19	19	87
21	16	21	15	12	14	81	60	33	32	19	20	85
22	17	20	15	12	14	90	61	34	31	17	23	92
23	17	20	15	12	15	92	56	34	30	19	23	99
24	17	19	15	12	15	85	53	34	28	21	22	107
25	16	18	15	12	16	87	51	34	26	25	21	114
26	19	18	15	12	18	82	49	34	25	26	21	134
27	19	18	15	12	19	77	47	34	25	26	22	143
28	19	17	14	13	20	74	46	34	24	25	22	148
29	19	17	14	13	-----	69	44	32	23	26	20	149
30	22	17	14	13	-----	64	43	28	24	26	19	145
31	24	-----	14	13	-----	60	-----	28	-----	25	20	-----
TOTAL	551	617	479	391	394	2,202	1,502	1,172	850	664	644	3,682
MEAN	17.6	20.6	15.5	12.6	14.1	73.0	50.1	37.8	28.3	21.4	20.8	123
MAX	24	24	17	14	20	135	61	54	37	27	24	169
MIN	15	17	14	12	13	22	43	28	23	16	18	43
AC=FT	1,090	1,220	950	776	781	4,490	2,980	2,320	1,690	1,320	1,280	7,300
CAL YR 1972	TOTAL 36,670											
WTR YR 1973	TOTAL 13,208											
MEAN 100	MEAN 36.2											
MAX 373	MAX 169					MIN 14	AC=FT 72,730					
						MIN 12	AC=FT 26,200					

## 05061500 South Branch Buffalo River at Sabin, Minn.

LOCATION.--Lat 46°46'20", long 96°37'40", in SW¼SW¼ sec.9, T.138 N., R.47 W., Clay County, near center of span on downstream side of highway bridge, 0.3 mi (0.5 km) downstream from Stony Creek and 1 mi (1.6 km) east of Sabin.

DRAINAGE AREA.--522 mi<sup>2</sup> (1,351 km<sup>2</sup>).

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

GAGE.--Nonrecording gage read once or twice daily and crest-stage gage. Datum of gage is 902.39 ft (275.05 m) above mean sea level, datum of 1929 (levels by Soil Conservation Service). Prior to Aug. 17, 1948, nonrecording gage at site 1 mi (1.6 km) downstream at different datum.

AVERAGE DISCHARGE.--28 years, 53.8 ft<sup>3</sup>/s (1,524 m<sup>3</sup>/s), 38,980 acre-ft/yr (48.1 hm<sup>3</sup>/yr).

EXTREMES.--Current year: Maximum discharge, 132 ft<sup>3</sup>/s (3.74 m<sup>3</sup>/s) Mar. 16 (gage height, 7.33 ft or 2.234 m, backwater from ice); maximum gage height, 7.85 ft (2.393 m) Mar. 15 (backwater from ice); minimum discharge, 0.47 ft<sup>3</sup>/s (0.013 m<sup>3</sup>/s) July 9 (gage height, 3.07 ft or 0.936 m).  
Period of record: Maximum discharge, 6,410 ft<sup>3</sup>/s (182 m<sup>3</sup>/s) Apr. 10, 1969 (gage height, 18.12 ft or 5.523 m); no flow for many days in most years.

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

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

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8.1	26	7.7	4.0	6.0	3.9	33	25	16	1.4	4.9	4.9
2	7.9	27	7.4	4.0	6.0	4.0	30	24	12	1.6	4.7	7.2
3	7.0	26	7.1	4.0	6.0	4.1	30	23	10	1.1	5.3	11
4	6.0	24	6.6	4.0	6.0	4.2	28	23	8.4	.90	5.0	16
5	4.6	24	6.3	4.0	6.0	4.3	27	22	6.5	.68	4.9	17
6	5.0	25	6.0	4.0	5.9	4.4	26	19	7.0	.62	4.9	16
7	3.8	25	5.6	4.0	5.8	4.8	24	17	6.2	.57	4.7	15
8	3.9	23	5.2	4.0	5.6	5.5	24	16	6.5	.57	4.1	15
9	4.1	21	4.9	4.0	5.5	6.2	24	17	5.3	.47	4.3	16
10	3.7	19	4.6	4.0	5.4	9.5	24	19	4.4	.68	4.0	16
11	5.8	17	4.2	4.0	5.4	16	23	19	3.7	2.7	3.7	14
12	5.5	15	4.0	4.0	5.3	30	23	22	2.9	1.9	3.7	13
13	6.7	13	3.9	4.1	5.2	50	23	23	2.5	4.1	3.7	11
14	8.6	12	3.9	4.1	5.0	60	22	25	2.4	3.4	3.6	9.1
15	9.7	11	3.9	4.3	4.7	69	23	26	2.5	3.5	3.6	7.7
16	11	11	3.9	4.5	4.6	76	25	25	2.6	3.6	3.5	6.4
17	14	11	4.0	4.7	4.5	79	27	24	2.7	4.1	3.4	5.5
18	16	10	4.0	5.0	4.4	78	25	22	2.8	6.0	3.0	3.5
19	19	10	4.0	5.4	4.3	77	26	18	2.3	6.0	2.7	3.5
20	19	10	4.0	5.6	4.3	72	28	16	2.1	5.8	2.5	3.0
21	20	9.9	4.0	5.8	4.2	54	30	14	1.6	6.0	2.3	2.8
22	21	9.8	4.0	5.9	4.2	43	32	15	1.6	5.8	2.3	3.7
23	22	9.8	4.0	6.0	4.1	41	35	13	1.6	5.7	2.3	5.2
24	22	9.8	4.0	6.0	4.0	49	35	16	1.9	5.5	2.3	6.9
25	23	9.7	4.0	6.0	4.0	50	34	17	2.3	5.5	2.2	19
26	24	9.5	4.0	6.0	3.9	50	34	19	1.9	5.3	2.2	23
27	24	9.2	4.0	6.0	3.8	45	32	21	1.5	5.2	2.3	22
28	25	8.9	4.0	6.0	3.8	46	31	23	1.7	4.9	2.3	21
29	25	8.6	4.0	6.0	-----	41	30	26	1.4	4.9	2.1	21
30	25	8.2	4.0	6.0	-----	38	28	24	1.3	4.9	1.9	21
31	26	-----	4.0	6.0	-----	36	-----	20	-----	4.7	2.2	-----
TOTAL	426.4	453.4	145.2	151.4	137.9	1,150.9	836	633	125.6	108.09	104.6	356.4
MEAN	13.8	15.1	4.68	4.88	4.93	37.1	27.9	20.4	4.19	3.49	3.37	11.9
MAX	26	27	7.7	6.0	6.0	79	35	26	16	6.0	5.3	23
MIN	3.7	8.2	3.9	4.0	3.8	3.9	22	13	1.3	.47	1.9	2.8
AC-FT	846	899	288	300	274	2,280	1,660	1,260	249	214	207	707

CAL YR 1972 TOTAL 22,243.20 MEAN 60.8 MAX 1,800 MIN 1.0 AC-FT 44,120  
WTR YR 1973 TOTAL 4,628.89 MEAN 12.7 MAX 79 MIN .47 AC-FT 9,180





## 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 (30 m) upstream from highway bridge, 0.8 mi (1.3 km) northeast of village of Twin Valley, and 2 mi (3 km) upstream from small tributary.

DRAINAGE AREA.--888 mi<sup>2</sup> (2,300 km<sup>2</sup>).

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 (307.29 m) 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 (30 m) downstream from present site at present datum. Nov. 25, 1934, to Aug. 2, 1950, water-stage recorder 80 ft (24 m) upstream from present site at present datum.

AVERAGE DISCHARGE.--51 years, 169 ft<sup>3</sup>/s (4.79 m<sup>3</sup>/s), 122,400 acre-ft/yr (151 hm<sup>3</sup>/yr).

EXTREMES.--Current year: Maximum discharge, 1,670 ft<sup>3</sup>/s (47.3 m<sup>3</sup>/s) Sept. 4 (gage height, 7.75 ft or 2.362 m); minimum, 31 ft<sup>3</sup>/s (0.88 m<sup>3</sup>/s) Oct. 19 (gage height, 1.32 ft or 0.402 m).  
Period of record: Maximum discharge, 9,200 ft<sup>3</sup>/s (261 m<sup>3</sup>/s) July 22, 1909 (gage height, 20.0 ft or 6.09m, site and datum then in use), from rating curve extended above 3,300 ft<sup>3</sup>/s (93.5 m<sup>3</sup>/s); minimum, 0.5 ft<sup>3</sup>/s (0.014 m<sup>3</sup>/s) Nov. 4, 1939.

REMARKS.--Records good except those for winter period, which are 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	47	86	42	34	40	44	260	186	129	118	84	213
2	54	93	41	34	40	44	254	180	126	114	84	742
3	50	91	40	34	40	44	240	170	129	109	81	1,230
4	45	96	40	34	40	44	227	162	134	105	81	1,560
5	46	99	39	35	40	45	226	154	148	100	81	1,470
6	48	105	38	35	39	49	218	156	140	99	86	1,190
7	49	106	37	35	39	70	211	156	129	94	94	1,040
8	50	111	37	35	39	96	198	164	124	96	88	960
9	50	109	36	36	39	170	190	150	114	94	94	915
10	54	102	36	36	39	230	182	162	109	93	94	886
11	80	90	36	36	38	320	175	184	114	84	93	858
12	96	75	35	36	38	440	166	250	106	79	94	830
13	103	60	35	36	38	530	166	254	97	72	93	786
14	99	55	35	36	38	540	158	233	88	67	93	747
15	81	50	35	37	38	560	169	213	87	65	94	711
16	74	49	35	37	39	540	185	202	106	62	93	672
17	70	47	34	37	39	470	186	198	137	56	88	635
18	60	45	34	37	39	400	180	185	172	51	87	596
19	53	44	34	38	40	350	185	167	175	50	84	560
20	64	43	35	38	40	320	201	174	166	51	77	532
21	86	43	34	39	40	290	229	159	170	46	81	522
22	91	42	34	39	41	280	248	167	170	42	79	537
23	97	42	34	40	41	280	254	180	156	44	70	563
24	91	41	34	41	42	280	246	191	138	47	67	560
25	87	41	34	41	42	290	242	186	129	48	69	620
26	84	41	34	40	43	310	229	182	121	56	69	771
27	86	41	34	40	43	330	215	177	129	64	67	789
28	88	41	34	40	44	320	202	169	150	67	70	763
29	88	40	34	40	-----	304	193	162	151	74	70	721
30	91	40	34	40	-----	306	191	154	135	81	64	674
31	86	-----	34	40	-----	276	-----	142	-----	81	67	-----
TOTAL	2,248	1,968	1,108	1,156	1,118	8,572	6,226	5,573	3,979	2,309	2,536	23,653
MEAN	72.5	63.6	35.7	37.3	39.9	277	208	180	133	74.5	81.8	788
MAX	103	111	42	41	44	560	260	254	175	114	94	1,560
MIN	45	40	34	34	38	44	158	142	87	42	64	213
AC-FT	4,460	3,900	2,200	2,290	2,220	17,000	12,350	11,050	7,890	4,580	5,030	46,920

CAL YR 1972 TOTAL 92,764 MEAN 253 MAX 1,760 MIN 34 AC-FT 184,000  
WTR YR 1973 TOTAL 60,446 MEAN 166 MAX 1,560 MIN 34 AC-FT 119,900

NOTE.--No gage-height record Jan. 3 to Feb. 27.

## RED RIVER OF THE NORTH BASIN

05064000 Wild Rice River at Hendrum, Minn.

LOCATION.--Lat 47°16'05", long 96°47'50", in SE¼ sec.19, T.144 N., R.48 W., Norman County, near center of span on downstream side of highway bridge, 0.5 mi (0.8 km) east of Hendrum and 4 mi (6.4 km) upstream from mouth.

DRAINAGE AREA.--1,600 mi<sup>2</sup> (4,140 km<sup>2</sup>), approximately.

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

GAGE.--Nonrecording gage and crest-stage gage. Datum of gage is 836.75 ft (255.03 m) above mean sea level, datum of 1929 (levels by Corps of Engineers).

AVERAGE DISCHARGE.--29 years, 243 ft<sup>3</sup>/s (6.882 m<sup>3</sup>/s), 176,100 acre-ft/yr (217 hm<sup>3</sup>/yr).

EXTREMES.--Current year: Maximum discharge, 1,630 ft<sup>3</sup>/s (46.2 m<sup>3</sup>/s) Sept. 6 (gage height, 13.03 ft or 3.972 m); maximum gage height, 15.26 ft (4.651 m) Mar. 16 (from floodmark, backwater from ice); minimum daily discharge, 36 ft<sup>3</sup>/s (1.02 m<sup>3</sup>/s) Dec. 11-21; minimum gage height, 2.61 ft (0.796 m) July 25, 26.

Period of record: Maximum discharge, 8,300 ft<sup>3</sup>/s (235 m<sup>3</sup>/s) Apr. 15, 1969 (gage height, 31.42 ft or 9.577 m); 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 mi (5.6 km) east of Ada. Another diversion into the Marsh River basin formed in 1947, 1.5 miles (2.4 km) southeast of Ada and diverted water at all stages 1947-51, after which it was closed except for a small regulated flow diverted for abatement of pollution from Ada sewage plant effluent. Amount of diversion not known.

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

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	64	97	45	38	41	45	322	221	161	148	80	81
2	59	100	44	38	42	45	302	216	141	141	82	234
3	58	103	43	38	42	46	293	213	137	120	84	530
4	64	102	42	38	42	46	281	205	132	111	80	1,090
5	59	101	41	38	42	49	271	196	141	106	83	1,460
6	54	100	40	38	42	70	261	186	143	105	87	1,600
7	54	102	39	38	42	96	254	183	152	103	100	1,500
8	53	105	38	39	42	130	250	184	143	89	102	1,250
9	52	106	37	39	42	185	243	185	134	99	94	1,080
10	53	113	37	39	43	260	232	188	126	99	94	1,020
11	77	108	36	39	43	340	225	189	118	99	94	964
12	86	102	36	39	43	430	219	199	110	92	93	913
13	103	122	36	39	43	530	207	235	115	80	92	847
14	97	89	36	39	43	680	199	275	106	71	91	802
15	103	75	36	39	43	850	203	268	99	71	88	756
16	94	60	36	40	44	1,050	198	247	124	65	90	714
17	75	61	36	40	44	1,030	209	234	124	64	85	682
18	64	62	36	40	44	980	222	220	122	64	83	646
19	64	63	36	40	44	800	217	211	152	61	82	613
20	66	60	36	40	44	600	221	185	185	57	80	581
21	69	62	36	40	44	489	228	186	185	57	82	573
22	77	60	37	41	44	460	240	190	180	58	81	570
23	85	58	37	41	44	430	263	186	183	58	79	564
24	94	56	37	41	44	415	277	189	172	58	75	682
25	94	54	37	41	45	400	269	204	165	57	72	789
26	86	53	37	41	45	380	267	205	151	57	71	763
27	88	51	37	41	45	370	262	200	143	58	77	874
28	86	50	37	41	45	365	247	198	133	68	70	896
29	89	49	37	41	-----	355	238	192	138	74	70	847
30	93	47	37	41	-----	350	225	181	157	72	64	790
31	95	-----	38	41	-----	344	-----	171	-----	81	68	-----
TOTAL	2,357	2,371	1,173	1,228	1,211	12,620	7,345	6,342	4,272	2,543	2,573	24,711
MEAN	76.0	79.0	37.8	39.6	43.3	407	245	205	142	82.0	83.0	824
MAX	103	122	45	41	45	1,050	322	275	185	148	102	1,600
MIN	52	47	36	38	41	45	198	171	99	57	64	81
AC-FT	4,680	4,700	2,330	2,440	2,400	25,030	14,570	12,580	8,470	5,040	5,100	49,010

CAL YR 1972 TOTAL 141,532 MEAN 387 MAX 4,540 MIN 36 AC-FT 280,700  
 WTR YR 1973 TOTAL 68,746 MEAN 188 MAX 1,600 MIN 36 AC-FT 136,400

LOCATION.--Lat 47°21'10", long 96°50'50", on line between secs.24 and 25, T.14S N., R.49 W., Traill County, on left bank on upstream side of highway bridge, 0.5 mi (0.8 km) west of Halstad, 2.5 mi (4.0 km) downstream from Wild Rice River, and at mile 375.2 (kilometre 603.7).

EXTREMES.--Current year: Maximum discharge, 6,200 ft<sup>3</sup>/s (176 m<sup>3</sup>/s) Mar. 18, gage height, 17.71 ft (5.398 m), backwater from ice; minimum, 183 ft<sup>3</sup>/s (5.18 m<sup>3</sup>/s) Aug. 31, gage height, 2.29 ft (0.698 m).  
Period of record: Maximum discharge, 35,700 ft<sup>3</sup>/s (1,010 m<sup>3</sup>/s) Apr. 18, 1969, gage height, 38.29 ft (11.671 m); minimum discharge observed, 5.4 ft<sup>3</sup>/s (0.15 m<sup>3</sup>/s) Oct. 8, 9, 12-14, 1936.  
Flood in 1897 reached a stage of about 38.5 ft (11.73 m).

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

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	602	690	430	450	500	613	2,200	929	853	431	272	206
2	579	690	430	450	600	609	2,080	879	838	423	257	382
3	564	693	430	450	620	623	1,960	838	801	404	257	963
4	564	700	440	450	630	654	1,900	805	790	396	253	1,540
5	564	708	440	440	630	750	1,820	798	790	391	248	1,860
6	567	690	450	440	630	850	1,760	805	787	415	250	1,980
7	573	682	450	430	619	950	1,720	826	772	429	269	1,940
8	585	682	450	430	613	1,050	1,680	819	733	412	284	1,740
9	596	686	450	430	609	1,150	1,600	812	697	391	296	1,560
10	599	690	450	430	588	1,440	1,530	805	672	385	274	1,450
11	630	686	450	430	567	1,850	1,450	794	630	402	267	1,360
12	650	682	450	430	561	2,300	1,420	805	599	370	267	1,290
13	664	646	450	430	558	2,460	1,360	826	576	354	267	1,230
14	672	585	450	430	550	2,820	1,300	876	543	329	272	1,180
15	668	580	450	430	540	4,630	1,220	872	516	322	267	1,110
16	664	590	450	430	530	5,610	1,180	849	525	299	267	1,050
17	647	600	450	430	530	6,070	1,160	838	522	269	286	982
18	609	610	450	430	525	6,120	1,160	826	501	253	306	936
19	606	610	450	430	510	5,820	1,110	830	495	243	314	883
20	623	600	440	430	528	5,500	1,090	780	555	284	309	834
21	640	590	440	430	567	5,300	1,090	726	567	262	299	798
22	679	590	440	430	592	5,020	1,120	711	561	229	289	798
23	668	580	440	430	596	4,800	1,120	690	567	208	362	805
24	657	570	440	430	596	4,280	1,120	715	570	196	332	925
25	675	560	450	430	602	3,460	1,100	736	540	192	255	1,420
26	679	550	450	430	599	3,000	1,070	772	495	199	224	2,150
27	675	530	450	430	606	2,770	1,060	780	462	213	208	2,050
28	675	445	450	430	613	2,710	1,050	780	431	245	201	1,840
29	668	440	450	440	-----	2,600	1,030	790	429	253	190	1,700
30	675	430	450	450	-----	2,400	990	787	431	257	185	1,600
31	679	-----	450	470	-----	2,270	-----	808	-----	269	187	-----
TOTAL	19,596	18,385	13,820	13,500	16,209	90,479	41,450	24,907	18,248	9,725	8,214	38,542
MEAN	632	613	446	435	579	2,919	1,382	803	608	314	265	1,285
MAX	679	708	450	470	630	6,120	2,200	929	853	431	362	2,150
MIN	564	430	430	430	500	609	990	690	429	192	185	206
AC=FT	38,870	36,470	27,410	26,78								

## RED RIVER OF THE NORTH BASIN

05067500 Marsh River near Shelly, Minn.

LOCATION.--Lat 47°24'45", long 96°45'50", in NE¼NW¼ sec.3, T.145 N., R.48 W., Norman County, near center of span on downstream truss of bridge, 3.8 mi (6.1 km) southeast of Shelly and 10 mi (16 km) upstream from mouth.

DRAINAGE AREA.--151 mi<sup>2</sup> (391 km<sup>2</sup>).

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 (356.38 m) above mean sea level, datum of 1929 (levels by Corps of Engineers). Prior to Oct. 1, 1965, nonrecording gage at datum 3.0 ft (0.9 m) higher.

AVERAGE DISCHARGE.--29 years, 73.3 ft<sup>3</sup>/s (2.076 m<sup>3</sup>/s), 53,110 acre-ft/yr (65.5 hm<sup>3</sup>/yr).

EXTREMES.--Current year: Maximum discharge, 366 ft<sup>3</sup>/s (10.4 m<sup>3</sup>/s) Mar. 16 (gage height, 9.30 ft or 2.835 m, backwater from ice); maximum gage height, 9.83 ft (2.996 m) Mar. 15 (from floodmark, backwater from ice); no flow on many days.

Period of record: Maximum discharge, 4,660 ft<sup>3</sup>/s (132 m<sup>3</sup>/s) May 11, 1950 (gage height, 21.96 ft (6.693 m), from floodmark, present datum); no flow for many days most years.

REMARKS.--Records fair. Large part of high flow of Wild Rice River diverted into Marsh River basin at overflow section 3.5 mi (5.6 km) east of Ada. Another diversion from Wild Rice River basin formed in 1947, 1.5 miles (2.4 km) southeast of Ada and diverted water at all stages 1947-51, after which it was closed except for a small regulated flow diverted for abatement of pollution from Ada sewage plant effluent.

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.22		0	.16	.07	.10	22	5.1	2.2			0
2	.22		.09	.16	.07	.11	21	4.9	1.7			3.1
3	.34		.11	.15	.07	.12	20	4.5	2.0			6.2
4	.34		.12	.14	.07	.14	19	3.9	1.7			4.3
5	.42		.16	.14	.07	.17	18	3.3	2.6			2.3
6	.42		.20	.13	.07	.50	16	3.0	2.0			.58
7	.58		.24	.12	.07	2.5	14	2.6	1.8			1.1
8	.58		.31	.12	.07	15	11	2.2	1.8			3.5
9	.40		.37	.11	.07	80	10	2.3	1.2			3.7
10	.34		.41	.11	.07	168	9.5	3.1	.82			2.6
11	.74		.44	.10	.07	170	8.7	3.5	.58			1.8
12	.58		.46	.10	.07	170	7.4	4.3	.60			6.4
13	.80		.46	.10	.07	170	7.0	6.6	.42			28
14	1.0		.45	.10	.07	192	7.2	9.0	.28			20
15	1.3		.43	.09	.08	270	8.0	6.7	.28			24
16	1.6		.41	.09	.08	347	6.4	5.3	.74			24
17	1.1		.38	.09	.08	250	7.0	4.7	.50			23
18	.82		.36	.08	.08	182	7.0	4.5	.34			22
19	.74		.34	.08	.08	125	7.0	5.3	.22			21
20	.70		.32	.08	.08	80	6.4	4.6	.04			16
21	.74		.30	.08	.08	61	7.0	4.0	0			14
22	.74		.29	.08	.08	53	7.6	5.1	0			15
23	.74		.27	.07	.09	48	8.2	4.5	.04			18
24	1.1		.26	.07	.09	40	8.2	3.9	.04			22
25	1.3		.24	.07	.09	34	7.4	4.0	.04			61
26	1.6		.23	.07	.09	28	8.7	3.7	.04			123
27	1.4		.22	.07	.10	28	8.2	3.6	.16			100
28	1.2		.21	.07	.10	26	8.2	3.5	.04			81
29	1.1		.19	.07	-----	22	7.5	3.3	.04			66
30	1.6		.18	.07	-----	24	6.7	3.0	0			55
31	1.2	-----	.17	.07	-----	22	-----	2.5	-----			-----
TOTAL	25.96	0	8.62	3.04	2.18	2,608.64	310.3	130.5	22.22	0	0	768.58
MEAN	.84	0	.28	.098	.078	84.1	10.3	4.21	.74	0	0	25.6
MAX	1.6	0	.46	.16	.10	347	22	9.0	2.6	0	0	123
MIN	.22	0	0	.07	.07	.10	6.4	2.2	0	0	0	0
AC-FT	51	0	17	6.0	4.3	5,170	615	259	44	0	0	1,520
CAL YR 1972	TOTAL	21,584.68	MEAN	59.0	MAX	1,830	MIN	0	AC-FT	42,810		
WTR YR 1973	TOTAL	3,880.04	MEAN	10.6	MAX	347	MIN	0	AC-FT	7,700		

## RED RIVER OF THE NORTH BASIN

57

05069000 Sandhill River at Climax, Minn.

LOCATION.--Lat 47°36'43", long 96°48'52", in NE¼NE¼ sec.30, T.148 N., R.48 W., Polk County, near center of span on downstream side of bridge on U.S. Highway 75 in Climax and 3.7 mi (6.0 km) upstream from mouth.

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

GAGE.--Nonrecording gage and crest-stage gage. Datum of gage is 820.10 ft (249.97 m) above mean sea level, datum of 1929 (levels by Corps of Engineers). Prior to Oct. 1, 1966, nonrecording gage at site 3.2 mi (5.1 km) upstream at datum 12.78 ft (3.90 m) higher.

AVERAGE DISCHARGE.--27 years (1946-73), 68.6 ft<sup>3</sup>/s (1.943 m<sup>3</sup>/s), 49,700 acre-ft/yr (61.3 hm<sup>3</sup>/yr).

EXTREMES.--Current year: Maximum discharge, 897 ft<sup>3</sup>/s (25.4 m<sup>3</sup>/s) Mar. 17 (gage height, 11.25 ft or 3.429 m, backwater from ice); minimum 8.1 ft<sup>3</sup>/s (0.229 m<sup>3</sup>/s) July 20 (gage height, 4.63 ft or 1.411 m); minimum gage height, 4.58 ft (1.396 m) Aug. 20.

Period of record: Maximum discharge, 4,560 ft<sup>3</sup>/s (129 m<sup>3</sup>/s) Apr. 14, 1965 (gage height, 17.81 ft or 5.428 m, site and datum then in use); maximum gage height, 28.32 ft (8.632 m) Apr. 17, 1969 (from floodmark, backwater from Red River of the North); minimum discharge not determined.

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

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

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	19	29	22	11	12	16	87	38	31	20	12	12
2	18	30	21	11	12	18	77	36	29	19	11	22
3	18	31	20	11	12	20	72	34	26	17	10	41
4	15	31	19	11	12	24	65	34	26	16	9.6	46
5	13	31	18	11	12	30	61	33	26	14	9.6	48
6	15	31	17	11	12	37	60	31	24	13	11	61
7	18	33	16	11	12	46	58	30	22	13	12	84
8	21	34	15	11	12	55	58	31	23	12	13	84
9	25	34	14	11	12	70	46	32	24	12	14	89
10	19	38	13	11	12	100	47	36	23	11	15	98
11	19	36	12	11	12	130	45	38	21	10	15	106
12	21	38	11	11	12	160	46	51	20	9.6	14	113
13	21	42	10	11	12	300	45	52	20	10	13	103
14	21	31	10	11	12	550	44	51	18	10	12	93
15	21	34	10	11	12	670	43	50	17	9.6	12	81
16	20	40	10	11	12	620	43	46	17	9.1	12	78
17	20	38	10	11	12	790	43	43	18	9.1	12	75
18	19	38	10	11	12	640	43	38	20	9.1	11	66
19	26	37	10	11	12	500	44	36	21	9.1	10	61
20	29	34	10	11	12	380	47	38	21	8.1	8.6	48
21	33	33	10	11	12	290	49	34	22	8.6	10	50
22	28	32	10	11	12	260	48	37	24	9.1	12	57
23	26	32	10	11	12	230	47	37	24	9.6	12	102
24	25	33	10	11	12	200	48	36	24	14	12	112
25	26	33	11	11	12	184	50	35	22	14	12	145
26	25	30	11	11	13	175	47	35	22	14	14	121
27	26	26	11	11	14	147	44	34	23	14	18	103
28	27	25	11	11	15	127	43	35	23	14	18	106
29	26	24	11	11	-----	109	42	34	22	14	17	92
30	27	23	11	11	-----	100	40	34	21	13	16	113
31	29	-----	11	11	-----	92	-----	32	-----	13	13	-----
TOTAL	696	981	395	341	342	7,070	1,532	1,161	674	378.0	390.8	2,410
MEAN	22.5	32.7	12.7	11.0	12.2	228	51.1	37.5	22.5	12.2	12.6	80.3
MAX	33	42	22	11	15	790	87	52	31	20	18	145
MIN	13	23	10	11	12	16	40	30	17	8.1	8.6	12
AC-FT	1,380	1,950	783	676	678	14,020	3,040	2,300	1,340	750	775	4,780

CAL YR 1972 TOTAL 43,987.0 MEAN 120 MAX 2,090 MIN 10 AC-FT 87,250

WTR YR 1973 TOTAL 16,370.8 MEAN 44.9 MAX 790 MIN 8.1 AC-FT 32,470

## 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 mi (21 km) northwest of village of Red Lake.

DRAINAGE AREA.--1,950 mi<sup>2</sup> (5,050 km<sup>2</sup>), 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 (356.311 m) 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 (21.031 m) lower.

EXTREMES.--Current year: Maximum gage height, 6.23 ft (1.899 m) Sept. 2 (affected by wind action); maximum daily, 5.85 ft (1.783 m) Sept. 29; minimum daily, 4.58 ft (1.396 m) July 13.  
Period of record: Maximum gage height, 9.53 ft (2.905 m) June 25, 1950; minimum recorded, 0.80 ft (0.244 m) 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 1972 TO SEPTEMBER 1973

Oct. 31 .....	4.91	Feb. 28 .....	4.87	June 27 .....	4.86
Nov. 30 .....	5.01	Mar. 31 .....	5.05	July 31 .....	4.85
Dec. 31 .....	5.00	Apr. 30 .....	5.27	Aug. 31 .....	5.08
Jan. 29 .....	4.93	May 31 .....	5.18	Sept.30 .....	5.80

NOTE.--Mean daily gage heights are available.

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

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	789	785	510	500	522	520	123	170	351	175	191	198
2	789	782	505	502	520	520	130	177	351	184	191	194
3	796	716	505	503	520	520	131	172	351	182	189	194
4	796	606	500	504	520	520	124	236	366	182	191	200
5	800	556	500	508	520	520	123	296	354	179	194	202
6	793	560	495	510	520	515	121	309	354	187	196	193
7	789	564	490	512	520	515	124	312	357	186	198	189
8	793	546	485	514	520	505	116	312	351	175	203	189
9	789	546	480	515	522	488	123	320	354	174	207	193
10	793	550	480	518	522	485	128	328	354	177	209	299
11	796	550	480	519	522	488	133	334	345	174	207	419
12	796	542	480	519	523	481	118	331	342	174	209	422
13	796	540	480	520	524	485	118	328	337	179	212	419
14	793	535	480	522	525	491	119	331	334	175	216	478
15	796	530	480	522	525	512	133	331	307	174	216	564
16	796	525	480	523	525	505	136	331	254	170	214	567
17	804	530	480	524	525	342	109	331	216	172	212	564
18	804	535	480	525	525	121	112	334	194	174	205	556
19	796	540	485	526	525	114	109	334	191	172	209	560
20	804	550	485	528	525	114	136	331	187	170	203	553
21	808	550	485	526	525	111	177	331	186	170	198	553
22	804	545	485	524	525	111	189	339	182	169	194	584
23	800	540	485	522	530	114	177	345	172	170	193	560
24	800	540	485	522	530	123	170	345	174	172	191	553
25	796	535	490	522	525	121	174	360	175	175	187	592
26	796	530	490	522	525	130	179	357	175	179	194	588
27	796	525	490	525	525	133	170	351	175	186	194	588
28	782	520	490	528	520	136	169	354	174	180	196	595
29	785	520	490	528	-----	123	165	357	172	182	196	592
30	785	515	495	525	-----	119	159	354	174	180	194	588
31	785	-----	500	522	-----	119	-----	351	-----	182	191	-----
TOTAL	24,645	16,908	15,145	16,080	14,655	10,101	4,205	9,792	8,009	5,480	6,200	12,946
MEAN	795	564	489	519	523	326	140	316	267	177	200	432
MAX	808	785	510	528	530	520	189	360	366	187	216	595
MIN	782	515	480	500	520	111	109	170	172	169	187	189
AC-FT	48,880	33,540	30,040	31,890	29,070	20,040	8,340	19,420	15,890	10,870	12,300	25,680
CAL YR 1972	TOTAL	275,899	MEAN	754	MAX	1,220	MIN	184	AC-FT	547,200		
WTR YR												

LOCATION.--Lat 48°02'34", long 95°48'28", on line between secs. 28 and 29, T.153 N., R.40 W., Pennington County, on left bank 50 ft (15 m) upstream from highway bridge at High Landing, 7 mi (11 km) south of Goodridge and 33 mi (53 km) upstream from Thief River.

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

AVERAGE DISCHARGE.--44 years, 501 ft<sup>3</sup>/s (14.19 m<sup>3</sup>/s), 363,000 acre-ft per year (448 hm<sup>3</sup>/yr).

EXTREMES.--Current year: Maximum discharge, 1,290 ft<sup>3</sup>/s (36.5 m<sup>3</sup>/s) Sept. 25 (gage height, 7.93 ft or 2.417 m); maximum gage height, 10.01 ft (3.051 m) Mar. 15 (backwater from ice); minimum discharge, 119 ft<sup>3</sup>/s (3.37 m<sup>3</sup>/s) Apr. 13 (gage height, 1.78 ft or 0.543 m); minimum gage height, 1.73 ft (0.527 m) Apr. 18.  
Period of record: Maximum discharge, 3,720 ft<sup>3</sup>/s (105 m<sup>3</sup>/s) May 11, 1950 (gage height, 13.42 ft or 4.090 m); no flow during infrequent periods in 1931-34, 1936-37.

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

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	980	962	616	521	538	605	241	238	421	185	213	286
2	978	965	614	520	539	610	234	242	419	183	205	339
3	975	967	608	520	540	615	225	239	421	169	206	379
4	972	889	605	520	540	620	213	231	402	169	216	481
5	972	737	600	520	541	630	200	333	384	176	223	442
6	983	665	595	519	543	640	196	424	393	191	279	395
7	978	648	590	516	545	650	200	426	394	188	267	373
8	959	652	585	518	550	660	184	419	393	181	241	365
9	965	652	585	517	554	678	180	427	381	180	235	359
10	972	657	580	515	557	685	169	446	390	180	237	350
11	975	654	575	515	558	710	163	475	379	178	240	408
12	985	654	565	515	559	740	154	462	371	170	236	542
13	980	625	560	514	559	770	133	459	373	175	235	576
14	967	615	558	513	560	800	121	447	369	183	236	565
15	967	615	557	512	561	810	162	430	359	188	235	594
16	946	630	555	513	565	780	166	419	350	187	238	670
17	939	640	550	515	568	750	159	434	275	169	246	689
18	944	645	545	516	570	630	138	418	223	175	249	685
19	946	655	542	518	572	525	133	410	208	178	243	677
20	944	660	540	520	573	445	184	414	200	179	233	670
21	957	664	538	520	577	405	263	418	199	176	235	687
22	965	664	537	520	580	360	282	423	198	179	233	756
23	970	662	536	520	584	335	284	427	195	179	234	772
24	972	660	535	521	590	307	275	425	193	205	233	951
25	962	655	533	523	594	304	273	418	189	217	236	1,240
26	957	640	531	524	595	297	264	425	183	215	236	1,100
27	962	635	529	525	600	291	263	423	186	222	236	1,040
28	944	625	525	528	602	289	258	418	189	236	232	980
29	957	620	524	530	-----	280	255	409	186	227	220	942
30	965	618	523	534	-----	267	241	405	186	218	218	919
31	965	-----	521	538	-----	250	-----	410	-----	214	226	-----
TOTAL	29,908	20,630	17,357	16,122	15,814	16,738	6,213	12,394	9,009	5,872	7,252	19,232
MEAN	965	688	560	520	565	540	207	400	300	189	234	641
MAX	985	967	616	538	602	810	284	475	421	236	279	1,240
MIN	939	615	521	512	538	250	121	231	183	169	205	286
AC-FT	59,320	40,920	34,430	31,980	31,370	33,200	12,320	24,580	17,870	11,650	14,380	38,150
CAL YR 1972	TOTAL	338,643	MEAN	926	MAX	1,550	MIN	521	AC=FT	672,100		
WTR YR 1973	TOTAL	176,541	MEAN	484	MAX	1,240	MIN	121	AC=FT	350,200		



DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.5	8.4	.42	.01	0	.02	41	33	21	8.5	.19	.23
2	2.8	11	.32	.01	0	.04	35	33	18	6.9	.27	.41
3	3.5	13	.23	.01	0	.06	32	32	16	2.9	.36	4.1
4	3.1	7.1	.18	.01	0	.10	29	26	14	1.4	.30	59
5	2.2	4.3	.13	.01	0	.17	26	21	11	1.3	.25	135
6	2.0	3.6	.10	.01	0	.33	22	17	11	2.3	.68	127
7	2.0	4.7	.09	.01	0	.60	23	20	10	.74	5.9	100
8	9.9	4.2	.07	.01	0	1.2	27	23	8.4	.45	8.6	82
9	8.3	6.1	.06	.01	0	3.0	24	22	5.7	.25	14	71
10	7.7	8.1	.04	.01	0	5.5	18	30	5.0	.16	17	62
11	8.3	6.6	.04	.01	0	17	15	37	3.5	.12	14	58
12	8.3	4.8	.03	.01	0	60	13	53	2.0	.09	13	52
13	8.6	4.3	.02	.01	0	130	13	50	1.1	.06	18	44
14	13	3.7	.02	.01	0	250	10	42	.64	.06	15	40
15	14	3.1	.02	.01	0	385	11	36	.45	.04	14	36
16	6.9	2.7	.01	.01	0	395	12	33	.52	.02	10	32
17	119	2.5	.01	.01	0	350	13	29	2.8	.02	6.2	28
18	145	2.2	.01	.01	0	315	12	26	4.3	0	3.9	25
19	153	2.0	.01	.01	0	275	10	26	12	0	3.1	23
20	178	1.8	.01	.01	0	235	14	30	16	0	1.2	20
21	127	1.6	.01	.01	0	220	19	31	21	0	.97	24
22	122	1.5	.01	.01	0	215	44	34	17	0	1.8	32
23	119	1.3	.01	.01	0	205	51	45	18	0	1.1	51
24	119	1.2	.01	.01	0	185	46	43	20	0	.58	126
25	119	1.1	.01	.01	0	165	42	42	18	0	.49	377
26	119	.95	.01	0	.01	116	44	38	15	0	.57	480
27	118	.86	.01	0	.01	107	39	35	17	0	.53	745
28	116	.72	.01	0	.01	88	37	33	21	0	.38	838
29	114	.62	.01	0	-----	67	36	32	15	0	.24	858
30	109	.51	.01	0	-----	55	34	30	11	0	.17	803
31	37	-----	.01	0	-----	46	-----	28	-----	.08	.12	-----
TOTAL	1,917.1	114.56	1.93	.25	.03	3,892.02	792	1,010	336.41	25.39	152.90	5,332.74
MEAN	61.6	3.82	.062	.008	.001	126	26.4	32.6	11.2	.82	4.93	178
MAX	178	13	.42	.01	.01	395	51	53	21	8.5	18	858
MIN	2.0	.51	.01	0	0	.02	10	17	.45	0	.12	.23
AC=FT	3,800	227	3.8	.5	.06	7,720	1,570	2,000	667	50	303	10,580
CAL YR 1972	TOTAL 59,300.92		MEAN 162		MAX 2,320	MIN .01	AC=FT 117,600					
NTR YR 1973	TOTAL 13,575.33		MEAN 37.2		MAX 858	MIN 0	AC=FT 26,930					

## 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 mi (6.4 km) upstream from mouth, and 4.8 mi (7.7 km) east of Gonvick.

DRAINAGE AREA.--45.2 mi<sup>2</sup> (117 km<sup>2</sup>).

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 (374.27 m) 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.--13 years, 14.5 ft<sup>3</sup>/s (0.411 m<sup>3</sup>/s), 10,500 acre-ft/yr (12.9 hm<sup>3</sup>/yr).

EXTREMES.--Current year: Maximum discharge, 156 ft<sup>3</sup>/s (4.42 m<sup>3</sup>/s) Sept. 2 (gage height, 3.94 ft or 1.200 m); maximum gage height, 5.31 ft (1.618 m) Mar. 14 (backwater from ice); minimum discharge, 0.60 ft<sup>3</sup>/s (0.017 m<sup>3</sup>/s) Aug. 31; minimum gage height, 0.94 ft (0.287 m) July 20.  
Period of record: Maximum discharge, 453 ft<sup>3</sup>/s (12.8 m<sup>3</sup>/s) Mar. 30, 1967 (gage height, 6.35 ft or 1935 m); maximum gage height, 6.62 ft (2.018 m) Apr. 9 (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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.4	5.9	5.2	4.1	4.7	4.9	17	9.6	4.3	2.0	5.4	111
2	2.2	6.2	4.9	4.0	4.7	5.0	17	8.8	4.1	1.8	4.1	147
3	2.4	7.4	4.7	3.9	4.6	5.2	16	7.6	3.9	2.0	3.4	141
4	1.8	8.8	4.5	3.8	4.6	5.4	14	6.6	3.7	2.2	3.2	144
5	2.4	8.2	4.3	3.8	4.6	5.7	14	6.6	3.4	2.4	3.0	118
6	2.4	7.9	4.1	3.7	4.7	6.3	13	5.9	3.2	6.9	8.2	97
7	4.1	8.5	3.8	3.6	4.7	8.0	10	5.9	2.6	3.9	6.2	80
8	3.2	9.3	3.6	3.5	4.8	11	8.8	5.4	2.8	3.4	5.2	63
9	2.6	9.6	3.5	3.5	4.9	22	9.3	5.2	2.4	2.8	6.6	47
10	3.2	11	3.4	3.4	5.0	35	8.2	20	2.4	2.6	5.9	35
11	11	11	3.3	3.4	5.1	60	7.4	25	2.2	2.0	5.0	27
12	10	11	3.3	3.5	5.1	82	6.6	20	2.2	1.6	4.3	22
13	8.2	11	3.2	3.7	5.2	92	5.9	15	2.2	1.2	3.9	13
14	4.5	10	3.2	3.8	5.2	98	6.2	13	1.6	2.2	3.2	12
15	5.7	9.6	3.2	3.9	5.1	92	7.9	12	1.8	1.6	2.8	12
16	5.4	9.1	3.1	4.1	5.0	80	6.4	13	1.4	1.8	2.6	12
17	7.9	8.7	3.1	4.2	5.0	50	6.4	8.8	1.4	1.6	2.0	11
18	5.2	8.6	3.1	4.2	4.9	38	6.6	7.4	1.8	1.6	2.0	9.0
19	5.4	8.8	3.0	4.2	4.9	29	9.9	6.6	1.8	1.4	2.0	6.6
20	5.7	8.5	3.0	4.2	4.8	28	29	6.2	2.6	1.0	1.4	4.1
21	7.6	8.3	3.1	4.2	4.8	30	26	4.5	2.8	1.2	1.8	5.0
22	8.2	8.1	3.2	4.3	4.7	31	25	6.4	2.8	1.0	1.8	20
23	7.6	7.7	3.4	4.4	4.7	32	22	6.6	2.2	2.0	1.8	16
24	7.4	7.3	3.6	4.5	4.6	32	20	6.6	1.6	3.7	1.8	25
25	7.6	7.1	3.7	4.5	4.6	31	17	6.4	2.0	5.0	1.8	115
26	7.6	6.9	3.9	4.6	4.7	30	14	6.2	2.4	4.5	1.8	120
27	7.4	6.7	4.0	4.7	4.7	28	12	7.1	2.4	7.9	1.8	111
28	6.4	6.5	4.1	4.8	4.8	24	9.0	5.2	2.6	9.0	1.0	102
29	5.2	6.0	4.2	4.8	-----	21	9.6	4.3	2.8	6.4	.70	87
30	5.2	5.5	4.2	4.8	-----	18	10	4.8	2.2	6.4	.70	67
31	5.9	-----	4.1	4.7	-----	17	-----	4.3	-----	6.6	1.4	-----
TOTAL	171.8	249.2	115.0	126.8	135.2	1,051.5	384.2	271.0	75.6	99.7	96.80	1,779.7
MEAN	5.54	8.31	3.71	4.09	4.83	33.9	12.8	8.74	2.52	3.22	3.12	59.3
MAX	11	11	3.2	4.8	5.2	98	29	25	4.3	9.0	8.2	147
MIN	1.8	5.5	3.0	3.4	4.6	4.9	5.9	4.3	1.4	1.0	.70	4.1
AC-FT	341	494	228	252	268	2,090	762	538	150	198	192	3,530

CAL YR 1972 TOTAL 5,566.80 MEAN 15.2 MAX 211 MIN .80 AC-FT 11,040  
WTR YR 1973 TOTAL 4,556.50 MEAN 12.5 MAX 147 MIN .70 AC-FT 9,040

## PEAK DISCHARGE (BASE, 65 CFS)

DATE	TIME	G. H.	DISCHARGE	DATE	TIME	G. H.	DISCHARGE
3-14	1300	5.31	101	9-25	1900	3.75	140
9-2	0100	3.94	156				

## 05078000 Clearwater River at Plummer, Minn.

LOCATION.--Lat 47°55'24", long 96°02'46", in SE¼SW¼ sec.4, T.151 N., R.42 W., Red Lake County, on right bank 200 ft (61 m) downstream from Soo Line Railroad bridge, 300 ft (91 m) downstream from bridge on U.S. Highway 59, 0.9 mi (1.4 km) northwest of railroad depot in Plummer, and 8 mi (13 km) upstream from Hill River.

DRAINAGE AREA.--512 mi<sup>2</sup> (1,326 km<sup>2</sup>).

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

GAGE.--Water-stage recorder. Datum of gage is 1,099.12 ft (335.012 m) above mean sea level, adjustment of 1912 (levels by Corps of Engineers). Prior to Nov. 10, 1939, nonrecording gage at site 100 ft (30 m) upstream at same datum.

AVERAGE DISCHARGE.--34 years, 177 ft<sup>3</sup>/s (5.013 m<sup>3</sup>/s), 128,200 acre-ft/yr (158 hm<sup>3</sup>/yr).

EXTREMES.--Current year: Maximum discharge, 1,270 ft<sup>3</sup>/s (36.0 m<sup>3</sup>/s) Sept. 6 (gage height, 7.98 ft or 2.432 m); maximum gage height, 8.83 ft (2.691 m) Mar. 17 (backwater from ice); minimum discharge, 5.0 ft<sup>3</sup>/s (0.14 m<sup>3</sup>/s) July 5, gage height, 1.97 ft (0.600 m), result of diversion upstream from wild rice irrigation.  
Period of record: Maximum discharge, 3,640 ft<sup>3</sup>/s (103 m<sup>3</sup>/s) June 9, 1962 (gage height, 11.90 ft or 3.627 m); maximum gage height, 12.31 ft (3.752 m) Apr. 10, 1969 (backwater from ice); minimum discharge, 5.0 ft<sup>3</sup>/s (0.14 m<sup>3</sup>/s) July 5, 1973 (gage height, 1.97 ft or 0.600 m), result of diversion upstream for wild rice irrigation.

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

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	68	102	84	68	43	52	205	41	45	32	123	138
2	67	103	82	66	44	54	191	52	42	33	119	490
3	65	101	81	63	44	56	162	48	53	35	116	729
4	64	100	80	61	44	58	127	32	74	13	122	904
5	63	102	79	59	44	59	96	17	72	7.7	126	1,160
6	63	104	78	57	43	61	91	26	37	43	181	1,260
7	71	107	78	56	43	66	55	27	34	35	242	1,200
8	76	110	77	55	43	72	29	25	17	40	289	1,060
9	76	111	77	53	42	90	47	25	9.4	29	291	904
10	76	113	77	51	42	130	22	28	8.1	37	343	764
11	77	132	78	50	42	250	13	51	23	39	351	650
12	103	123	80	49	42	300	16	109	16	28	323	581
13	124	82	81	48	41	360	12	101	11	13	264	531
14	127	89	81	47	41	420	27	104	8.5	20	238	495
15	127	84	81	46	41	540	44	68	10	12	222	452
16	125	108	82	45	41	750	39	72	15	12	208	415
17	124	134	82	45	42	980	28	73	24	8.5	190	388
18	118	118	83	44	42	800	20	80	35	18	178	344
19	109	105	83	44	43	580	18	109	61	16	174	293
20	116	99	83	43	44	430	32	52	50	13	178	252
21	108	109	83	42	45	420	70	47	54	17	160	234
22	108	112	82	42	46	440	137	50	72	17	165	269
23	106	95	82	42	46	460	144	67	52	26	149	349
24	112	98	81	42	47	450	133	67	32	20	148	450
25	110	108	80	42	48	440	112	56	46	16	146	800
26	105	107	79	43	48	410	93	37	53	12	146	930
27	103	92	78	43	49	380	84	40	56	47	137	947
28	102	89	76	43	50	356	77	52	47	84	137	1,030
29	103	86	74	43	-----	317	54	47	52	115	130	1,000
30	98	85	72	43	-----	281	46	35	46	113	112	924
31	98	-----	70	43	-----	246	-----	32	-----	108	106	-----
TOTAL	2,992	3,108	2,464	1,518	1,230	10,308	2,224	1,690	1,155.0	1,059.2	5,814	19,993
MEAN	96.5	104	79.5	49.0	43.9	333	74.1	54.5	38.5	34.2	188	666
MAX	127	134	84	68	50	980	205	109	74	115	351	1,260
MIN	63	82	70	42	41	52	12	17	8.1	7.7	106	138
AC=FT	5,930	6,160	4,890	3,010	2,440	20,450	4,410	3,350	2,290	2,100	11,530	39,660
CAL YR 1972	TOTAL 77,240.0	MEAN 211	MAX 2,330	MIN 42	AC=FT 153,200							
WTR YR 1973	TOTAL 53,555.2	MEAN 147	MAX 1,260	MIN 7.7	AC=FT 106,200							

## PEAK DISCHARGE (BASE, 500 CFS)

DATE	TIME	G.HT	DISCHARGE	DATE	TIME	G.HT	DISCHARGE
3-17	----	----	About 1,050	9-28	0800	7.39	1,030
9-6	0830	7.98	1,270				

## 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 mi (19 km) upstream from mouth.

DRAINAGE AREA.--266 mi<sup>2</sup> (689 km<sup>2</sup>).

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 (343.491 m) 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 (2.438 m) higher. Sept. 9, 1960, to Sept. 30, 1964, nonrecording gage at same site at datum 8.00 ft (2.438 m) higher.

AVERAGE DISCHARGE.--13 years, 79.8 ft<sup>3</sup>/s (2.260 m<sup>3</sup>/s), 57,820 acre-ft/yr (71.3 hm<sup>3</sup>/yr).

EXTREMES.--Current year: Maximum discharge, 1,030 ft<sup>3</sup>/s (29.2 m<sup>3</sup>/s) Sept. 4 (gage height, 11.27 ft or 3.435 m); maximum gage height, 11.78 ft (3.591 m) Mar. 15 (backwater from ice); minimum daily discharge, 2.1 ft<sup>3</sup>/s (0.059 m<sup>3</sup>/s) July 20 (gage height, 2.38 ft or 0.725 m).

Period of record: Maximum discharge, 3,210 ft<sup>3</sup>/s (90.9 m<sup>3</sup>/s) Apr. 11, 1969 (gage height, 14.91 ft or 4.545 m, 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 (5.605 m) Apr. 21, 1950 (present datum), from floodmarks (discharge, 2,790 ft<sup>3</sup>/s or 79.0 m<sup>3</sup>/s).

REMARKS.--Records poor.

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	17	22	10	4.2	4.4	9.0	105	43	16	3.9	11	107
2	16	23	4.2	4.2	4.5	9.0	100	44	17	2.7	9.6	593
3	16	24	4.5	4.2	4.7	9.4	95	38	19	4.9	8.6	1,010
4	14	28	7.4	4.2	4.9	11	90	35	16	10	7.7	1,010
5	15	26	7.1	4.2	5.2	12	85	33	14	9.3	6.6	828
6	16	28	6.5	4.2	5.6	15	80	39	12	33	8.6	567
7	17	31	6.0	4.2	6.0	22	75	48	11	17	74	430
8	17	32	5.6	4.2	6.3	35	70	46	9.3	12	68	352
9	16	33	5.3	4.2	6.6	80	63	40	11	8.6	53	292
10	16	32	5.1	4.2	7.0	140	49	46	10	7.3	50	277
11	27	30	5.0	4.1	7.5	220	48	95	9.6	6.2	49	247
12	38	27	4.8	4.1	8.0	265	48	90	8.8	5.3	45	221
13	35	25	4.6	4.1	8.5	320	48	80	9.8	4.7	45	196
14	30	23	4.4	4.1	8.5	520	48	63	8.8	4.4	46	188
15	24	22	4.3	4.1	9.0	590	49	56	5.3	4.1	43	182
16	21	21	4.3	4.1	9.0	480	47	54	11	3.8	37	167
17	22	21	4.2	4.1	9.0	380	42	49	13	3.4	32	137
18	24	21	4.2	4.1	9.0	280	40	43	14	2.8	28	128
19	21	20	4.2	4.1	9.0	195	39	40	12	2.3	26	118
20	18	21	4.2	4.1	9.0	182	61	38	9.3	2.1	25	104
21	17	19	4.2	4.0	9.0	175	94	28	7.9	2.6	30	111
22	18	19	4.2	4.0	9.0	180	90	26	7.3	3.0	26	180
23	18	18	4.2	4.0	9.0	190	86	26	6.6	3.4	24	211
24	19	17	4.2	4.0	9.0	200	81	33	6.0	3.9	34	196
25	21	16	4.2	4.0	9.0	200	73	35	5.5	4.1	52	394
26	22	16	4.2	4.0	9.0	180	68	32	5.8	4.5	43	443
27	17	15	4.2	4.0	9.0	160	63	29	4.5	6.6	19	387
28	24	14	4.2	4.0	9.0	140	58	28	5.1	17	22	335
29	17	13	4.2	4.0	-----	130	51	23	4.7	15	19	275
30	18	11	4.2	4.1	-----	120	47	19	4.2	14	15	224
31	21	-----	4.2	4.3	-----	110	-----	17	-----	12	9.8	-----
TOTAL	632	668	161.5	127.4	213.7	5,559.4	1,993	1,316	294.5	233.9	966.9	9,910
MEAN	20.4	22.3	5.21	4.11	7.63	179	66.4	42.5	9.82	7.55	31.2	330
MAX	38	33	10	4.3	9.0	590	105	95	19	33	74	1,010
MIN	14	11	4.2	4.0	4.4	9.0	39	17	4.2	2.1	6.6	104
AC-FT	1,250	1,320	320	253	424	11,030	3,950	2,610	584	464	1,920	19,660

CAL YR 1972 TOTAL 32,918.1 MEAN 89.9 MAX 1,950 MIN 4.2 AC-FT 65,290  
WTR YR 1973 TOTAL 22,076.3 MEAN 60.5 MAX 1,010 MIN 2.1 AC-FT 43,790

LOCATION.--Lat 47°53'15", long 96°16'25", in NW¼NE¼ sec.22, T.151 N., R.44 W., Red Lake County, on left bank 40 ft (12 m) downstream from Great Northern Railroad bridge in Red Lake Falls, 1.4 mi (2.3 km) upstream from mouth, and 3 mi (5 km) downstream from Badger Creek.

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

AVERAGE DISCHARGE.--47 years, 311 ft<sup>3</sup>/s (8.808 m<sup>3</sup>/s), 225,300 acre-ft/yr (278 hm<sup>3</sup>/yr).

EXTREMES.--Current year: Maximum discharge, 2,900 ft<sup>3</sup>/s (82.1 m<sup>3</sup>/s) Mar. 15 (gage height, 7.42 ft or 2.262 m, backwater from ice); maximum gage height, 7.53 ft (2.295 m) Mar. 14 (backwater from ice); minimum discharge, 17 ft<sup>3</sup>/s (0.48 m<sup>3</sup>/s) July 19, 20 (gage height, 1.61 ft or 0.491 m); minimum gage height, 1.60 ft (0.488 m) June 15, 16.

Period of record: Maximum discharge, 9,740 ft<sup>3</sup>/s (276 m<sup>3</sup>/s) Apr. 12, 1969 (gage height, 11.82 ft or 3.603 m); maximum gage height observed, 17.5 ft (5.344 m) Apr. 15, 1913, site and datum then in use (backwater from ice); no flow Sept. 15, 1936, Sept. 14, 1939, Aug. 19-22, 1940.

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

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	121	155	115	84	63	65	547	170	81	65	148	139
2	119	162	105	83	63	66	485	150	100	54	155	307
3	116	164	100	82	63	72	459	142	98	34	148	1,080
4	114	164	97	80	62	80	405	138	110	38	148	1,720
5	114	169	95	79	62	91	346	127	124	30	159	2,160
6	110	180	94	78	62	128	324	115	125	31	188	2,360
7	105	184	92	77	62	195	289	105	89	86	230	2,150
8	111	189	90	77	62	270	251	105	81	98	280	1,860
9	120	196	88	75	62	390	219	110	72	104	316	1,580
10	122	193	87	74	62	660	224	120	43	84	347	1,580
11	128	204	86	71	62	800	203	139	32	74	388	1,200
12	127	216	85	71	62	1,050	178	209	29	76	384	1,090
13	182	161	85	70	62	1,300	164	263	39	74	351	1,020
14	209	125	85	70	62	2,000	161	242	33	60	294	964
15	209	154	85	69	62	2,650	162	231	25	41	267	900
16	200	150	86	69	62	2,200	182	190	24	37	251	818
17	191	170	87	68	62	2,000	177	171	27	31	233	769
18	175	188	87	68	62	1,700	162	159	36	30	216	707
19	158	169	88	67	62	1,430	152	165	49	20	208	653
20	178	157	88	67	62	1,190	153	173	86	24	203	597
21	173	163	88	67	61	976	169	128	89	26	199	574
22	167	170	90	66	61	912	251	131	82	23	181	570
23	167	164	90	66	61	1,010	319	128	96	26	179	682
24	164	144	90	65	61	976	310	143	78	30	175	952
25	171	143	90	65	62	982	282	149	64	41	180	2,070
26	171	159	90	65	62	982	249	143	46	36	178	2,320
27	166	162	88	64	63	917	224	121	55	33	181	2,100
28	164	150	88	64	64	774	211	117	74	40	164	1,930
29	161	135	88	64	-----	717	200	124	62	108	157	1,760
30	161	125	86	64	-----	653	185	114	69	143	148	1,580
31	155	-----	86	64	-----	602	-----	95	-----	146	134	-----
TOTAL	4,729	4,965	2,799	2,193	1,738	27,838	7,643	4,617	2,018	1,743	6,790	38,012
MEAN	153	166	90.3	70.7	62.1	898	255	149	67.3	56.2	219	1,267
MAX	209	216	115	84	64	2,650	547	263	123	146	388	2,360
MIN	105	125	85	64	61	65	152	95	24	20	134	139
AC=FT	9,380	9,850	5,550	4,350	3,450	55,220	15,160	9,160	4,000	3,460	13,470	75,400
CAL YR 1972	TOTAL	171,637	MEAN	469	MAX	6,200	MIN	60	AC=FT	340,400		
NTR YR 1973	TOTAL	105,085	MEAN	288	MAX	2,6						

## RED RIVER OF THE NORTH BASIN

05079000 Red Lake River at Crookston, Minn.

LOCATION.--Lat 47°46'32", long 96°36'33", in SW¼SW¼ sec.30, T.150 N., R.46 W., Polk County, on right bank at downstream side of highway bridge in Crookston, 0.3 mi (0.5 km) downstream from Interstate Power Co.'s dam, 0.6 mi (1.0 km) downstream from bridge on U.S. Highway 75, and 53 mi (85 km) above mouth.

DRAINAGE AREA.--5,280 mi<sup>2</sup> (13,680 km<sup>2</sup>), 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 (253.813 m) above mean sea level, datum of 1929. May 18, 1901, to June 30, 1909, nonrecording gage at bridge 300 ft (91 m) 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.--72 years, 1,079 ft<sup>3</sup>/s (30.56 m<sup>3</sup>/s), 781,700 acre-ft/yr (964 hm<sup>3</sup>/yr).

EXTREMES.--Current year: Maximum discharge, 4,960 ft<sup>3</sup>/s (140 m<sup>3</sup>/s) Sept. 26 (gage height, 10.86 ft or 3.310 m); minimum, 174 ft<sup>3</sup>/s (4.93 m<sup>3</sup>/s) July 21 (gage height, 2.99 ft or 0.911 m).  
Period of record: Maximum discharge, 28,400 ft<sup>3</sup>/s (804 m<sup>3</sup>/s) Apr. 12, 1969 (gage height, 27.33 ft or 8.330 m); 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 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1,120	1,070	550	615	585	650	980	491	517	259	372	445
2	1,100	1,040	670	615	580	640	888	467	521	256	355	472
3	1,100	1,040	780	610	580	630	812	440	554	249	355	850
4	1,090	1,040	750	610	585	625	798	439	567	231	349	1,920
5	1,090	1,030	710	605	585	620	725	441	538	237	368	2,530
6	1,080	959	680	605	585	625	670	422	550	246	411	3,100
7	1,050	836	670	600	585	640	620	409	504	274	541	3,100
8	1,050	751	675	600	580	660	579	584	496	290	531	2,770
9	1,060	757	680	600	580	690	540	581	475	286	631	2,410
10	1,040	771	685	605	585	790	507	716	462	267	664	2,170
11	1,060	736	685	605	585	1,030	493	712	430	244	672	1,900
12	1,060	766	680	610	585	1,420	450	702	422	232	675	1,700
13	1,030	524	675	615	590	1,770	419	822	418	231	695	1,570
14	1,120	371	670	620	595	2,140	390	827	422	215	640	1,690
15	1,120	374	665	620	595	3,550	389	803	388	222	583	1,650
16	1,120	496	660	615	600	4,270	344	766	423	193	564	1,570
17	1,080	509	655	615	605	4,060	376	680	424	219	537	1,470
18	1,130	603	650	610	610	3,750	365	654	415	206	510	1,500
19	1,150	666	645	610	615	3,050	388	663	396	213	486	1,450
20	1,140	651	645	605	620	2,450	379	672	361	203	479	1,370
21	1,190	558	640	605	630	2,080	373	632	337	176	489	1,350
22	1,170	527	640	605	635	1,850	382	641	337	180	475	1,410
23	1,180	624	635	600	635	1,790	520	641	301	221	461	1,440
24	1,140	682	635	595	640	1,940	694	636	299	230	443	1,710
25	1,160	681	630	595	650	1,990	681	636	299	230	450	2,900
26	1,180	600	630	590	655	1,940	647	645	282	253	443	4,670
27	1,140	534	625	590	660	1,850	601	645	275	243	467	4,590
28	1,150	440	625	590	655	1,550	561	580	263	269	458	4,270
29	1,140	360	625	585	-----	1,260	547	593	281	287	432	4,030
30	1,140	430	620	585	-----	1,180	522	576	264	321	423	3,750
31	1,140	-----	620	585	-----	1,070	-----	576	-----	382	415	-----
TOTAL	34,520	20,426	20,405	18,715	16,990	52,560	18,640	19,092	12,221	7,567	15,376	65,745
MEAN	1,114	661	658	604	607	1,695	555	616	407	244	496	2,191
MAX	1,190	1,070	780	620	660	4,270	980	827	567	382	695	4,670
MIN	1,030	360	550	585	580	620	344	409	263	176	349	445
AC-FT	68,470	40,510	40,470	37,120	33,700	104,300	35,010	37,670	24,240	15,010	30,500	130,400

CAL YR 1972 TOTAL 607,535 MEAN 1,660 MAX 14,300 MIN 360 AC-FT 1,205,000  
WTR YR 1973 TOTAL 300,255 MEAN 823 MAX 4,670 MIN 176 AC-FT 595,600

LOCATION.--Lat 47°56'34", long 97°03'10", in SW¼NE¼ sec.33, T.152 N., R.50 W., Grand Forks County, on left bank on second floor of old sawage plant in Grand Forks, 2.3 mi (3.7 km) downstream from Red Lake River, and at mile 296.0 (kilometre 476.3).

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

GAGE.--Water-stage recorder. Datum of gage is 778.35 ft (237.241 m) above mean sea level. Nov. 3, 1933, to Apr. 13, 1965, water-stage recorder 0.3 mi (0.5 km) upstream at present datum. See WSP 1728 or 1913 for history of changes prior to Nov. 3, 1933.

EXTREMES.--Current year: Maximum discharge, 11,300 ft<sup>3</sup>/s (320 m<sup>3</sup>/s) Mar. 20, gage height 27.32 ft (8.327 m); minimum observed discharge, 421 ft<sup>3</sup>/s (11.9 m<sup>3</sup>/s) July 24; minimum gage height, 3.4 ft (1.04 m) July 23-25. Period of record: Maximum discharge about 80,000 ft<sup>3</sup>/s (2,270 m<sup>3</sup>/s) Apr. 10, 1897, gage height, 50.2 ft (15.30 m), site and datum then in use, from rating curve extended above 54,000 ft<sup>3</sup>/s (1,530 m<sup>3</sup>/s) minimum, 2.4 ft<sup>3</sup>/s (0.068 m<sup>3</sup>/s) Feb. 3-5, 12, 14, 16-19, 1937, caused by unusual regulation during repair of dam at Grand Forks.

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

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1,740	1,920	1,060	1,200	1,100	1,170	3,610	1,480	1,300	735	585	579
2	1,720	1,910	1,100	1,200	1,100	1,190	3,400	1,420	1,290	714	637	634
3	1,700	1,890	1,100	1,190	1,100	1,200	3,200	1,350	1,320	704	627	760
4	1,670	1,870	1,100	1,190	1,100	1,230	3,000	1,290	1,280	682	606	1,090
5	1,660	1,860	1,080	1,180	1,110	1,300	2,700	1,240	1,270	654	597	2,130
6	1,660	1,870	1,060	1,170	1,120	1,490	2,550	1,200	1,270	624	615	3,210
7	1,660	1,860	1,080	1,170	1,130	1,800	2,410	1,200	1,260	621	640	4,090
8	1,650	1,760	1,140	1,140	1,140	2,000	2,280	1,240	1,240	668	696	4,530
9	1,660	1,670	1,170	1,120	1,150	2,410	2,170	1,290	1,210	662	756	4,360
10	1,680	1,620	1,170	1,100	1,190	2,900	2,060	1,360	1,150	704	802	3,920
11	1,720	1,610	1,180	1,100	1,210	3,520	1,950	1,400	1,120	672	854	3,510
12	1,720	1,610	1,180	1,100	1,250	4,280	1,860	1,400	1,080	624	875	3,240
13	1,740	1,530	1,190	1,110	1,240	5,140	1,770	1,420	1,020	603	900	2,980
14	1,760	1,220	1,190	1,110	1,240	6,230	1,680	1,460	984	582	886	2,780
15	1,800	1,000	1,200	1,110	1,230	7,850	1,630	1,540	956	573	872	2,700
16	1,850	973	1,200	1,110	1,210	9,220	1,550	1,560	934	528	844	2,680
17	1,860	1,040	1,200	1,110	1,200	10,300	1,480	1,540	934	504	816	2,580
18	1,860	1,060	1,200	1,100	1,170	11,000	1,430	1,450	938	480	794	2,460
19	1,820	1,100	1,200	1,100	1,160	11,200	1,430	1,410	924	474	770	2,380
20	1,830	1,180	1,200	1,100	1,160	11,200	1,440	1,390	906	450	770	2,300
21	1,840	1,220	1,190	1,100	1,160	10,200	1,410	1,380	900	445	784	2,270
22	1,880	1,170	1,190	1,100	1,160	9,300	1,400	1,410	910	441	777	2,240
23	1,910	1,140	1,190	1,100	1,150	8,800	1,400	1,340	903	437	798	2,150
24	1,920	1,180	1,180	1,100	1,150	8,190	1,440	1,270	910	433	756	2,330
25	1,920	1,200	1,180	1,100	1,150	7,180	1,570	1,280	858	429	784	2,520
26	1,920	1,300	1,180	1,100	1,150	6,300	1,640	1,290	850	441	774	3,370
27	1,940	1,230	1,180	1,100	1,150	5,380	1,640	1,290	840	453	732	5,420
28	1,940	1,160	1,180	1,110	1,160	4,870	1,600	1,290	794	462	665	6,440
29	1,930	1,090	1,180	1,110	-----	4,540	1,560	1,290	770	474	630	6,370
30	1,920	1,020	1,190	1,100	-----	4,190	1,520	1,290	752	513	615	5,990
31	1,930	-----	1,200	1,100	-----	3,900	-----	1,280	-----	549	582	-----
TOTAL	55,810	42,263	36,040	34,830	32,540	169,480	58,780	42,050	30,873	17,355	22,839	92,013

## RED RIVER OF THE NORTH BASIN

05087500 Middle River at Argyle, Minn.

LOCATION.--Lat 48°20'27", long 96°49'02", in SE&SW¼ sec. 10, T.156 N., R.48 W., Marshall County, on left bank 20 ft (6.1 m) upstream from bridge on U.S. Highway 75 in Argyle and 14 mi (22 km) upstream from mouth.

DRAINAGE AREA.--265 mi (686 km<sup>2</sup>).

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 (252.54 m) 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 (.30 m) higher.

AVERAGE DISCHARGE.--23 years (1950-73), 42.0 ft<sup>3</sup>/s (1.19 m<sup>3</sup>/s), 30.430 acre-ft/yr (37.5 hm<sup>3</sup>/s).

EXTREMES.--Current year: Maximum discharge, about 93 ft<sup>3</sup>/s (2.63 m<sup>3</sup>/s) Mar. 15 or 16; maximum gage height, 5.10 ft (1.554 m) Mar. 15 or 16 (from floodmark, backwater from ice); no flow for many days.

Period of record: Maximum discharge, 2,590 ft<sup>3</sup>/s (73.3 m<sup>3</sup>/s) Apr. 12, 1965 (gage height, 15.29 ft or 4.660 m); maximum gage height, 16.00 ft (4.877 m) Apr. 3, 1966 (backwater from ice); no flow at times in most years.

Flood of April 1950 reached a stage of 15.25 ft (4.648 m) present datum, from floodmarks (discharge, 2,790 ft<sup>3</sup>/s or 79.0 m<sup>3</sup>/s).

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

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0	.02	.01			0	20	1.4	2.8	0	0	0
2	0	.02	.01			.01	18	1.3	2.3	0	0	0
3	0	.03	.01			.02	16	1.1	1.5	0	0	0
4	0	.07	.01			.03	14	.88	1.1	0	0	0
5	0	.18	.01			.05	12	.98	.88	0	0	0
6	.03	.76	.01			.10	11	1.1	.60	.04	.63	0
7	.02	.66	.01			.20	9.1	1.1	.41	0	0	0
8	.01	.44	.01			.40	8.4	1.3	.38	0	0	0
9	.01	.47	.01			1.0	7.7	2.6	.29	0	.08	0
10	0	.42	0			5.0	6.7	3.7	.15	0	.01	0
11	.02	.42	0			20	6.2	2.7	.11	0	0	0
12	.01	.41	0			40	5.6	3.5	.07	0	0	0
13	0	.34	0			60	5.1	3.3	.03	0	0	0
14	0	.31	0			80	5.1	2.7	0	0	0	0
15	0	.20	0			90	4.8	2.5	0	0	0	0
16	0	.10	0			90	3.9	2.7	0	0	0	0
17	0	.07	0			85	3.7	5.2	.07	0	0	0
18	0	.05	0			80	3.6	6.6	.05	0	0	0
19	0	.03	0			70	3.7	6.0	.07	0	0	0
20	0	.03	0			60	3.7	5.5	.08	0	0	0
21	0	.03	0			55	2.9	5.1	.04	0	0	0
22	0	.02	0			44	3.3	6.3	.02	0	0	.32
23	0	.02	0			40	3.1	6.1	.03	0	0	.01
24	0	.02	0			37	2.9	5.1	.01	0	0	1.1
25	0	.02	0			41	2.7	4.3	0	0	0	.60
26	0	.02	0			33	2.3	4.8	0	0	0	.23
27	0	.01	0			29	2.6	4.2	0	0	0	.06
28	0	.01	0			37	1.8	3.6	0	0	0	.01
29	0	.01	0			34	1.4	3.0	0	0	0	0
30	.04	.01	0		-----	26	1.4	2.1	0	0	0	0
31	.03	-----	0		-----	22	-----	1.5	-----	0	0	-----
TOTAL	.17	5.20	.09	0	0	1,079.81	192.7	102.26	10.99	.04	.72	2.33
MEAN	.006	.17	.003	0	0	34.8	6.42	3.30	.37	.001	.023	.078
MAX	0	.76	.01	0	0	90	20	6.6	2.8	.04	.63	1.1
MIN	0	.01	0	0	0	0	1.4	.88	0	0	0	0
AC-FT	.3	10	.2	0	0	2,140	382	203	22	.08	1.4	4.6

CAL YR 1972 TOTAL 8,719.56 MEAN 23.8 MAX 708 MIN 0 AC-FT 17,300  
WTR YR 1973 TOTAL 1,394.31 MEAN 3.82 MAX 90 MIN 0 AC-FT 2,770

NOTE.--No gage-height record Dec. 7 to Mar. 21.



LOCATION.--Lat 48°34'20", long 97°08'50", in SE<sub>4</sub>SE<sub>4</sub>SE<sub>4</sub> sec.24, T.159 N., R.51 W., Pembina County, on downstream end of east pier of interstate highway bridge, 1.5 mi (2.4 km) northeast of Drayton and at mile 206.7 (kilometre 332.6).

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

GAGE.--Water-stage recorder and concrete control. Datum of gage is 755.00 ft (230.124 m) above mean sea level (Minnesota highway benchmark). Prior to Nov. 30, 1954, nonrecording gage at site 1.5 mi (2.4 km) upstream at datum 1.59 ft (0.485 m) higher.

EXTREMES.--Current year: Maximum discharge, 13,400 ft<sup>3</sup>/s (379 m<sup>3</sup>/s) Mar. 25, gage height, 24.49 ft (7.465 m); minimum discharge, 369 ft<sup>3</sup>/s (10.5 m<sup>3</sup>/s) July 23, gage height, 9.29 ft (2.832 m).

Period of record: Maximum discharge, 86,500 ft<sup>3</sup>/s (2,450 m<sup>3</sup>/s) May 12, 1950, gage height, 41.58 ft (12.674 m), former site and datum; minimum observed, 7.7 ft<sup>3</sup>/s (0.22 m<sup>3</sup>/s) Oct. 16, 1936, gage height, 1.75 ft (0.533 m), former site and datum.

Maximum discharge known since 1860, that of May 12, 1950. Flood of April 1897 reached a stage of about 41 ft (12.5 m), at site and datum in use prior to Nov. 30, 1954.

REMARKS.--Records good. Some regulation by reservoirs on tributaries. Records of chemical analyses and water temperatures for the water year 1973 are published in Part 2 of this report.

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

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1,710	1,990	990	1,200	1,100	1,170	4,900	1,750	1,510	830	446	730
2	1,710	1,970	920	1,210	1,100	1,170	4,820	1,700	1,500	784	468	718
3	1,710	1,970	990	1,220	1,100	1,170	4,150	1,660	1,510	766	514	757
4	1,660	1,960	1,000	1,200	1,100	1,170	3,840	1,600	1,490	766	586	766
5	1,660	1,950	1,100	1,200	1,120	1,170	3,510	1,510	1,460	766	658	850
6	1,610	1,930	1,150	1,200	1,140	1,200	3,280	1,440	1,440	739	718	1,330
7	1,560	1,960	1,150	1,200	1,150	1,210	3,090	1,390	1,430	706	682	2,580
8	1,600	1,960	1,150	1,150	1,160	1,240	2,900	1,350	1,390	682	658	3,770
9	1,610	1,910	1,150	1,120	1,170	1,300	2,740	1,330	1,400	622	694	4,910
10	1,570	1,800	1,150	1,100	1,180	1,400	2,600	1,370	1,370	670	757	5,180
11	1,580	1,700	1,150	1,100	1,200	1,700	2,460	1,450	1,320	694	811	4,910
12	1,640	1,650	1,160	1,100	1,240	2,180	2,350	1,530	1,260	682	840	4,220
13	1,650	1,580	1,160	1,100	1,220	2,830	2,350	1,580	1,220	706	910	3,760
14	1,700	1,320	1,170	1,100	1,220	3,970	2,270	1,620	1,170	670	960	3,410
15	1,730	1,190	1,180	1,100	1,220	4,900	2,060	1,600	1,100	646	970	3,190
16	1,750	1,120	1,170	1,100	1,220	7,100	1,960	1,700	1,060	598	970	3,030
17	1,840	1,060	1,180	1,100	1,210	8,600	1,860	1,760	1,190	574	950	2,960
18	1,840	1,050	1,180	1,100	1,200	9,800	1,780	1,750	1,090	526	940	2,890
19	1,840	1,110	1,180	1,100	1,220	11,000	1,740	1,710	1,080	479	880	2,770
20	1,820	1,140	1,180	1,100	1,280	11,800	1,700	1,650	1,090	457	870	2,660
21	1,820	1,160	1,180	1,100	1,280	12,400	1,660	1,620	1,090	446	850	2,540
22	1,830	1,220	1,180	1,100	1,280	12,700	1,660	1,730	1,060	402	840	2,420
23	1,830	1,190	1,180	1,100	1,280	13,000	1,640	1,730	1,040	380	890	2,370
24	1,900	1,140	1,180	1,100	1,280	13,200	1,600	1,660	1,020	413	920	2,320
25	1,930	1,200	1,200	1,100	1,260	13,300	1,580	1,570	1,010	413	910	2,340
26	1,950	1,290	1,220	1,100	1,220	12,000	1,660	1,500	980	402	900	2,470
27	1,970	1,250	1,210	1,100	1,190	10,100	1,800	1,500	960	424	920	2,940
28	1,990	1,190	1,200	1,100	1,170	8,300	1,870	1,500	950	424	900	4,790
29	2,000	1,130	1,200	1,100	-----	7,000	1,860	1,530	930	413	860	6,090
30	2,000	1,100	1,200	1,100	-----	6,000	1,800	1,530	880	424	811	6,580
31	2,020	-----	1,200	1,100	-----	5,200	-----	1,520	-----	435	775	-----
TOTAL	55,010	44,190	35,610	34,900	33,510	189,280	73,					

05094000 South Branch Two Rivers at Lake Bronson, Minn.

LOCATION.--Lat 48°43'50", long 96°39'50", in SW¼SW¼ sec.30, T.161 N., R.46 W., Kittson County, on left bank 70 ft (21 m) upstream from culvert on U.S. Highway 59 at town of Lake Bronson and 2 mi (3 km) downstream from dam at outlet of Bronson Lake.

DRAINAGE AREA.--444 mi<sup>2</sup> (1,150 km<sup>2</sup>).

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 (283.02 m) above mean sea level, datum of 1929 (Minnesota Highway Department bench mark). Prior to Nov. 23, 1953, nonrecording gage at bridge 100 ft (30 m) downstream at datum 2.00 ft (0.61 m) higher. Nov. 23, 1953, to Oct. 5, 1963, water-stage recorder at same site at datum 2.00 ft (0.61 m) higher.

AVERAGE DISCHARGE.--32 years (1928-36, 1941-43, 1945-47, 1953-73), 90.5 ft<sup>3</sup>/s (2.56 m<sup>3</sup>/s), 65,570 acre-ft/yr (80.8 hm<sup>3</sup>/yr).

EXTREMES.--Current year: Maximum discharge, 800 ft<sup>3</sup>/s (22.7 m<sup>3</sup>/s) Mar. 14 (gage height, 10.18 ft or 3.103 m, backwater from ice); no flow for part of Nov. 27 (result of freezeup).

Period of record: Maximum discharge, 5,410 ft<sup>3</sup>/s (153 m<sup>3</sup>/s) Apr. 5, 1966 (gage height, 18.23 ft or 5.556 m); no flow at times in 1937, 1941, 1960, 1973.

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 or 4.56 hm<sup>3</sup>).

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

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.0	2.4	2.0	1.6	42	2.0	17	3.8	6.5	2.0	4.0	2.5
2	3.7	2.4	2.0	1.5	70	2.0	13	3.5	6.0	1.8	1.9	2.9
3	4.2	2.3	2.0	1.5	3.0	2.2	11	3.3	6.8	1.5	1.7	3.7
4	3.4	2.3	2.0	1.5	2.9	2.3	9.2	3.3	3.7	1.8	1.2	3.5
5	4.2	2.5	2.0	1.5	2.8	3.0	8.0	6.5	2.8	2.0	1.2	2.9
6	4.2	2.5	2.0	1.4	2.6	4.0	6.6	4.0	3.1	2.1	1.6	2.8
7	4.8	2.5	2.0	1.4	2.4	5.8	5.9	3.1	3.0	2.0	1.2	4.9
8	5.2	2.3	2.0	1.4	2.3	8.0	5.5	3.3	3.2	1.8	1.0	4.6
9	5.6	2.4	2.0	1.4	2.2	14	5.0	3.5	2.8	1.6	1.2	3.0
10	5.6	2.3	2.0	1.4	2.1	16	4.7	5.9	3.1	1.4	1.1	2.3
11	4.8	2.3	2.0	1.4	2.0	18	4.4	5.9	2.8	1.8	.98	2.5
12	4.7	2.2	1.9	1.4	2.0	22	3.9	6.0	2.9	1.5	.78	2.9
13	4.2	2.1	1.9	1.4	2.0	25	3.8	6.9	2.8	1.2	.77	2.6
14	4.1	2.3	1.9	1.4	2.0	200	4.0	6.9	2.8	1.9	.79	2.8
15	4.2	2.3	1.9	1.4	2.0	139	3.3	6.8	2.9	1.9	.96	2.8
16	4.0	2.3	1.9	1.4	2.0	78	2.9	5.9	3.9	1.6	1.3	2.5
17	4.3	2.3	1.9	1.4	2.0	88	3.3	5.4	4.0	1.4	1.4	2.2
18	3.6	2.3	1.9	1.4	2.0	105	3.5	5.4	3.8	1.9	1.4	2.3
19	3.9	2.4	1.8	1.4	2.0	88	4.3	5.7	3.8	1.8	2.2	2.1
20	3.6	2.3	1.8	1.4	2.0	75	5.9	5.5	3.9	1.4	1.8	1.9
21	3.7	2.3	1.8	1.4	2.0	70	4.1	5.5	3.5	1.2	2.8	3.0
22	3.9	2.3	1.8	1.4	2.0	65	3.8	7.1	3.1	.96	2.3	3.1
23	3.8	2.2	1.8	1.4	2.0	62	4.2	7.4	2.9	1.4	2.6	2.1
24	3.8	2.0	1.7	1.4	2.0	59	4.3	6.9	3.0	1.6	2.5	3.4
25	3.4	2.0	1.7	1.4	2.0	55	4.3	6.1	2.8	1.3	2.7	3.4
26	3.4	2.0	1.7	1.4	2.0	51	4.4	7.0	2.3	1.3	2.8	2.7
27	3.3	1.2	1.7	1.4	2.0	47	4.1	7.4	2.3	1.8	2.8	2.1
28	3.0	1.6	1.7	1.4	2.0	41	4.3	6.1	2.1	1.7	2.6	1.9
29	3.0	2.0	1.6	37	-----	34	4.7	5.4	2.4	1.4	2.3	1.8
30	3.0	2.0	1.6	10	-----	28	3.6	4.9	2.3	1.6	2.2	2.4
31	2.6	-----	1.6	5.0	-----	22	-----	5.0	-----	80	2.1	-----
TOTAL	123.4	66.3	57.6	91.8	166.3	1,431.3	167.2	169.4	101.3	128.66	56.18	127.7
MEAN	3.98	2.21	1.86	2.96	6.01	46.2	5.57	5.46	3.38	4.15	1.81	4.26
MAX	5.6	2.5	2.0	37	70	200	17	7.4	6.8	80	4.0	4.9
MIN	2.6	1.2	1.6	1.4	2.0	2.0	2.9	3.1	2.1	.96	.77	1.8
AC-FT	245	132	114	182	334	2,840	332	336	201	255	111	253
CAL YR 1972 TOTAL	18,417.17			MEAN 50.3								
WTR YR 1973 TOTAL	2,689.14			MEAN 7.37								
				MAX 1,150								
				MIN .97								
				AC-FT 36,530								
				MIN .77								
				AC-FT 5,330								

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 (460 m) downstream from Canadian National Railway bridge in Emerson, 0.8 mi (1.3 km) downstream from international boundary, 3.6 mi (5.8 km) downstream from Pembina River, and at mile 154.3 (kilometre 248.3).

DRAINAGE AREA.--40,200 mi<sup>2</sup> (104,100 km<sup>2</sup>), approximately, includes 3,800 mi<sup>2</sup> (9,840 km<sup>2</sup>) 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 (213.360 m) 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.--61 years (1912-73), 3,125 ft<sup>3</sup>/s (88.50 m<sup>3</sup>/s), 2,264,000 acre-ft/yr (2.792 km<sup>3</sup>/yr); median of yearly mean discharges, 2,630 ft<sup>3</sup>/s (74.5 m<sup>3</sup>/s), 1,910,000 acre-ft/yr (2.36 km<sup>3</sup>/s).

EXTREMES.--Current year: Maximum discharge, 14,700 ft<sup>3</sup>/s (416 m<sup>3</sup>/s) Mar. 27; maximum daily gage height, 67.32 ft (20.519 m) Mar. 26; minimum discharge, 443 ft<sup>3</sup>/s (12.5 m<sup>3</sup>/s).  
Period of record: Maximum discharge, 95,500 ft<sup>3</sup>/s (2,700 m<sup>3</sup>/s) May 13, 1950, gage height, 90.89 ft (27.703 m); minimum observed, 0.9 ft<sup>3</sup>/s (0.025 m<sup>3</sup>/s) Feb. 6-8, 1937, gage height, 44.00 ft (13.411 m).

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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1,820	2,010	1,520	1,170	1,080	1,090	5,610	1,940	1,630	883	478	710
2	1,820	1,990	1,450	1,170	1,080	1,100	4,910	1,900	1,610	838	487	684
3	1,820	1,980	1,250	1,170	1,090	1,110	4,480	1,860	1,610	778	503	672
4	1,810	1,970	1,150	1,180	1,100	1,120	4,190	1,820	1,600	742	527	669
5	1,800	1,960	1,090	1,180	1,120	1,120	3,970	1,760	1,580	733	577	688
6	1,770	1,950	1,090	1,170	1,140	1,130	3,770	1,690	1,560	730	623	759
7	1,750	1,940	1,110	1,160	1,140	1,140	3,550	1,620	1,540	724	660	1,100
8	1,720	1,930	1,120	1,150	1,140	1,160	3,340	1,570	1,510	713	668	2,110
9	1,710	1,930	1,120	1,130	1,150	1,190	3,140	1,520	1,480	682	659	3,040
10	1,720	1,920	1,100	1,110	1,150	1,270	2,960	1,490	1,470	645	664	3,970
11	1,720	1,870	1,080	1,100	1,160	1,560	2,800	1,500	1,440	638	695	4,150
12	1,720	1,790	1,080	1,090	1,150	2,090	2,670	1,530	1,390	651	789	4,070
13	1,730	1,720	1,100	1,090	1,150	2,860	2,550	1,590	1,340	664	886	3,820
14	1,740	1,760	1,110	1,080	1,160	3,760	2,420	1,660	1,280	683	915	3,490
15	1,760	1,740	1,120	1,080	1,160	4,870	2,290	1,700	1,220	687	946	3,180
16	1,790	1,650	1,130	1,090	1,140	6,040	2,200	1,720	1,150	693	975	3,000
17	1,800	1,520	1,140	1,090	1,110	6,760	2,120	1,760	1,330	675	990	2,860
18	1,820	1,400	1,150	1,090	1,100	7,520	2,030	1,810	1,480	643	985	2,780
19	1,850	1,340	1,150	1,090	1,090	8,130	1,970	1,840	1,400	606	985	2,700
20	1,870	1,320	1,160	1,090	1,100	8,500	1,920	1,850	1,330	566	938	2,630
21	1,880	1,370	1,160	1,090	1,110	8,880	1,880	1,800	1,250	527	917	2,550
22	1,890	1,450	1,160	1,080	1,120	9,660	1,840	1,810	1,170	488	886	2,510
23	1,890	1,530	1,150	1,080	1,110	10,500	1,820	1,850	1,130	460	857	2,470
24	1,900	1,590	1,140	1,090	1,090	10,800	1,800	1,860	1,070	449	848	2,440
25	1,920	1,620	1,130	1,090	1,080	12,200	1,770	1,820	1,030	457	842	2,420
26	1,930	1,630	1,120	1,100	1,070	13,500	1,750	1,740	997	476	835	2,430
27	1,950	1,630	1,120	1,100	1,070	14,200	1,770	1,670	966	495	829	2,590
28	1,970	1,610	1,120	1,100	1,080	12,400	1,840	1,630	932	489	829	3,090
29	1,980	1,590	1,130	1,100	-----	10,000	1,910	1,620	916	490	821	4,200
30	2,000	1,570	1,140	1,090	-----	8,050	1,950	1,630	906	494	796	5,220
31	2,010	-----	1,160	1,080	-----	6,630	-----	1,650	-----	483	753	-----
TOTAL	56,860	51,280	35,750	34,480	31,240	180,340	81,220	53,210	39,317	19,282	24,163	77,002
MEAN	1,834	1,709	1,153	1,112	1,116	5,817	2,707	1,716	1,311	622	779	2,567
MAX	2,010	2,010	1,520	1,180	1,160	14,200	5,610	1,940	1,630	883	990	5,220
MIN	1,710	1,320	1,080	1,080	1,070	1,090	1,750	1,490	906	449	478	669
AC=FT	112,800	101,700	70,910	68,390	61,960	357,700	161,100	105,500	77,990	38,250	47,930	152,700
CAL YR 1972	TOTAL 1,924,260		MEAN 5,258		MAX 30,700		MIN 1,080		AC=FT 3,817,000			
WTR YR 1973	TOTAL 684,144		MEAN 1,874		MAX 14,200		MIN 449		AC=FT 1,357,000			

05104500 Roseau River below South Fork near Malung, Minn.

LOCATION.--Lat 48°47'30", long 95°44'40", in SW¼ sec.6, T.161 N., R.39 W., Roseau County, on left bank 0.3 mi (0.5 km) downstream from South Fork and 1.5 mi (2.4 km) northwest of Malung.

DRAINAGE AREA.--573 mi<sup>2</sup> (1,484 km<sup>2</sup>).

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

GAGE.--Water-stage recorder and concrete control. Datum of gage is 1,029.67 ft (313.84 m) above mean sea level, adjustment of 1912.

AVERAGE DISCHARGE.--27 years, 150 ft<sup>3</sup>/s (4.25 m<sup>3</sup>/s), 108,700 acre-ft/yr (134 hm<sup>3</sup>/yr).

EXTREMES.--Current year: Maximum discharge, 564 ft<sup>3</sup>/s (16.0 m<sup>3</sup>/s) Sept. 28 (gage height, 7.37 ft or 2.246 m); minimum, 0.64 ft<sup>3</sup>/s (0.018 m<sup>3</sup>/s) July 22, 23 (gage height, 4.27 ft or 1.302 m).

Period of record: Maximum discharge, 5,750 ft<sup>3</sup>/s (163 m<sup>3</sup>/s) July 18, 1968 (gage height, 22.32 ft or 6.803 m); maximum gage height, 23.37 ft (7.123 m) 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 mi (1.3 km) upstream and returns to river 0.5 mi (0.8 km) downstream. Overflow begins at stage of about 13.0 ft (4.0 m) discharge, 1,800 ft<sup>3</sup>/s (51.0 m<sup>3</sup>/s). 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.6	2.8	4.9	3.8	3.7	2.0	37	35	34	8.3	7.6	20
2	1.8	3.8	4.7	3.8	3.7	2.0	32	33	33	7.1	6.2	20
3	1.4	3.4	4.5	4.2	3.8	2.2	28	31	31	5.8	5.2	21
4	1.4	7.3	4.4	4.2	3.5	2.3	27	29	30	4.7	4.5	39
5	1.5	6.9	4.1	4.2	3.5	2.7	27	28	28	4.2	3.5	72
6	1.4	8.8	3.8	4.3	3.4	3.8	24	26	27	4.2	4.9	98
7	1.5	9.3	3.6	4.3	3.2	6.2	22	25	25	4.0	4.9	112
8	1.3	9.0	3.3	4.0	3.0	1.9	20	23	24	3.0	4.3	130
9	1.1	8.9	3.1	4.0	2.8	6.1	19	22	17	2.6	4.7	141
10	1.2	8.7	2.9	4.0	2.7	10.1	18	25	11	2.3	5.4	158
11	1.7	8.5	2.3	4.0	2.6	15.6	17	29	9.3	2.6	6.2	109
12	1.8	7.8	2.6	4.0	2.6	14.4	17	32	8.8	3.1	7.3	114
13	1.8	7.2	2.5	4.0	2.4	18.4	16	31	8.0	2.6	6.6	113
14	1.9	6.7	2.4	3.9	2.4	13.9	16	35	7.1	2.3	5.8	103
15	1.9	6.2	2.4	4.1	2.3	9.6	16	38	5.8	2.6	6.6	92
16	1.9	5.8	2.4	4.2	2.3	9.4	15	38	6.0	2.4	6.4	80
17	1.8	5.7	2.4	4.2	2.2	9.2	14	37	7.8	2.6	6.0	73
18	2.3	5.6	2.4	4.3	2.2	8.0	14	36	8.3	1.3	5.4	69
19	2.0	5.6	2.6	4.3	2.2	6.6	14	34	9.9	.89	4.0	64
20	1.7	5.6	2.6	4.3	2.2	5.0	19	33	10	.75	3.4	59
21	2.0	5.6	2.6	4.2	2.1	5.0	24	30	11	.67	3.1	53
22	2.2	5.6	2.8	4.2	2.1	5.1	27	31	11	.64	3.2	55
23	2.6	5.6	3.0	4.3	2.1	5.3	25	33	10	.67	2.8	78
24	2.6	5.6	3.0	4.3	2.1	5.1	34	34	8.8	.80	12	121
25	2.6	5.6	3.1	4.3	2.1	4.8	43	33	7.1	1.2	16	317
26	2.7	5.6	3.1	4.5	2.0	4.8	44	34	7.1	1.7	16	509
27	2.8	5.6	3.2	4.5	2.0	7.0	43	37	7.3	3.5	17	548
28	2.6	5.5	3.4	4.3	2.0	5.6	41	37	9.9	3.8	18	555
29	2.4	5.4	3.5	4.2	-----	3.7	39	37	11	4.9	19	538
30	2.8	5.2	3.5	4.0	-----	3.8	37	37	9.9	8.0	19	472
31	2.8	-----	3.8	3.7	-----	3.9	-----	36	-----	8.0	20	-----
TOTAL	61.1	188.9	99.4	128.6	73.2	1,844.2	769	999	434.1	101.22	255.0	4,933
MEAN	1.97	6.30	3.21	4.15	2.61	59.5	25.6	32.7	14.5	3.27	8.23	164
MAX	2.8	9.3	4.9	4.5	3.8	18.4	44	38	34	8.3	20	555
MIN	1.1	2.8	2.4	3.7	2.0	2.0	14	27	5.8	.64	2.8	20
AC-FT	121	375	197	255	145	3,660	1,530	1,980	861	201	506	9,780

CAL YR 1972 TOTAL 30,276.29 MEAN 82.7 MAX 1,670 MIN .89 AC-FT 60,050  
 WTR YR 1973 TOTAL 9,886.72 MEAN 27.1 MAX 555 MIN .64 AC-FT 19,610

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(International gaging station)

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

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	24	16	5.5	1.0	1.1	1.1	23	40	32	29	146	13
2	22	16	5.0	1.0	1.1	1.2	20	41	29	23	107	14
3	21	16	4.7	.90	1.1	1.2	18	39	24	16	79	17
4	20	16	4.2	.80	1.1	1.3	15	33	27	12	63	57
5	18	17	4.0	.70	1.1	1.3	15	32	33	10	50	94
6	17	21	4.0	.60	1.1	1.4	14	39	30	10	46	78
7	15	32	3.4	.60	1.1	1.4	12	45	28	9.6	48	60
8	16	31	3.1	.60	1.1	1.5	11	45	26	12	53	50
9	14	29	2.8	.60	1.1	2.0	16	44	22	12	122	41
10	13	30	2.5	.60	1.1	3.5	14	46	22	11	150	34
11	15	29	2.3	.60	1.2	10	11	53	20	6.8	136	28
12	17	26	2.1	.70	1.2	18	9.8	54	20	24	96	15
13	19	24	2.0	.90	1.2	37	8.1	51	17	45	77	29
14	18	21	1.9	1.1	1.2	42	6.5	47	15	38	65	18
15	16	16	1.8	1.1	1.2	46	6.4	41	17	32	54	17
16	16	12	1.8	1.1	1.2	45	11	37	15	25	48	16
17	14	11	1.7	1.0	1.2	40	10	36	17	20	41	15
18	12	10	1.7	1.0	1.2	35	6.4	36	26	17	35	12
19	11	10	1.6	1.0	1.2	32	6.0	33	41	15	31	12
20	11	9.7	1.6	1.0	1.2	30	16	25	64	9.9	27	9.0
21	13	9.0	1.5	1.0	1.1	32	57	25	78	17	26	13
22	13	8.5	1.5	1.0	1.1	36	74	30	80	6.6	26	52
23	13	8.3	1.4	1.0	1.1	45	70	43	76	7.4	25	87
24	11	8.1	1.4	1.0	1.1	55	66	49	64	7.4	22	126
25	12	7.9	1.3	1.0	1.1	67	62	47	50	8.1	21	312
26	13	7.5	1.3	1.0	1.1	68	60	44	45	8.8	22	368
27	13	7.4	1.2	1.0	1.1	64	57	43	47	27	23	341
28	14	6.4	1.2	1.0	1.1	56	53	40	49	51	21	300
29	15	6.1	1.1	1.0	-----	53	47	34	42	54	20	256
30	15	5.8	1.1	1.0	-----	42	43	30	36	105	17	219
31	16	-----	1.0	1.1	-----	31	-----	31	-----	182	10	-----
TOTAL	477	467.7	71.7	28.00	31.8	899.9	838.2	1,233	1,092	851.6	1,707	2,703.0
MEAN	15.4	15.6	2.31	.90	1.14	29.0	27.9	39.8	36.4	27.5	55.1	90.1
MAX	24	32	5.5	1.1	1.2	68	74	54	80	182	150	368
MIN	11	5.8	1.0	.60	1.1	1.1	6.0	25	15	6.6	10	9.0
AC=FT	946	928	142	56	63	1,780	1,660	2,450	2,170	1,690	3,390	5,360
CAL YR 1972	TOTAL	13,875.60	MEAN	37.9	MAX	473	MIN	.80	AC=FT	27,520		
WTR YR 1973	TOTAL	10,400.90	MEAN	28.5	MAX	368	MIN	.60	AC=FT	20,630		

## RED RIVER OF THE NORTH BASIN

05106500 Roseau River at Roseau Lake, Minn.

LOCATION.--Lat 48°54'22", long 95°49'55", in SW¼SW¼ sec.28, T.163 N., R.40 W., Roseau County, on left bank at downstream side of bridge at Roseau Lake, 3.5 mi (5.6 km) upstream from Pine Creek, 3.8 mi (6.1 km) downstream from Sprague Creek, and 7 mi (11 km) northwest of Roseau.

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

GAGE.--Water-stage recorder. Datum of gage is 1,018.59 ft (310.466 m) 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, 1,028.49 ft (313.484 m) about Sept. 27 (from recorded range in stage); minimum recorded, 1,020.95 ft (311.186 m) July 25.

Period of record: Maximum elevation observed, 1,036.86 ft (316.035 m) May 13, 1950; minimum observed, 1,019.75 ft (310.820 m) Aug. 16, 1941.

Flood of July 1919 reached an elevation of about 1,034 ft (315.2 m).

## GAGE HEIGHT, IN FEET, WATER YEAR (OCTOBER 1972 TO SEPTEMBER 1973)

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	21.57	21.57						22.43	22.20	21.83	23.13	21.46
2	21.54							22.37	22.12	21.73	22.91	21.52
3	21.53							22.34	22.06	21.54	22.55	21.64
4	21.54							22.29	22.13	21.39	22.24	21.97
5	21.57							22.20	22.16	21.28	21.98	22.57
6	21.55							22.28	22.16	21.24	21.87	23.04
7	21.52							22.37	22.07	21.27	21.89	23.14
8	21.47							22.38	22.01	21.33	21.91	23.14
9	21.55							22.30	21.93	21.34	22.11	23.15
10	21.42							22.35	21.83	21.31	22.73	23.19
11	21.44							22.50	21.75	21.24	22.97	23.17
12	21.47							22.59	21.62	21.15	22.81	22.81
13	21.53							22.58	21.52	21.52	22.51	22.61
14	21.57					27.13		22.48	21.44	21.76	22.25	22.59
15	21.56					26.81		22.43	21.38	21.74	22.04	22.42
16	21.57					26.67		22.38	21.41	21.62	21.87	
17	21.52					26.70		22.33	21.53	21.51	21.75	
18						26.47		22.28	21.77	21.40	21.62	
19						26.12		22.21	22.07	21.29	21.53	
20						25.66		22.13	22.51	21.19	21.48	
21						25.43		22.09	22.84	21.09	21.44	
22						25.39		22.16	22.89	21.15	21.41	
23						25.35		22.40	22.76	21.07	21.37	
24						25.06		22.51	22.60	21.04	21.36	
25						24.48	22.80	22.51	22.36	21.03	21.35	
26						23.96	22.79	22.49	22.17	21.05	21.50	
27							22.76	22.46	22.11	21.16	21.61	
28							22.69	22.43	22.12	21.46	21.64	
29					-----		22.61	22.34	22.06	21.85	21.64	
30					-----		22.51	22.25	21.95	22.18	21.61	
31		-----			-----		-----	22.25	-----	22.85	21.54	-----
MEAN								22.36	22.05	21.44	21.96	
MAX								22.59	22.89	22.85	23.13	
MIN								22.09	21.38	21.03	21.35	

NOTE.--Add 1,000 ft to obtain elevations above mean sea level.

05107500 Roseau River at Ross, Minn.

LOCATION.--Lat 48°54'37", long 95°55'18", in SE¼ sec.27, T.163 N., R.41 W., Roseau County, on left bank 300 ft (91 m) downstream from highway bridge, 0.2 mi (0.3 km) north of Ross, and 2.3 mi (3.7 km) downstream from Pine Creek.

DRAINAGE AREA.--1,220 mi<sup>2</sup> (3,160 km<sup>2</sup>), approximately.

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

GAGE.--Water-stage recorder. Datum of gage is 1,018.44 ft (310.42 m) 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.--45 years, 264 ft<sup>3</sup>/s, (7.476 m<sup>3</sup>/s), 191,300 acre-ft/yr (236 hm<sup>3</sup>/yr).

EXTREMES.--Current year: Maximum discharge, 893 ft<sup>3</sup>/s (25.3 m<sup>3</sup>/s) Sept. 27 (gage height, 8.78 ft or 2.676 m); minimum daily, 4.5 ft<sup>3</sup>/s (0.13 m<sup>3</sup>/s) Jan. 8-18.

Period of record: Maximum discharge, 6,560 ft<sup>3</sup>/s (186 m<sup>3</sup>/s) May 12, 1950 (gage height, 18.25 ft or 5.563 m); no flow Aug. 29, 30, 1961.

Maximum stage known, about 19 ft (5.8 m) in 1896. Other outstanding floods reached the following stages (from information by local residents): flood of July 1919, 17.5 ft (5.3 m); flood of 1927, about 16 ft (4.9 m).

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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	39	30	14	5.2	5.3	5.4	106	118	101	67	174	63
2	36	31	13	5.1	5.4	5.4	97	113	95	59	160	64
3	34	32	12	5.0	5.5	5.6	91	111	91	51	134	71
4	32	34	11	4.9	5.5	5.8	84	108	92	40	110	90
5	31	36	10	4.8	5.6	6.1	81	103	94	32	94	128
6	30	42	9.7	4.7	5.6	6.4	76	107	95	25	86	169
7	28	47	9.6	4.6	5.6	7.0	71	113	90	25	86	181
8	27	54	9.3	4.5	5.5	9.0	66	114	85	31	90	182
9	26	60	9.2	4.5	5.5	15	64	108	82	31	99	185
10	27	63	8.9	4.5	5.4	27	66	111	75	27	144	188
11	28	64	8.7	4.5	5.4	60	62	122	70	23	166	190
12	30	60	8.5	4.5	5.4	150	59	129	64	16	156	159
13	33	55	8.3	4.5	5.4	250	57	130	57	33	132	140
14	34	49	8.1	4.5	5.3	450	55	123	52	59	112	138
15	35	45	7.9	4.5	5.3	465	55	116	46	60	99	126
16	33	41	7.7	4.5	5.3	470	54	113	47	54	89	115
17	30	39	7.5	4.5	5.2	460	59	110	56	45	82	107
18	30	36	7.3	4.5	5.2	450	55	105	71	39	75	101
19	29	35	7.1	4.6	5.2	450	53	101	86	32	69	95
20	29	33	7.0	4.6	5.2	460	61	97	114	25	64	91
21	29	31	6.8	4.6	5.2	498	109	94	139	18	60	90
22	28	30	6.6	4.6	5.2	502	157	97	144	16	57	102
23	26	29	6.4	4.7	5.2	499	164	114	133	16	56	134
24	25	28	6.2	4.8	5.2	448	153	125	121	12	52	189
25	24	26	6.1	4.8	5.2	354	152	125	103	11	50	481
26	25	24	6.0	4.9	5.2	267	151	124	89	11	62	803
27	26	21	5.8	5.0	5.2	211	148	121	84	18	69	885
28	28	19	5.6	5.0	5.3	171	142	117	83	35	69	885
29	29	17	5.5	5.1	-----	144	135	111	81	70	69	862
30	30	16	5.4	5.2	-----	138	126	103	75	91	69	825
31	30	-----	5.3	5.3	-----	121	-----	103	-----	140	67	-----
TOTAL	923	1,127	250.5	147.0	149.5	7,110.7	2,809	3,486	2,615	1,212	2,901	7,839
MEAN	29.8	37.6	8.08	4.74	5.34	229	93.6	112	87.2	39.1	93.6	261
MAX	39	64	14	5.3	5.6	502	164	130	144	140	174	885
MIN	24	16	5.3	4.5	5.2	5.4	53	94	46	11	50	63
AC=FT	1,830	2,240	497	292	297	14,100	5,570	6,910	5,190	2,400	5,750	15,550

CAL YR 1972 TOTAL 76,141.2 MEAN 208 MAX 1,860 MIN 5.1 AC=FT 151,000  
WTR YR 1973 TOTAL 30,569.7 MEAN 83.8 MAX 885 MIN 4.5 AC=FT 60,630

NOTE: No gage-height record Oct. 18 to Nov. 1, Nov. 5 to Dec. 4, Dec. 8 to Jan. 16.

## 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 (122 m) downstream from State ditch 51 (known locally as Caribou cutoff ditch) and 0.6 mi (1.0 km) west of Caribou.

DRAINAGE AREA.--1,570 m<sup>2</sup> (4,066 km<sup>2</sup>), 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 (305.452 m) 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 mi (1.0 km) upstream at datum 0.95 ft (0.290 m) lower.

AVERAGE DISCHARGE.--16 years (1920-30, 1932-33, 1936-37, 1940-43, 1972-73), 284 ft<sup>3</sup>/s (8.043 m<sup>3</sup>/s), 205,800 acre-ft/yr (253.8 hm<sup>3</sup>/yr).

EXTREMES.--Current year: Maximum discharge, 719 ft<sup>3</sup>/s (20.4 m<sup>3</sup>/s) Sept. 30 (gage height, 5.35 ft or 1.631 m); maximum gage height, 5.75 ft (1.753 m) Mar. 26 (backwater from ice); minimum daily discharge, 8.0 ft<sup>3</sup>/s (0.23 m<sup>3</sup>/s) Feb. 11-19; minimum gage height, 1.82 ft (0.555 m) July 27, 28, 29.  
Period of record: Maximum discharge, 4,080 ft<sup>3</sup>/s (116 m<sup>3</sup>/s) May 19, 1950 (gage height, 11.81 ft or 3.600 m); no flow Aug. 13, 1936.

Flood of 1916 is reported to have reached a stage of about 15.5 ft (4.72 m) at former site.

REMARKS.--Records good except those for winter periods, which are fair. Occasionally, at high stages, there is some natural diversion of flow above station to headwaters of Two Rivers.

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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	38	32	25	11	9.0	10	143	127	94	75	127	36
2	42	36	25	11	9.0	10	129	115	89	67	169	34
3	42	40	23	11	9.0	10	116	107	84	56	173	36
4	42	38	22	11	9.0	11	105	104	73	51	148	43
5	40	38	21	10	9.0	11	96	106	71	43	116	51
6	41	40	19	10	9.0	12	91	100	80	37	97	88
7	38	47	14	10	9.0	13	83	99	83	32	79	141
8	38	52	18	10	9.0	15	75	106	77	26	71	164
9	36	59	17	10	9.0	19	70	110	71	25	73	167
10	34	66	17	10	9.0	32	64	112	67	26	79	171
11	36	72	17	10	8.0	55	66	110	61	26	121	175
12	36	72	17	10	8.0	95	64	117	54	25	156	175
13	36	70	16	10	8.0	185	60	128	48	21	157	152
14	36	67	16	10	8.0	260	57	127	41	20	136	129
15	36	62	16	10	8.0	400	56	119	36	27	111	122
16	36	56	15	10	8.0	430	53	114	36	41	91	112
17	34	49	15	10	8.0	450	52	107	38	47	75	97
18	32	45	15	10	8.0	460	53	104	40	45	64	86
19	33	43	14	10	8.0	455	53	99	48	38	65	79
20	34	42	14	10	9.0	445	55	92	66	32	48	72
21	34	41	13	10	9.0	440	55	86	88	27	43	71
22	31	40	13	9.0	9.0	425	92	87	118	23	38	75
23	30	39	13	9.0	9.0	430	157	90	140	20	35	76
24	29	39	12	9.0	9.0	440	173	102	149	19	34	115
25	28	38	12	9.0	9.0	520	164	118	140	18	34	200
26	30	35	12	9.0	9.0	470	158	123	118	18	33	367
27	34	33	11	9.0	10	370	154	121	102	17	32	536
28	32	32	11	9.0	10	279	152	118	89	18	41	645
29	32	30	11	9.0	-----	220	146	113	86	19	42	694
30	31	28	11	9.0	-----	175	136	106	82	47	40	713
31	34	-----	11	9.0	-----	154	-----	99	-----	77	38	-----
TOTAL	1,085	1,381	491	304.0	245.0	7,301	2,928	3,366	2,369	1,063	2,566	5,622
MEAN	35.0	46.0	15.8	9.81	8.75	236	97.6	109	79.0	34.3	82.8	187
MAX	42	72	26	11	10	520	173	128	149	77	173	713
MIN	28	25	11	9.0	8.0	10	52	86	36	17	32	34
AC-FT	2,150	2,740	974	603	486	14,480	5,810	6,680	4,700	2,110	5,090	11,150

WTR YR 1973 TOTAL 28,721.0 MEAN 78.7 MAX 713 MIN 8.0 AC-FT 56,970.



05124480 Kawishiwi River near Ely, Minn.

(Hydrologic bench-mark station)

LOCATION.--Lat 47°55'22", long 91°32'06", in SE¼ sec.24, T.63 N., R.10 W., Lake County, on left bank upstream from rapids, 2 mi (3 km) upstream from South Kawishiwi River, 2.2 mi (3.5 km) southwest of Fernberg Lookout Tower and 14 mi (23 km) east of Ely.

DRAINAGE AREA.--253 mi<sup>2</sup> (655 km<sup>2</sup>).

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

GAGE.--Water-stage recorder. Altitude of gage is 1,450 ft (442 m), from topographic map.

AVERAGE DISCHARGE.--7 years, 249 ft<sup>3</sup>/s (7.052 m<sup>3</sup>/s), 13.37 in/yr (340 mm/yr).

EXTREMES.--Current year: Maximum discharge, 690 ft<sup>3</sup>/s (19.5 m<sup>3</sup>/s) May 11, 12 (gage height, 4.81 ft or 1.466 m); minimum, 45 ft<sup>3</sup>/s (1.27 m<sup>3</sup>/s) Mar. 6 (gage height, 2.90 ft or 0.884 m).  
Period of record: Maximum discharge, 1,540 ft<sup>3</sup>/s (43.6 m<sup>3</sup>/s) Apr. 29, 1969 (gage height, 5.88 ft or 1.792 m); minimum, 24 ft<sup>3</sup>/s (0.68 m<sup>3</sup>/s) Sept. 28, 29, 1966; minimum gage height, 2.70 ft (0.823 m) Feb. 23-29, 1968.

REMARKS.--Records good. 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	169	103	103	85	66	50	81	519	475	255	229	412
2	167	103	102	84	66	50	85	542	459	240	225	417
3	165	100	100	82	65	50	86	548	459	229	225	422
4	161	100	100	85	65	48	90	548	448	216	225	433
5	158	99	100	88	63	46	94	548	443	210	222	433
6	163	103	100	86	62	45	97	565	433	206	240	433
7	158	110	99	86	60	50	103	640	422	200	236	438
8	154	110	99	81	62	52	108	658	422	197	240	443
9	148	110	94	79	63	51	116	670	417	189	251	453
10	146	111	90	76	63	50	122	677	407	186	262	448
11	148	113	88	76	60	52	130	683	397	184	255	453
12	146	113	88	76	59	56	139	690	387	192	247	453
13	143	113	88	74	59	56	148	683	368	186	232	448
14	137	111	88	74	59	57	163	664	363	182	222	438
15	132	111	88	73	59	59	184	645	354	176	206	433
16	127	110	88	73	59	59	219	633	354	169	219	417
17	120	110	88	73	59	58	240	608	359	165	219	402
18	116	110	88	73	56	57	270	590	344	200	225	383
19	115	108	85	72	56	57	300	571	326	206	251	368
20	113	108	82	73	56	57	340	553	318	194	291	349
21	116	108	82	73	56	57	392	530	318	182	313	336
22	116	108	82	72	54	57	428	513	318	174	349	331
23	118	107	81	72	53	57	453	491	308	167	368	322
24	115	105	79	72	52	57	480	475	300	167	373	308
25	111	105	77	70	52	60	502	491	287	172	383	291
26	111	105	77	70	52	63	513	502	291	194	387	287
27	110	105	77	69	52	69	525	502	291	236	383	283
28	108	103	76	69	51	76	530	491	275	244	378	270
29	107	103	74	68	-----	78	530	491	266	236	373	258
30	105	103	81	68	-----	77	519	486	262	229	383	255
31	103	-----	85	66	-----	78	-----	486	-----	229	383	-----
TOTAL	4,106	3,206	2,729	2,338	1,639	1,789	7,987	17,693	10,871	6,212	8,795	11,417
MEAN	132	107	88.0	75.4	58.5	57.7	266	571	362	200	284	381
MAX	169	113	103	88	66	78	530	690	475	255	387	453
MIN	103	99	74	66	51	45	81	475	262	165	206	255
CFSM	.52	.42	.35	.30	.23	.23	1.05	2.26	1.43	.79	1.12	1.51
IN.	.60	.47	.40	.34	.24	.26	1.17	2.60	1.60	.91	1.29	1.68
CAL YR 1972	TOTAL 72,628	MEAN 198	MAX 1,350	MIN 57	CFSM .78	IN 10.68						
WTR YR 1973	TOTAL 78,784	MEAN 216	MAX 690	MIN 45	CFSM .85	IN 11.58						

## LAKE OF THE WOODS BASIN

05127000 Kawishiwi River near Winton, Minn.

LOCATION.--Lat 47°56'05", long 91°45'50", in NE¼NW¼ sec.20, T.63 N., R.11 W., Lake County, at powerplant of Minnesota Power & Light Co., just upstream from Fall Lake, and 1.8 mi (2.9 km) east of Winton.

DRAINAGE AREA.--1,200 mi<sup>2</sup> (3,110 km<sup>2</sup>), 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).--54 years (1905-06, 1915-17, 1918-19, 1923-73), 1,025 ft<sup>3</sup>/s (29.03 m<sup>3</sup>/s), 11.60 in/yr (295 mm/yr).

EXTREMES.--Current year: Maximum daily discharge, 4,340 ft<sup>3</sup>/s (123 m<sup>3</sup>/s) May 13; minimum daily, 218 ft<sup>3</sup>/s (6.17 m<sup>3</sup>/s) Feb. 19.

Period of record: Maximum daily discharge, 16,000 ft<sup>3</sup>/s (453 m<sup>3</sup>/s) 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1,620	992	626	372	313	250	982	2,470	2,870	1,470	1,810	2,120
2	1,190	928	725	348	313	250	982	2,430	3,030	1,470	1,600	2,060
3	1,350	960	756	330	345	250	1,050	2,750	3,100	1,340	1,310	2,370
4	1,120	960	748	377	219	250	982	2,800	2,920	1,220	1,220	2,400
5	1,130	928	797	345	345	250	986	2,740	2,740	1,060	1,250	2,630
6	1,090	956	640	345	280	250	1,120	2,740	2,340	1,060	1,390	2,630
7	1,120	956	564	345	345	266	1,120	3,320	1,970	928	1,260	2,520
8	1,150	956	564	365	280	440	1,020	3,980	1,810	1,120	1,480	2,460
9	1,150	988	499	345	345	310	922	3,980	1,790	1,020	1,490	2,460
10	1,120	956	531	318	313	343	922	4,010	1,690	863	1,540	2,460
11	1,050	924	531	313	219	375	922	4,290	1,760	831	1,700	2,460
12	1,000	827	452	345	313	407	1,270	4,280	1,690	905	1,630	2,460
13	960	859	422	313	312	413	1,010	4,340	1,550	992	1,630	2,140
14	928	827	358	280	312	480	897	4,220	1,510	863	1,730	1,510
15	960	827	377	377	279	521	1,010	3,910	1,470	831	1,760	1,520
16	895	795	329	345	312	543	875	3,570	1,220	831	1,900	1,510
17	960	891	282	313	279	480	779	3,280	1,010	992	2,070	1,520
18	928	889	282	313	312	383	811	2,970	1,020	1,190	1,940	1,740
19	960	857	315	345	218	448	875	2,540	1,390	992	2,010	1,320
20	960	922	347	313	250	448	1,010	2,350	1,780	960	1,840	1,160
21	1,060	889	315	313	250	480	1,300	2,320	2,080	831	1,940	1,100
22	960	793	250	345	250	480	1,690	2,180	1,710	799	1,870	1,240
23	960	936	250	313	250	678	1,820	2,080	1,720	746	2,120	1,270
24	960	864	282	345	282	795	1,760	1,930	1,300	954	2,450	1,200
25	960	809	315	313	250	728	2,200	2,080	1,370	1,020	2,670	1,140
26	960	809	250	313	282	825	2,580	2,160	1,160	1,190	2,790	1,110
27	960	809	409	313	250	825	2,670	2,240	1,660	1,150	2,600	1,020
28	863	776	312	345	250	922	2,750	2,210	1,570	1,120	2,300	1,030
29	928	761	313	313	-----	950	2,790	2,280	1,610	1,060	2,040	1,030
30	895	605	410	345	-----	918	2,780	2,370	1,600	1,410	1,870	1,060
31	960	-----	442	280	-----	982	-----	2,600	-----	1,710	1,590	-----
TOTAL	32,107	26,249	13,693	10,285	7,968	15,940	41,885	91,420	54,440	32,928	56,800	52,650
MEAN	1,036	875	442	332	285	514	1,396	2,949	1,815	1,062	1,832	1,755
MAX	1,620	992	797	377	345	982	2,790	4,340	3,100	1,710	2,790	2,630
MIN	863	605	250	280	218	250	779	1,930	1,010	746	1,220	1,020
Δ	-151	-143	-75	-28	-60	-68	+509	+65	-42	+28	+1	+2
MEAN Δ	885	732	367	304	225	446	1,905	3,014	1,773	1,090	1,833	1,757
CFSM Δ	.74	.61	.31	.25	.19	.37	1.59	2.51	1.48	.91	1.53	1.46
IN. Δ	.85	.68	.35	.29	.19	.43	1.77	2.90	1.65	1.05	1.76	1.63
CAL YR 1972	TOTAL	454,758	MEAN	1,243	MAX	8,260	MIN	129	MEAN Δ	1,210	CFSM Δ	1.01
WTR YR 1973	TOTAL	436,365	MEAN	1,196	MAX	4,340	MIN	218	MEAN Δ	1,199	CFSM Δ	1.00
											IN. Δ	13.72
											IN. Δ	13.56

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.

LOCATION.--Lat 47°54'55", long 91°56'59", in NE¼NE¼ sec.26, T.63 N., R.13 W., St. Louis County, on left bank on downstream handrail of bridge on County Road 88, 2.5 mi (4.0 km) upstream from mouth, 4 mi (6 km) northwest of Ely and 5 mi (8 km) downstream from outlet of Burntside Lake.

AVERAGE DISCHARGE.--6 years, 63.8 ft<sup>3</sup>/s (1.807 m<sup>3</sup>/s).

EXTREMES.--Current year: Maximum discharge, 151 ft<sup>3</sup>/s (4.28 m<sup>3</sup>/s) May 11 (gage height, 6.74 ft or 2.054 m); maximum gage height, 7.81 ft (2.380 m) Aug. 10; minimum daily discharge, 4.1 ft<sup>3</sup>/s (0.12 m<sup>3</sup>/s) Feb. 6; minimum gage height, 5.13 ft (1.564 m) Nov. 3.  
Period of record: Maximum discharge, 455 ft<sup>3</sup>/s (12.9 m<sup>3</sup>/s) June 12, 1970 (gage height, 8.59 ft or 2.618 m, from floodmark); minimum daily discharge, 0.8 ft<sup>3</sup>/s (0.023 m<sup>3</sup>/s) Oct. 6, 7, 1967.

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

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9.8	7.4	5.5	5.9	5.0	5.0	25	66	107	76	134	95
2	9.2	8.1	5.5	6.0	4.8	5.0	24	78	105	73	130	117
3	7.2	7.2	5.5	6.0	4.6	5.0	25	74	103	65	124	120
4	6.3	7.3	5.6	6.0	4.4	5.0	24	75	98	62	120	119
5	5.6	7.6	5.6	6.0	4.2	5.0	23	84	87	60	124	115
6	5.9	7.7	5.6	6.0	4.1	5.5	24	105	83	58	127	108
7	6.0	7.9	5.6	6.0	4.2	5.5	25	126	81	57	124	102
8	6.2	7.7	5.7	6.0	4.2	6.0	25	134	80	56	140	96
9	6.4	7.7	5.7	6.1	4.2	6.5	26	142	78	54	146	89
10	6.5	7.4	5.7	6.1	4.5	8.0	23	149	75	52	147	82
11	7.2	7.1	5.7	6.1	4.5	10	23	151	71	49	145	76
12	16	6.8	5.7	6.1	4.5	13	25	150	63	69	142	73
13	14	6.6	5.7	6.1	4.5	16	26	150	61	75	137	69
14	13	6.5	5.7	6.1	4.5	17	28	146	60	79	131	67
15	11	6.3	5.7	6.1	5.0	19	30	138	57	78	126	70
16	10	6.2	5.7	6.1	5.0	20	32	132	60	74	121	73
17	9.2	6.1	5.7	6.1	5.0	20	36	133	64	72	116	66
18	9.0	6.0	5.8	6.1	5.0	20	37	134	70	74	113	56
19	9.2	5.9	5.8	6.1	5.0	20	40	130	66	76	111	52
20	8.5	5.8	5.8	6.0	5.0	20	45	127	73	74	109	49
21	8.6	5.7	5.8	6.0	5.0	20	47	124	77	70	101	48
22	8.8	5.6	5.8	5.9	5.0	20	51	116	76	66	96	49
23	9.0	5.6	5.8	5.8	5.0	21	56	111	76	62	89	51
24	9.0	5.6	5.8	5.7	5.0	21	61	114	77	66	83	54
25	8.8	5.6	5.8	5.6	5.0	22	66	129	79	85	81	54
26	8.8	5.5	5.8	5.6	5.0	23	65	138	84	109	80	57
27	8.8	5.5	5.8	5.5	5.0	23	65	137	84	138	78	58
28	8.6	5.5	5.9	5.4	5.0	24	65	127	82	150	74	60
29	8.4	5.5	5.9	5.3	-----	25	66	116	80	150	66	61
30	8.1	5.5	5.9	5.2	-----	26	66	109	79	142	62	63
31	7.4	-----	5.9	5.1	-----	26	-----	108	-----	141	65	-----
TOTAL	270.5	194.9	177.5	182.1	132.2	482.5	1,174	3,753	2,336	2,512	3,442	2,249
MEAN	8.73	6.50	5.73	5.87	4.72	15.6	39.1	121	77.9	81.0	111	75.0
MAX	16	8.1	5.9	6.1	5.0	26	66	151	107	150	147	120
MIN	5.6	5.5	5.5	5.1	4.1	5.0	23	66	57	49	62	48
CAL YR 1972	TOTAL 16,382.9		MEAN 44.8	MAX 230	MIN 5.5							
WTR YR 1973	TOTAL 16,905.7		MEAN 46.3	MAX 151	MIN 4.1							

## LAKE OF THE WOODS BASIN

05127207 Bjorkman's Creek near Ely, Minn.

LOCATION.--Lat 47°55'31", long 91°53'26", in NW¼SE¼ sec.20, T.63 N., R.12 W., St. Louis County, at bridge on County Highway 88, at mouth, 2.5 mi (4.0 km) northwest of Ely, Minn.

DRAINAGE AREA.--1.36 mi<sup>2</sup> (3.52 km<sup>2</sup>).

PERIOD OF RECORD.--July 1972 to current year.

GAGE.--Nonrecording gage read once daily. Altitude of gage is 1,340 ft (408 m), from topographic map.

EXTREMES.--July to September 1972: Maximum discharge, 7.0 ft<sup>3</sup>/s (0.20 m<sup>3</sup>/s) Aug. 17 (gage height, 1.70 ft or 0.518 m); no flow on many days.

Water year 1973: Maximum discharge, 13 ft<sup>3</sup>/s (0.37 m<sup>3</sup>/s) May 7, Sept. 2 (gage height, 1.95 ft or 0.594 m); maximum gage height, 2.52 ft (0.768 m) Mar. 22 (backwater from ice); no flow on many days.

A discharge of 60.3 ft<sup>3</sup>/s (1.71 m<sup>3</sup>/s) was measured June 10, 1970.

REMARKS.--Records fair.

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

Discharge measurements made prior to beginning of continuous discharge record

Date	Discharge (cfs)	Date	Discharge (cfs)	Date	Discharge (cfs)
May 6, 1969	2.82	Nov. 3	1.56	Oct. 28	6.47
13	1.21	Dec. 17	0.15	Dec. 3	0.98
June 3	2.27	Jan. 8, 1970	0	Apr. 13, 1971	11.9
17	0.54	Apr. 14	4.65	15	10.9
July 23	0.59	27	26.9	17	26.3
Aug. 14	0.16	May 22	20.1	19	20.0
26	0	June 10	60.3	20	18.2
Sept. 10	0	Aug. 20	0	May 19	0.70
		Sept. 24	3.27		

DISCHARGE, IN CUBIC FEET PER SECOND, JULY TO SEPTEMBER 1972

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1								14		0	.20	.10
2										0	.20	.10
3										0	.10	.10
4										0	.20	.10
5										0	.10	.10
6										0	.10	.10
7										0	.10	.10
8										0	.20	.10
9										0	.10	.10
10										0	.10	.10
11		1.4								0	.10	0
12										0	.10	0
13										0	.10	.10
14										0	0	.10
15										.10	.10	.10
16										.10	1.6	.10
17										.20	6.1	0
18										.20	4.4	0
19										.20	3.1	0
20										.40	2.2	.10
21										.50	1.5	.20
22										1.0	1.4	.20
23										1.7	1.0	.20
24										2.5	.80	.20
25										1.6	.60	.20
26										1.0	.50	.10
27										.70	.40	0
28										.60	.40	.10
29										.50	.20	.10
30										.40	.20	0
31										.30	.20	-----
TOTAL										12.00	26.40	2.80
MEAN										.39	.85	.093
MAX										2.5	6.1	.20
MIN										0	0	0
CFSM										.29	.63	.07
IN.										.33	.72	.08

## LAKE OF THE WOODS BASIN

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05127207 Bjorkman's Creek near Ely, Minn.--Continued

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0	.20				0	3.0	1.2	.80	.40	1.1	4.0
2	0	.20				0	4.8	2.5	.70	.30	.70	12
3	0	.20				0	4.8	2.4	.70	.20	.60	8.0
4	0	.20				0	4.3	1.9	.60	.10	.60	4.4
5	0	.30				0	3.7	2.8	.50	.10	.60	3.0
6	.10	.30				0	3.5	6.0	.40	.10	.60	2.0
7	.10	.40				0	2.9	12	.40	.10	.60	1.4
8	.10	.30				0	2.6	9.6	.60	.10	2.6	1.2
9	.10	.30				0	2.2	6.6	.50	.10	3.5	1.0
10	.10	.30				0	1.7	5.0	.40	.10	3.1	.80
11	.10	.30				0	1.1	4.1	.30	0	2.3	.60
12	.10	.20				0	1.1	3.0	.20	.50	1.7	.50
13	.10	.20				0	1.1	2.3	.20	.30	1.1	.40
14	.10	.20				0	1.8	2.0	.20	.30	.70	.40
15	.10	.20				.10	2.5	1.8	.20	.20	.50	.30
16	.10	.20				.10	3.8	1.5	.20	.20	.50	.20
17	.10	.10				.10	3.7	1.2	.40	.20	.40	.20
18	.10	.10				.10	2.9	1.1	.60	.20	.40	.20
19	.10	.10				.10	3.0	.90	.50	.20	.60	.20
20	.10	.10				.10	3.3	.80	.90	.10	.60	.20
21	.10	.10				.10	3.3	.60	1.2	.10	.40	.20
22	.10	.10				.10	3.4	.60	.90	.10	.40	.20
23	.10	.10				.10	3.6	.60	.90	.10	.30	.30
24	.20	.10				.20	2.9	.50	.90	.20	.30	.40
25	.20	.10				.40	2.4	1.7	.90	.80	.20	.60
26	.20	.10				.70	2.0	1.6	1.0	3.4	.30	.60
27	.20	.10				1.7	1.7	1.5	.90	4.8	.30	.60
28	.20	.10				3.4	1.5	1.4	.70	3.9	.20	.40
29	.20	.10			-----	3.8	1.4	1.3	.60	3.0	.20	.40
30	.20	0			-----	3.8	1.1	1.1	.40	2.2	.20	.30
31	.20	-----			-----	3.6	-----	.90	-----	1.7	.30	-----
TOTAL	3.40	5.30	0	0	0	18.50	81.1	80.50	17.70	24.10	25.90	45.00
MEAN	.11	.18	0	0	0	.60	2.70	2.60	.59	.78	.84	1.50
MAX	.20	.40	0	0	0	3.8	4.8	12	1.2	4.8	3.5	12
MIN	0	0	0	0	0	0	1.1	.50	.20	0	.20	.20
CFSM	.08	.13	0	0	0	.44	1.99	1.91	.43	.57	.62	1.10
IN.	.09	.14	0	0	0	.51	2.22	2.20	.48	.66	.71	1.23

WTR YR 1973 TOTAL 301.50 MEAN .83 MAX 12 MIN 0 CFSM .61 IN 8.25

## LAKE OF THE WOODS BASIN

05127210 Armstrong Creek near Ely, Minn.

LOCATION.--Lat 47°53'48", long 91°55'50", in SW¼NE¼ sec.36, T.63 N., R.13 W., St. Louis County, near right bank 50 ft (15 m) upstream from culvert on County Road 88, 1.2 mi (1.9 km) upstream from mouth and 2.5 mi (4.0 km) southwest of Ely.

DRAINAGE AREA.--5.29 mi<sup>2</sup> (13.70 km<sup>2</sup>).

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

GAGE.--Nonrecording gage read once daily and crest-stage gage. Altitude of gage is 1,565 ft (416 m), from topographic map. Prior to Oct. 1, 1969, at site 100 ft (30 m) downstream at same datum.

AVERAGE DISCHARGE.--6 years, 5.08 ft<sup>3</sup>/s (0.144 m<sup>3</sup>/s), 13.04 in/yr (331 mm/yr).

EXTREMES.--Current year: Maximum discharge, 57 ft<sup>3</sup>/s (1.61 m<sup>3</sup>/s) Sept. 2 (gage height, 4.46 ft or 1.359 m); minimum, 0.1 ft<sup>3</sup>/s (0.003 m<sup>3</sup>/s) Jan. 12 (gage height, 1.34 ft or 0.408 m).

Period of record: Maximum discharge, 131 ft<sup>3</sup>/s (3.71 m<sup>3</sup>/s) May 21, 1970 (gage height, 5.88 ft or 1.792 m, from floodmark); no flow Feb. 28 to Mar. 6, 1968.

REMARKS.--Records fair.

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

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEH	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.50	1.2	.70	.20	.30	.20	5.0	2.9	3.7	2.2	4.6	6.8
2	.40	1.2	.70	.20	.30	.20	6.7	8.6	3.5	1.5	2.9	34
3	.30	1.0	.70	.30	.30	.20	6.5	9.8	3.4	1.0	1.9	45
4	.40	1.2	.60	.30	.20	.20	5.5	7.3	3.2	.90	3.0	28
5	.40	1.4	.50	.30	.20	.20	4.3	12	2.0	.80	9.2	17
6	.80	1.7	.50	.30	.20	.20	3.6	37	1.7	.80	14	12
7	.80	2.5	.50	.30	.20	.20	2.5	36	1.5	.70	12	8.9
8	.80	2.0	.40	.40	.20	.20	2.0	21	2.1	.70	19	7.0
9	.70	2.0	.40	.40	.20	.20	1.6	22	1.6	.60	29	5.5
10	.70	2.0	.40	.40	.20	.20	1.1	20	1.3	.60	26	4.5
11	.80	1.7	.30	.40	.20	.30	.90	17	1.0	.60	21	3.4
12	1.0	1.5	.30	.10	.20	.40	1.0	14	.80	10	14	3.2
13	.90	1.3	.30	.30	.20	.80	1.2	11	.70	10	9.2	3.7
14	.90	1.1	.20	.30	.20	1.9	6.0	8.1	.70	4.5	5.9	7.3
15	.80	1.0	.20	.40	.20	2.0	10	6.0	.70	2.3	4.2	10
16	.80	1.0	.20	.40	.20	1.8	11	5.5	1.3	1.5	4.3	11
17	.80	1.0	.20	.40	.20	1.5	8.3	4.5	2.6	1.3	3.7	11
18	.80	1.0	.20	.40	.20	1.3	6.8	4.0	5.2	2.8	4.0	11
19	.80	1.1	.20	.40	.20	1.2	6.8	3.3	3.4	1.6	4.4	12
20	.80	1.1	.20	.40	.20	1.1	11	2.8	7.0	1.2	4.8	13
21	.90	1.1	.20	.40	.20	1.0	16	2.2	12	1.0	3.4	14
22	1.0	1.0	.20	.40	.20	1.1	17	1.8	10	.90	2.9	15
23	1.1	1.1	.20	.30	.20	1.5	15	1.6	9.1	1.8	2.8	16
24	1.2	1.2	.20	.20	.20	2.0	12	1.6	8.1	3.9	1.9	18
25	1.2	1.1	.20	.40	.20	3.0	10	9.6	7.0	11	2.0	19
26	1.3	.90	.20	.50	.20	4.0	6.5	8.4	12	20	2.2	21
27	1.2	.80	.20	.50	.20	5.0	5.1	7.1	9.8	26	2.4	22
28	1.1	.80	.20	.50	.20	8.0	4.2	6.0	7.1	18	2.0	22
29	1.0	.80	.20	.40	-----	7.0	3.3	5.2	5.1	12	2.0	22
30	1.0	.80	.20	.40	-----	6.0	2.9	3.6	3.2	11	1.7	22
31	1.1	-----	.20	.40	-----	5.5	-----	4.5	-----	7.1	3.0	-----
TOTAL	26.30	37.60	9.90	11.00	5.90	58.40	193.80	304.4	130.80	158.30	223.4	445.3
MEAN	.85	1.25	.32	.35	.21	1.88	6.46	9.82	4.36	5.11	7.21	14.8
MAX	1.3	2.5	.70	.50	.30	8.0	17	37	12	26	29	45
MIN	.30	.80	.20	.10	.20	.20	.90	1.6	.70	.60	1.7	3.2
CFSM	.16	.24	.06	.07	.04	.36	1.22	1.86	.82	.97	1.36	2.80
IN.	.18	.26	.07	.08	.04	.41	1.36	2.14	.92	1.11	1.57	3.13
CAL YR 1972	TOTAL 1.103.00	MEAN 3.01	MAX 43	MIN .20	CFSM .57	IN 7.76						
WTR YR 1973	TOTAL 1.605.10	MEAN 4.40	MAX 45	MIN .10	CFSM .83	IN 11.29						

## 05127215 Longstorff Creek near Ely, Minn.

LOCATION.--Lat 47°53'33", long 91°54'55", in SE¼SW¼ sec.31, T.63 N., R.12 W., St. Louis County, left bank on downstream side of culvert on county road, 500 ft (152 m) downstream from U.S. Highway 169, 0.7 mi (1.1 km) upstream from mouth, 1.5 mi (2.4 km) southwest of Ely and 2.5 mi (4.0 km) downstream from outlet of Mitchell Lake.

DRAINAGE AREA.--8.84 mi<sup>2</sup> (22.90 km<sup>2</sup>).

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

GAGE.--Nonrecording gage read once daily and crest-stage gage. Datum of gage is 1,360.67 ft (414.732 m) above mean sea level, datum of 1929 (levels by Minnesota Highway Department).

AVERAGE DISCHARGE.--6 years, 8.71 ft<sup>3</sup>/s (0.247 m<sup>3</sup>/s), 13.38 in/yr (340 mm/yr).

EXTREMES.--Current year: Maximum discharge, 95 ft<sup>3</sup>/s (2.69 m<sup>3</sup>/s) Sept. 2 (gage height, 3.75 ft or 1.143 m); minimum daily discharge, 0.5 ft<sup>3</sup>/s (0.014 m<sup>3</sup>/s) Dec. 12.  
Period of record: Maximum discharge, 230 ft<sup>3</sup>/s (6.51 m<sup>3</sup>/s) June 10, 1970 (gage height, 6.52 ft or 1.987 m, from floodmark); no flow on many days in 1968 and May 7, 1969.

REMARKS.--Records fair.

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

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.3	1.5	.70	1.8	1.7	1.1	13	12	9.3	5.5	9.8	40
2	1.3	1.4	.80	2.0	1.6	1.2	21	16	8.8	4.9	7.9	92
3	1.2	1.2	.80	2.3	1.6	1.2	18	20	8.1	3.5	6.4	70
4	1.2	1.5	.80	2.3	1.5	1.2	14	19	7.6	2.7	6.3	42
5	.90	1.8	.80	2.2	1.5	1.2	11	69	6.1	2.2	8.5	29
6	2.3	2.3	.80	2.0	1.4	1.3	10	89	4.9	1.9	13	21
7	1.7	2.8	.70	1.9	1.4	1.3	9.4	72	4.3	1.6	12	24
8	1.3	2.5	.70	1.8	1.4	1.4	8.5	57	5.0	1.5	45	15
9	1.2	2.5	.70	1.8	1.3	1.5	7.7	43	4.7	1.3	57	12
10	3.6	2.4	.90	1.8	1.3	1.6	7.4	37	4.3	1.1	49	10
11	1.6	2.0	1.0	1.8	1.3	1.7	6.4	33	4.0	1.0	39	6.8
12	1.2	1.7	.50	1.8	1.3	1.9	7.0	30	3.6	10	30	5.6
13	1.1	1.4	.90	1.8	1.4	2.8	7.4	25	2.3	9.1	21	4.0
14	1.1	1.3	.90	1.8	1.4	5.2	10	20	1.9	6.0	17	4.2
15	1.2	1.0	.90	1.9	1.4	5.2	14	17	1.6	3.8	14	4.0
16	1.8	1.0	.80	1.9	1.4	4.7	20	15	2.4	3.0	12	3.8
17	1.3	.90	.80	1.9	1.4	4.1	17	13	3.7	2.9	10	3.5
18	1.1	.80	.70	1.9	1.3	3.7	16	12	5.8	5.0	10	3.0
19	1.1	.70	.70	1.9	1.2	4.0	16	11	4.7	3.2	10	2.8
20	1.2	.60	.70	2.0	1.2	4.3	19	9.7	5.0	2.5	11	2.2
21	1.3	.70	.80	2.0	1.1	4.6	19	8.7	8.7	2.1	10	2.2
22	1.4	.70	1.1	2.0	1.1	4.7	20	7.7	9.1	1.7	6.4	3.0
23	1.5	.70	1.3	2.0	1.1	4.9	21	9.3	8.2	1.6	5.5	4.0
24	1.6	.80	1.4	2.0	1.1	5.0	18	8.9	7.5	2.9	4.3	4.6
25	1.3	.80	1.4	1.9	1.1	5.4	16	16	6.8	7.7	4.1	6.1
26	1.4	.80	1.3	1.8	1.0	8.1	15	15	11	19	3.8	5.8
27	1.2	.70	1.2	1.8	1.0	13	15	14	12	23	3.5	5.6
28	1.2	.90	1.1	1.8	1.0	18	14	13	10	21	3.2	4.4
29	1.2	.90	1.2	1.8	-----	20	14	12	8.5	17	3.0	3.8
30	1.2	.70	1.3	1.8	-----	17	13	11	7.0	15	2.2	3.4
31	1.3	-----	1.5	1.8	-----	15	-----	11	-----	12	4.9	-----
TOTAL	43.30	39.00	29.20	59.3	36.5	166.3	417.8	746.3	186.9	195.7	439.8	437.8
MEAN	1.40	1.30	.94	1.91	1.30	5.36	13.9	24.1	6.23	6.31	14.2	14.6
MAX	3.6	2.8	1.5	2.3	1.7	20	21	89	12	23	57	92
MIN	.90	.60	.50	1.8	1.0	1.1	6.4	7.7	1.6	1.0	2.2	2.2
CFSM	.16	.15	.11	.22	.15	.61	1.57	2.73	.70	.71	1.61	1.65
IN.	.18	.16	.12	.25	.15	.70	1.76	3.14	.79	.82	1.85	1.84
CAL YR 1972	TOTAL 1,877.80	MEAN 5.13	MAX 75	MIN .40	CFSM .58	IN 7.90						
WTR YR 1973	TOTAL 2,797.90	MEAN 7.67	MAX 92	MIN .50	CFSM .87	IN 11.77						

## LAKE OF THE WOODS BASIN

05127219 Shagawa Lake tributary at Ely, Minn.

LOCATION.--Lat 47°54'24", long 91°52'23", in NE¼SW¼ sec.28, T.63 N., R.12 W., St. Louis County, on left bank, 200 ft (61 m) upstream from mouth, 500 ft (152 m) northwest of sewage plant in Ely.

DRAINAGE AREA.--0.71 mi<sup>2</sup> (1.84 km<sup>2</sup>).

PERIOD OF RECORD.--April 1971 to current year.

GAGE.--Water-stage recorder and V-notch sharp crested weir. Datum of gage is 1,348.29 ft (410.959 m) above mean sea level, datum of 1929. Prior to June 8, 1971, nonrecording gage at site 75 ft (23 m) downstream at different datum.

EXTREMES.--Current year: Maximum discharge, 54 ft<sup>3</sup>/s (1.53 m<sup>3</sup>/s) Sept. 1 (gage height, 3.16 ft or 0.963 m); no flow on many days.  
Period of record: Maximum discharge, 54 ft<sup>3</sup>/s (1.53 m<sup>3</sup>/s) Sept. 1, 1973 (gage height, 3.16 ft or 0.963 m); no flow at times each year.

REMARKS.--Records poor. On March 20, 1972, storm sewer carrying runoff from business and residential areas in basin was diverted 1,700 ft (518 m) 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.04	.02	.01		0	.03	.47	.03	0	0	0	5.5
2	.04	.02	0		0	.02	.58	.06	0	0	0	.88
3	.04	.02	0		0	.01	.52	.03	0	0	0	.28
4	.04	.02	0		0	.01	.40	.01	0	0	0	.06
5	.05	.02	0		0	0	.34	0	0	0	.01	0
6	.04	.04	0		0	0	.23	1.3	0	0	0	0
7	.04	.04	0		0	.01	.17	1.0	0	0	0	0
8	.04	.03	0		0	.01	.13	.15	0	0	3.4	0
9	.04	.03	0		0	0	.10	.08	0	0	.45	0
10	.04	.03	0		0	0	.08	.13	0	0	.01	0
11	.05	.03	0		0	.01	.05	.03	0	0	0	0
12	.04	.03	0		0	.01	.03	.02	0	.40	0	0
13	.04	.02	0		0	.02	.04	.01	0	0	0	0
14	.03	.02	0		0	.01	.05	0	0	0	0	0
15	.03	.02	0		0	.30	.05	0	0	0	0	0
16	.03	.09	0		0	.15	.04	0	0	0	0	0
17	.02	.17	0		0	.10	.04	0	0	0	0	0
18	.02	.02	0		0	.05	.06	0	0	0	0	0
19	.02	.02	0		0	.05	.02	0	0	0	.08	0
20	.02	.02	0		0	.10	.06	0	0	0	0	0
21	.03	.02	0		0	.18	.06	0	0	0	0	0
22	.03	.02	0		0	.22	.05	0	0	0	0	0
23	.02	.02	0		0	.24	.02	0	0	0	0	0
24	.02	.02	0		.01	.28	.01	0	0	0	0	0
25	.02	.02	0		.01	.32	.01	0	0	0	0	0
26	.02	.02	0		.02	.47	.01	0	.10	0	0	0
27	.02	.02	0		.05	.52	.01	0	0	.30	0	0
28	.02	.02	0		.05	.50	.01	0	0	0	0	0
29	.02	.02	0		-----	.44	.01	0	0	0	0	0
30	.02	.01	0		-----	.40	.01	0	0	0	0	0
31	.02	-----	0		-----	.38	-----	0	-----	0	.33	-----
TOTAL	.95	.90	.01	0	.14	5.44	3.66	2.85	.10	.70	4.28	6.72
MEAN	.031	.030	.0003	0	.005	.18	.12	.092	.003	.023	.14	.22
MAX	.05	.17	.01	0	.05	.61	.58	1.3	.10	.40	3.4	5.5
MIN	.02	.01	0	0	0	0	.01	0	0	0	0	0
CF8M	.04	.04	.0004	0	.007	.25	.17	.13	.004	.03	.20	.31
IN.	.05	.05	0	0	.007	.29	.19	.15	.005	.04	.22	.35
CAL YR 1972	TOTAL 34.80	MEAN .095	MAX 1.6	MIN 0	CF8M .13	IN 1.82						
WTR YR 1973	TOTAL 25.75	MEAN .071	MAX 5.5	MIN 0	CF8M .10	IN 1.35						



05127220 Burgo Creek near Ely, Minn.

LOCATION.--Lat 47°55'32", long 91°51'40", in SW¼NW¼ sec.22, T.63 N., R.12 W., St. Louis County, near right bank 10 ft (3 m) upstream from culvert on County Road 88, 0.5 mi (0.8 km) upstream from mouth and 1.5 mi (2.4 km) north of Ely.

DRAINAGE AREA.--3.04 mi<sup>2</sup> (7.87 km<sup>2</sup>).

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

GAGE.--Nonrecording gage read once daily and crest-stage gage. Datum of gage is 1,328.49 ft (404.924 m) above mean sea level, datum of 1929. Prior to Nov. 18, 1972, nonrecording gage and crest-stage gage at same site at different datum. Nov. 18, 1972, to July 12, 1973, reference point on downstream side of culvert at present datum, and July 13, 1973, to Sept. 26, 1973, nonrecording gage at site 125 ft (38 m) upstream at present datum.

AVERAGE DISCHARGE.--6 years, 3.71 ft<sup>3</sup>/s (0.105 m<sup>3</sup>/s), 16.57 in/yr (421 mm/yr).

EXTREMES.--Current year: Maximum discharge, 43 ft<sup>3</sup>/s (1.22 m<sup>3</sup>/s) Sept. 2 (gage height, 12.09 ft or 3.685 m, from floodmark, at site 125 ft (38 m) upstream); no flow Jan. 1-10.  
Period of record: Maximum discharge, 732 ft<sup>3</sup>/s (20.7 m<sup>3</sup>/s) June 10, 1970 (gage height, 12.14 ft or 3.700 m, from floodmark, datum then in use), from rating curve extended above 150 ft<sup>3</sup>/s (4.25 m<sup>3</sup>/s) on basis of flow through culvert and flow-over-road measurement of peak flow; no flow at times in 1967, 1968, 1972, 1973.

REMARKS.--Records poor.

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

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.20	.60	.50	0	.10	.10	6.0	4.3	2.6	1.3	2.0	9.6
2	.20	.60	.50	0	.10	.10	10	6.5	2.4	1.4	1.4	36
3	.20	.50	.40	0	.10	.10	8.6	6.0	2.4	.70	1.4	23
4	.20	.50	.40	0	.10	.10	7.2	5.6	2.3	.50	1.2	14
5	.20	.60	.40	0	.10	.10	6.3	6.0	2.2	.40	1.0	9.1
6	.30	.60	.30	0	.10	.10	5.6	35	1.6	.30	.90	6.6
7	.30	.90	.30	0	.10	.10	5.0	30	1.4	.30	1.0	4.8
8	.30	1.0	.30	0	.10	.10	4.0	27	1.5	.30	5.3	3.0
9	.30	.90	.30	0	.10	.10	3.6	21	1.2	.20	6.8	2.5
10	.30	.90	.20	0	.10	.10	3.3	17	1.0	.20	6.0	2.0
11	.40	.80	.20	.10	.10	.10	2.2	15	.80	.20	5.0	1.4
12	.40	.70	.20	.10	.10	.20	2.1	14	.80	.70	4.0	1.2
13	.40	.60	.20	.10	.10	.30	2.1	12	.60	1.0	2.8	1.0
14	.40	.60	.20	.10	.10	.70	3.0	11	.60	.60	1.8	.80
15	.40	.60	.10	.10	.10	.60	5.0	11	.50	.50	1.3	.70
16	.40	.50	.10	.20	.10	.60	7.3	8.4	.60	.40	1.4	.70
17	.40	.60	.10	.20	.10	.50	6.6	7.9	.70	.50	1.1	.70
18	.40	.60	.10	.20	.10	.50	6.5	8.1	.80	.60	1.3	.60
19	.40	.60	.10	.20	.10	.40	6.0	7.0	.80	.50	1.5	.50
20	.50	.60	.10	.20	.10	.40	6.0	6.0	1.0	.40	1.7	.50
21	.50	.60	.10	.10	.10	.50	7.0	5.6	1.1	.30	1.1	.50
22	.50	.60	.10	.10	.10	.70	9.0	3.7	1.1	.30	.80	.70
23	.50	.60	.10	.10	.10	1.0	10	3.0	1.4	.30	.60	1.0
24	.60	.60	.10	.10	.10	2.0	8.8	2.2	1.4	.30	.50	1.2
25	.60	.60	.10	.10	.10	4.0	7.7	4.4	1.4	.70	.60	1.4
26	.60	.60	.10	.10	.10	7.0	6.3	4.0	1.9	3.1	.60	1.6
27	.60	.60	.10	.10	.10	10	6.0	3.7	1.9	6.0	.70	1.8
28	.60	.60	.10	.10	.10	15	5.5	3.4	1.5	5.0	.50	1.5
29	.60	.60	.10	.10	-----	11	5.0	3.2	1.3	4.5	.30	1.4
30	.60	.60	.10	.10	-----	8.0	4.6	3.4	1.3	4.1	.30	1.4
31	.60	-----	.10	.10	-----	7.0	-----	3.0	-----	3.0	.80	-----
TOTAL	12.90	19.30	6.10	2.60	2.80	71.50	176.3	298.4	40.10	38.60	55.70	131.20
MEAN	.42	.64	.20	.084	.10	2.31	5.88	9.63	1.34	1.25	1.80	4.37
MAX	.60	1.0	.50	.20	.10	15	10	35	2.6	6.0	6.8	36
MIN	.20	.50	.10	0	.10	.10	2.1	2.2	.50	.20	.30	.50
CFSM	.14	.21	.07	.03	.03	.76	1.93	3.17	.44	.41	.59	1.44
IN.	.16	.24	.07	.03	.03	.87	2.16	3.65	.49	.47	.68	1.61

CAL YR 1972 TOTAL 781.90 MEAN 2.14 MAX 40 MIN 0 CFSM .70 IN 9.57  
WTR YR 1973 TOTAL 855.50 MEAN 2.34 MAX 36 MIN 0 CFSM .77 IN 10.47

NOTE.--No gage-height record Dec. 21 to Mar. 12.

## LAKE OF THE WOODS BASIN

05127225 Shagawa Lake at Ely, Minn.

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

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

GAGE.--Nonrecording gage read once daily. Datum of gage is 1,330.00 ft (405.384 m) 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, 1,338.79 ft (408.063 m) May 11, 14; minimum observed, 1,337.12 ft (407.554 m) Dec. 29, Mar. 2, 5, 6.

Period of record: Maximum elevation observed, 1,340.22 ft (408.499 m) June 13, 1970; minimum observed, 1,336.91 ft (407.490 m) Feb. 26, 1968.

Maximum elevation observed April 1962 to July 1966, 1,339.95 ft (408.417 m) 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 1972 TO SEPTEMBER 1973

Oct. 31 .....	1337.19	Feb. 28 .....	1337.13	June 29 .....	1338.19
Nov. 30 .....	1337.19	Mar. 30 .....	1337.49	July 31 .....	1338.47
Dec. 29 .....	1337.12	Apr. 30 .....	1338.12	Aug. 31 .....	1338.16
Jan. 29 .....	1337.18	May 31 .....	1338.48	Sept. 28 .....	1337.93

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

05127230 Shagawa River at Ely, Minn.

LOCATION.--Lat 47°55'09", long 91°50'08", in SW¼SW¼ sec.23, T.63 N., R.12 W., St. Louis County, on right bank, 300 ft (91 m) downstream from outlet of Shagawa Lake, 150 ft (46 m) north of the village limits of Ely, 0.8 mi (1.3 km) upstream from County Road 88 and 3 mi (5 km) upstream from Fall Lake.

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

GAGE.--Water-stage recorder. Altitude of gage is 1,335 ft (407 m), from topographic map). Prior to Aug. 2, 1967, nonrecording gage at same site and datum.

AVERAGE DISCHARGE.--6 years, 98.0 ft<sup>3</sup>/s (2.775 m<sup>3</sup>/s).

EXTREMES.--Current year: Maximum discharge, 216 ft<sup>3</sup>/s (6.12 m<sup>3</sup>/s) May 13, Aug. 10 (gage height, 5.55 ft or 1.692 m); minimum, 9.6 ft<sup>3</sup>/s (0.27 m<sup>3</sup>/s) Oct. 14 (gage height, 3.95 ft or 1.204 m).

Period of record: Maximum discharge, 640 ft<sup>3</sup>/s (18.1 m<sup>3</sup>/s) June 12, 1970 (gage height, 6.89 ft or 2.100 m); minimum, 6.2 ft<sup>3</sup>/s (0.18 m<sup>3</sup>/s) Mar. 4, 1968 (gage height, 3.74 ft or 1.140 m).

REMARKS.--Records good.

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	21	13	17	18	17	15	45	101	154	118	159	150
2	20	15	17	18	17	15	46	111	151	117	158	186
3	20	15	17	18	17	15	48	117	150	113	160	205
4	19	15	16	19	17	14	49	119	149	105	159	209
5	20	15	17	19	17	14	50	117	145	101	161	205
6	20	17	16	18	16	14	50	125	137	98	168	197
7	20	18	15	18	17	16	49	156	132	96	166	186
8	19	18	14	18	16	17	49	179	132	97	184	176
9	17	18	14	18	16	17	48	191	127	94	200	168
10	18	18	14	18	15	17	51	201	124	95	210	164
11	19	19	14	18	16	19	52	208	120	86	211	150
12	18	18	14	18	16	20	53	208	115	100	209	140
13	18	17	13	18	16	21	46	209	109	105	205	130
14	18	17	13	18	16	24	46	206	105	95	200	124
15	19	17	13	18	16	27	50	202	104	95	192	116
16	18	17	13	18	16	26	58	195	104	95	187	110
17	15	17	13	19	15	26	59	188	110	95	181	105
18	14	17	13	18	15	26	61	184	105	98	173	100
19	14	17	13	19	15	26	66	180	104	93	173	93
20	15	17	13	18	15	26	71	174	107	91	168	86
21	16	17	13	18	16	26	83	166	112	88	160	81
22	16	17	13	18	15	27	93	162	115	85	152	85
23	16	17	13	18	15	28	96	157	115	82	146	86
24	16	17	13	18	15	29	99	150	115	88	138	82
25	17	17	13	18	14	30	102	159	119	99	133	82
26	16	17	13	18	14	30	104	166	127	109	129	80
27	17	17	13	18	15	31	105	168	129	126	122	81
28	16	18	13	18	15	35	104	167	127	139	118	79
29	15	17	13	18	-----	39	102	165	122	147	115	77
30	15	18	17	17	-----	41	101	163	120	157	108	76
31	15	-----	19	17	-----	43	-----	160	-----	159	111	-----
TOTAL	537	507	442	560	440	754	2,036	5,154	3,685	3,266	5,056	3,809
MEAN	17.3	16.9	14.3	18.1	15.7	24.3	67.9	166	123	105	163	127
MAX	21	19	19	19	17	43	105	209	154	159	211	209
MIN	14	13	13	17	14	14	45	101	104	82	108	76

CAL YR 1972 TOTAL 25,519 MEAN 69.7 MAX 358 MIN 13

WTR YR 1973 TOTAL 26,246 MEAN 71.9 MAX 211 MIN 13

## 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 mi (23 km) northeast of Winton).

DRAINAGE AREA.--1,740 mi<sup>2</sup> (4,507 km<sup>2</sup>), 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 (395.265 m) 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 (0.914 m) higher. Oct. 28, 1938, to Sept. 30, 1966, water-stage recorder at datum 3.0 ft (0.914 m) higher.

AVERAGE DISCHARGE.--45 years (1925-27, 1930-73), 1,383 ft<sup>3</sup>/s (39.17 m<sup>3</sup>/s), 10.79 in/yr (274 mm/yr).

EXTREMES.--Current year: Maximum discharge, 3,920 ft<sup>3</sup>/s (111 m<sup>3</sup>/s) May 16, gage height, 5.42 ft (1.652 m); minimum, 399 ft<sup>3</sup>/s (11.3 m<sup>3</sup>/s) Mar. 5, 6, gage height, 2.66 ft (0.811 m).  
Period of record: Maximum discharge, 15,600 ft<sup>3</sup>/s (442 m<sup>3</sup>/s) May 24, 1950, gage height, 9.94 ft (3.030 m), present datum; minimum, 73 ft<sup>3</sup>/s (2.07 m<sup>3</sup>/s) 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1,440	936	832	529	474	417	760	1,420	2,930	1,400	1,520	2,710
2	1,470	941	813	529	474	417	740	2,030	2,930	1,330	1,630	2,900
3	1,460	923	791	529	468	411	810	2,080	2,980	1,280	1,640	3,000
4	1,420	915	773	536	466	405	830	2,160	3,010	1,220	1,650	3,020
5	1,400	919	765	544	468	405	860	2,260	3,000	1,190	1,650	2,980
6	1,390	941	759	536	462	405	880	2,360	2,990	1,150	1,660	2,970
7	1,360	951	754	536	455	417	900	2,600	2,960	1,130	1,650	2,970
8	1,330	954	740	536	455	430	920	2,790	2,910	1,080	1,720	2,950
9	1,330	951	726	536	455	430	940	2,990	2,840	1,060	1,720	2,920
10	1,330	902	715	529	455	430	940	3,200	2,740	1,050	1,740	2,870
11	1,330	934	700	529	455	436	960	3,410	2,650	1,060	1,750	2,820
12	1,320	931	685	522	455	455	990	3,570	2,550	1,070	1,780	2,800
13	1,290	926	670	514	455	468	1,020	3,720	2,480	1,080	1,800	2,780
14	1,250	918	656	514	455	481	1,080	3,810	2,420	1,060	1,810	2,710
15	1,230	913	638	507	448	468	1,160	3,880	2,370	1,050	1,830	2,630
16	1,170	905	624	507	448	494	1,250	3,880	2,270	1,060	1,920	2,520
17	1,150	900	611	500	455	500	1,260	3,900	2,190	1,090	1,960	2,420
18	1,120	900	592	494	455	507	1,280	3,860	2,100	1,130	1,990	2,340
19	1,100	900	575	494	455	507	1,300	3,770	2,040	1,140	2,100	2,260
20	1,070	899	563	494	455	514	1,330	3,650	1,980	1,130	2,140	2,190
21	1,090	896	553	488	455	514	1,360	3,540	1,900	1,130	2,160	2,140
22	1,090	896	540	488	448	522	1,400	3,430	1,820	1,140	2,160	2,110
23	1,070	893	524	488	442	522	1,410	3,320	1,780	1,160	2,160	2,050
24	1,050	892	512	488	442	529	1,420	3,260	1,720	1,190	2,180	2,000
25	1,040	885	501	481	436	544	1,420	3,250	1,690	1,210	2,230	1,950
26	1,030	880	491	488	436	573	1,450	3,180	1,650	1,250	2,300	1,910
27	1,010	867	479	488	423	597	1,510	3,120	1,610	1,300	2,370	1,880
28	966	860	472	488	423	640	1,600	3,050	1,550	1,330	2,410	1,820
29	951	856	472	488	-----	665	1,700	2,990	1,500	1,400	2,420	1,760
30	942	842	496	481	-----	703	1,810	2,960	1,450	1,430	2,480	1,710
31	940	-----	522	481	-----	722	-----	2,930	-----	1,490	2,530	-----
TOTAL	37,141	27,270	19,545	15,762	12,675	15,548	35,400	96,870	69,010	36,790	61,060	74,090
MEAN	1,198	909	630	508	453	502	1,180	3,125	2,300	1,187	1,970	2,470
MAX	1,470	954	832	544	474	722	1,810	3,900	3,010	1,490	2,530	3,020
MIN	940	842	472	481	423	405	760	1,920	1,450	1,050	1,520	1,710
CFSM	.69	.52	.36	.29	.26	.29	.68	1.80	1.32	.68	1.13	1.42
IN.	.79	.58	.42	.34	.27	.33	.76	2.07	1.48	.79	1.31	1.58

CAL YR 1972 TOTAL 558,424 MEAN 1,526 MAX 7,190 MIN 472 CFSM .88 IN 11.94  
WTR YR 1973 TOTAL 501,161 MEAN 1,373 MAX 3,900 MIN 405 CFSM .79 IN 10.71

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 mi (4.0 km) west of outlet of Lac la Croix.

DRAINAGE AREA.--5,170 mi<sup>2</sup> (13,390 km<sup>2</sup>).

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.--51 years (1922-73), 3,770 ft<sup>3</sup>/s (106.8 m<sup>3</sup>/s), 9.90 in/yr (251 mm/yr).EXTREMES.--Current year: Maximum discharge, 6,520 ft<sup>3</sup>/s (185 m<sup>3</sup>/s) Sept. 24 (elevation, 1,185.80 ft or 361.432 m); minimum, 1,150 ft<sup>3</sup>/s (32.6 m<sup>3</sup>/s) Mar. 5 (elevation, 1,182.37 ft or 360.386 m).  
Period of record: Maximum discharge, 28,200 ft<sup>3</sup>/s (799 m<sup>3</sup>/s) May 31 to June 2, 1950 (elevation, 1,193.30 ft or 363.718 m); minimum, 535 ft<sup>3</sup>/s (15.2 m<sup>3</sup>/s) at times in February, March and April 1924 (elevation, 1,181.50 ft or 360.121 m).

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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3,190	2,450	2,060	1,810	1,460	1,220	1,440	3,440	6,080	5,560	4,220	5,190
2	3,170	2,450	2,060	1,800	1,440	1,210	1,470	3,490	6,060	5,420	4,270	5,410
3	3,100	2,410	2,050	1,790	1,430	1,200	1,500	3,540	6,020	5,230	4,290	5,570
4	3,070	2,390	2,040	1,770	1,420	1,190	1,540	3,600	5,960	5,170	4,320	5,660
5	3,060	2,390	2,020	1,770	1,400	1,180	1,560	3,700	5,820	5,130	4,360	5,740
6	3,050	2,390	1,990	1,760	1,390	1,190	1,600	3,790	5,790	5,080	4,410	5,840
7	3,000	2,370	1,990	1,740	1,370	1,190	1,640	3,920	5,760	5,000	4,430	5,980
8	2,980	2,370	1,990	1,730	1,360	1,230	1,660	4,040	5,680	4,910	4,500	6,120
9	2,970	2,350	1,980	1,720	1,360	1,240	1,700	4,190	5,750	4,850	4,500	6,200
10	2,960	2,330	1,970	1,700	1,350	1,320	1,710	4,290	5,780	4,760	4,520	6,200
11	2,940	2,270	1,970	1,690	1,340	1,320	1,760	4,420	5,790	4,690	4,530	6,280
12	2,940	2,270	1,960	1,700	1,350	1,330	1,820	4,580	5,750	4,630	4,550	6,390
13	2,900	2,260	1,940	1,690	1,340	1,290	1,840	4,740	5,750	4,470	4,540	6,440
14	2,840	2,240	1,930	1,680	1,340	1,290	1,880	4,890	5,760	4,440	4,540	6,420
15	2,830	2,220	1,910	1,670	1,330	1,310	1,940	5,010	5,730	4,390	4,530	6,470
16	2,710	2,210	1,910	1,660	1,310	1,320	2,020	5,150	5,780	4,330	4,560	6,470
17	2,720	2,190	1,890	1,640	1,300	1,310	2,090	5,340	5,810	4,270	4,550	6,460
18	2,710	2,180	1,890	1,630	1,300	1,310	2,160	5,510	5,840	4,260	4,580	6,450
19	2,680	2,170	1,880	1,600	1,290	1,300	2,240	5,630	5,770	4,180	4,530	6,420
20	2,660	2,160	1,860	1,600	1,280	1,310	2,360	5,760	5,740	4,140	4,510	6,420
21	2,670	2,140	1,850	1,590	1,280	1,310	2,530	5,890	5,740	4,080	4,540	6,430
22	2,680	2,120	1,830	1,580	1,280	1,310	2,600	5,960	5,730	4,040	4,540	6,440
23	2,650	2,120	1,820	1,560	1,260	1,310	2,730	6,050	5,710	3,940	4,520	6,440
24	2,620	2,120	1,800	1,560	1,240	1,320	2,850	6,100	5,650	3,950	4,550	6,420
25	2,590	2,110	1,790	1,540	1,240	1,330	2,970	6,230	5,650	3,920	4,600	6,310
26	2,570	2,100	1,770	1,520	1,230	1,330	3,060	6,260	5,690	3,900	4,660	6,250
27	2,530	2,100	1,750	1,500	1,220	1,340	3,130	6,290	5,650	3,940	4,680	6,190
28	2,500	2,090	1,740	1,490	1,220	1,350	3,230	6,260	5,610	3,980	4,710	6,110
29	2,510	2,080	1,720	1,480	-----	1,370	3,290	6,220	5,610	4,000	4,740	6,020
30	2,500	2,070	1,740	1,470	-----	1,390	3,360	6,140	5,570	4,100	4,920	5,910
31	2,480	-----	1,800	1,470	-----	1,420	-----	6,130	-----	4,180	5,010	-----
TOTAL	86,780	67,120	58,900	50,910	37,130	40,040	65,680	156,560	173,030	138,940	140,710	184,650
MEAN	2,799	2,237	1,900	1,642	1,326	1,292	2,189	5,050	5,768	4,482	4,539	6,155
MAX	3,190	2,450	2,060	1,810	1,460	1,420	3,360	6,290	6,080	5,560	5,010	6,470
MIN	2,480	2,070	1,720	1,470	1,220	1,180	1,440	3,440	5,570	3,900	4,220	5,190
CFSM	.54	.43	.37	.32	.26	.25	.42	.98	1.12	.87	.88	1.19
IN.	.62	.48	.42	.37	.27	.29	.47	1.13	1.25	1.00	1.01	1.33
CAL YR 1972	TOTAL 1,609,070	MEAN 4,396	MAX 12,900	MIN 1,720	CFSM .85	IN 11.58						
WTR YR 1973	TOTAL 1,200,450	MEAN 3,289	MAX 6,470	MIN 1,180	CFSM .64	IN 8.64						

## LAKE OF THE WOODS BASIN

05128200 Vermilion Lake near Soudan, Minn.

LOCATION.--Lat 47°49'52", long 92°16'20", in SW¼SE¼ sec.20, T.62 N., R.15 W., St. Louis County, on south shore of Vermilion Lake, at McKinley Park, 2 miles (3.2 km) 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 (413.03 m) above mean sea level, datum of 1929. October 1913 to July 1915, nonrecording gage at Tower, 2 miles (3.2 km) southwest of present gage, at datum about 1,354.60 ft (412.88 m). July 1941 to November 1942, and June 1946 to June 1951, nonrecording gage approximately 13 miles (20.9 km) 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, 1,358.30 ft (414.010 m) July 2 (affected by wind action); maximum daily, 1,358.22 ft (413.985 m) June 28, 29; minimum, 1,356.98 ft (413.608 m) Mar. 3.

Period of record: Maximum elevation observed, 1,359.52 ft (414.382 m) May 16, 1950; minimum observed, 1,356.02 ft (413.315 m) Jan. 29, 1942.

Elevation on June 6, 1913, was 1,359.94 ft (414.510 m), determined from reference point set by local observers.

## MONTHEND ELEVATION, IN FEET, OCTOBER 1972 TO SEPTEMBER 1973

Oct. 31 .....	1,357.22	Feb. 28 .....	1,357.00	June 30 .....	1,358.21
Nov. 30 .....	1,357.18	Mar. 31 .....	1,357.28	July 31 .....	1,358.02
Dec. 31 .....	1,357.17	Apr. 30 .....	1,357.79	Aug. 31 .....	1,357.83
Jan. 31 .....	1,357.08	May 31 .....	1,357.98	Sept.30 .....	1,357.44

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

## LAKE OF THE WOODS BASIN

91

05129000 Vermilion River below Vermilion Lake, near Tower, Minn.

LOCATION.--Lat 47°57'41", long 92°28'33", in SE $\frac{1}{4}$ SW $\frac{1}{4}$  sec.2, T.63 N., R.17 W., St. Louis County, on left bank 200 ft (61 m) downstream from dam at outlet of Vermilion Lake, 4.4 mi (7.1 km) upstream from Twomile Creek, and 14.2 mi (22.8 km) northwest of Tower.

DRAINAGE AREA.--483 mi<sup>2</sup> (1,251 km<sup>2</sup>).

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 (410.675 m) above mean sea level, datum of 1929. June 26, 1928, to July 8, 1931, nonrecording gage at same site, at datum 3.05 ft (0.930 m) 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 (0.914 m) higher.

AVERAGE DISCHARGE.--51 years, 317 ft<sup>3</sup>/s (8.977 m<sup>3</sup>/s), 8.91 in/yr (226 mm/yr).

EXTREMES.--Current year: Maximum discharge, 722 ft<sup>3</sup>/s (20.4 m<sup>3</sup>/s) July 2 (gage height, 5.58 ft or 1.701 m); minimum, 72 ft<sup>3</sup>/s (2.04 m<sup>3</sup>/s) Mar. 6 (gage height, 3.43 ft or 1.045 m).  
Period of record: Maximum discharge, 2,710 ft<sup>3</sup>/s (76.7 m<sup>3</sup>/s) May 23, 1950 (gage height, 7.68 ft or 2.341 m, 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	210	171	143	141	106	80	190	477	615	717	610	543
2	210	163	141	142	105	81	200	485	606	697	604	544
3	200	175	140	140	105	79	205	483	598	669	596	569
4	200	167	138	141	103	77	211	501	588	646	589	557
5	200	174	137	140	102	76	219	519	537	652	568	508
6	200	172	136	137	98	77	222	529	521	638	579	484
7	210	161	135	133	98	79	229	562	510	623	557	485
8	210	175	132	130	98	81	231	581	510	593	606	477
9	210	178	132	128	96	81	231	609	499	578	614	461
10	210	171	131	125	97	80	232	629	471	540	617	430
11	200	160	130	124	98	81	240	620	457	538	627	410
12	190	159	127	124	96	88	246	630	433	595	636	408
13	190	161	125	126	93	95	253	643	421	536	625	411
14	190	160	123	129	90	103	260	648	421	530	629	372
15	190	160	119	131	89	111	266	646	409	520	627	346
16	190	158	119	129	90	112	281	610	432	520	604	343
17	190	155	119	127	91	114	290	585	503	481	603	328
18	190	155	115	124	90	114	306	560	529	497	603	320
19	190	156	114	122	87	116	320	550	544	475	584	291
20	200	152	115	122	88	117	350	540	533	461	563	286
21	200	151	116	122	89	118	405	535	537	452	564	302
22	210	152	117	118	87	121	400	540	551	437	548	269
23	210	152	112	120	85	123	427	560	562	421	517	299
24	200	150	113	120	84	126	445	590	590	437	508	319
25	189	148	110	117	84	129	457	620	610	477	494	300
26	182	150	111	115	83	136	464	650	645	526	484	289
27	181	148	108	113	81	145	469	640	680	563	492	290
28	153	147	107	113	82	155	483	625	690	592	492	290
29	177	148	106	112	-----	165	484	615	699	604	462	285
30	175	144	122	110	-----	176	488	612	707	609	499	285
31	174	-----	140	108	-----	184	-----	610	-----	619	528	-----
TOTAL	6,031	4,773	3,833	3,883	2,595	3,420	9,504	18,004	16,408	17,243	17,629	11,521
MEAN	195	159	124	125	92.7	110	317	581	547	556	569	384
MAX	210	178	143	142	106	184	488	650	707	717	636	569
MIN	153	144	106	108	81	76	190	477	409	421	462	285
CFSM	.40	.33	.26	.26	.19	.23	.66	1.20	1.13	1.15	1.18	.80
IN.	.46	.37	.30	.30	.20	.26	.73	1.39	1.26	1.33	1.36	.69
CAL YR 1972	TOTAL 123,418	MEAN 337	MAX 1,210	MIN 106	CFSM .70	IN 9.51						
WTR YR 1973	TOTAL 114,844	MEAN 315	MAX 717	MIN 76	CFSM .65	IN 8.85						

## 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 mi (8 km) 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 1973 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 mi (5 km) 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 mi (0.8 km) south, used during winter months, at same datum.

EXTREMES.--Current year: Maximum elevation, 1,108.11 ft (337.752 m) Aug. 19; minimum, 1,105.32 ft (336.902 m) Mar. 12.

Period of record: Maximum elevation observed, 1,112.97 ft (339.233 m) July 5, 1950; minimum observed, 1,101.26 ft (335.664 m) 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 1972 TO SEPTEMBER 1973

Oct. 31 .....	7.45	Feb. 28 .....	5.55	June 30 .....	6.99
Nov. 30 .....	7.27	Mar. 31 .....	5.46	July 31 .....	7.79
Dec. 31 .....	6.49	Apr. 30 .....	5.75	Aug. 31 .....	7.80
Jan. 31 .....	6.08	May 31 .....	6.37	Sept. 30 .....	7.91

NOTE.--Add 1,100 ft to obtain elevation above mean sea level. Elevations other than those shown are available.



05130500 Sturgeon River near Chisholm, Minn.

LOCATION.--Lat 47°40'25", long 92°54'00", in NE¼NW¼ sec.20, T.60 N., R.20 W., St. Louis County, on left bank 1,000 ft (305 m) upstream from highway bridge, 0.6 mi (1.0 km) downstream from East Branch Sturgeon River, and 11.5 mi (18.5 km) north of Chisholm.

DRAINAGE AREA.--187 mi<sup>2</sup> (484 km<sup>2</sup>).

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

GAGE.--Water-stage recorder. Datum of gage is 1,306.7 ft (398.282 m) above mean sea level, datum of 1929. Prior to Aug. 24, 1944, nonrecording gage at site 1,000 ft (305 m) downstream at different datum.

AVERAGE DISCHARGE.--31 years, 124 ft<sup>3</sup>/s (3.512 m<sup>3</sup>/s), 9.00 in/yr (229 mm/yr).

EXTREMES.--Current Year: Maximum discharge, 390 ft<sup>3</sup>/s (11.0 m<sup>3</sup>/s) Apr. 23 (gage height, 2.52 ft or 0.768 m); minimum daily, 19 ft<sup>3</sup>/s (0.54 m<sup>3</sup>/s) Jan. 8-18; minimum gage height, 0.51 ft (0.155 m) Feb. 28.  
Period of record: Maximum discharge, 3,630 ft<sup>3</sup>/s (103 m<sup>3</sup>/s) May 7, 1950 (gage height, 6.41 ft or 1.954 m), from rating curve extended above 1,600 ft<sup>3</sup>/s (45.3 m<sup>3</sup>/s) on basis of slope-area measurement of peak flow; minimum daily, 6.0 ft<sup>3</sup>/s (0.17 m<sup>3</sup>/s) Feb. 18-27, 1944; minimum gage height, 0.08 ft (0.024 m) 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	148	107	54	23	22	21	200	169	202	184	145	92
2	143	107	51	22	22	21	191	186	183	147	130	118
3	136	113	49	22	22	21	180	200	169	123	111	149
4	131	121	47	21	22	22	168	198	165	104	94	177
5	128	117	45	20	21	22	160	183	158	91	82	177
6	133	115	43	20	21	22	152	183	146	80	79	164
7	135	117	41	20	21	22	144	233	138	73	74	138
8	133	119	39	19	21	23	137	280	136	66	142	118
9	128	119	37	19	21	23	126	321	130	62	178	106
10	138	117	36	19	21	24	120	362	121	62	223	98
11	137	115	34	19	20	26	113	376	113	57	249	92
12	136	113	33	19	20	28	108	380	106	146	234	86
13	135	110	32	19	20	33	105	366	98	132	199	82
14	132	101	31	19	20	60	104	328	92	111	163	79
15	129	91	30	19	20	95	121	277	84	91	132	77
16	118	85	30	19	20	160	157	233	126	76	123	75
17	112	82	29	19	20	170	176	205	167	65	115	72
18	109	78	29	19	20	170	181	183	190	69	111	70
19	105	75	28	20	20	160	186	169	195	68	103	67
20	104	71	28	20	21	150	213	156	200	64	95	65
21	108	69	28	20	21	150	297	144	198	57	89	66
22	112	66	27	20	21	150	347	142	186	51	85	76
23	116	64	27	21	21	150	380	154	169	46	80	79
24	117	63	27	21	21	150	380	161	146	49	77	82
25	116	62	27	21	21	160	334	248	166	82	75	92
26	116	60	27	21	21	170	287	321	205	105	73	99
27	115	59	26	21	21	200	243	348	248	124	72	108
28	115	58	26	21	21	264	215	348	248	144	70	110
29	110	57	25	22	-----	249	193	304	248	145	67	105
30	107	56	25	22	-----	234	178	248	225	155	72	98
31	107	-----	24	22	-----	218	-----	220	-----	161	84	-----
TOTAL	3,809	2,687	1,035	629	583	3,368	5,896	7,626	4,958	2,990	3,626	3,017
MEAN	123	89.6	33.4	20.3	20.8	109	197	246	165	96.5	117	101
MAX	148	121	54	23	22	264	380	380	248	184	249	177
MIN	104	56	24	19	20	21	104	142	84	46	67	65
CFSM	.66	.48	.18	.11	.11	.58	1.05	1.32	.88	.52	.63	.54
IN.	.76	.53	.21	.13	.12	.67	1.17	1.52	.99	.59	.72	.60

CAL YR 1972 TOTAL 52,320 MEAN 143 MAX 1,200 MIN 17 CFSM .76 IN 10.41  
WTR YR 1973 TOTAL 40,224 MEAN 110 MAX 380 MIN 19 CFSM .59 IN 8.00

PEAK DISCHARGE (BASE, 500 CFS).--No peak above base.

05131000 Dark River near Chisholm, Minn.

LOCATION.--Lat 47°41'27", long 92°49'15", in SW¼SW¼ sec.12, T.60 N., R.20 W., St. Louis County, on right bank 50 ft (15 m) downstream from remains of abandoned highway bridge, 3.5 mi (5.6 km) upstream from mouth, and 12.2 mi (19.6 km) northeast of Chisholm.

DRAINAGE AREA.--50.6 mi<sup>2</sup> (131.1 km<sup>2</sup>) of which 13.5 mi<sup>2</sup> (35.0 km<sup>2</sup>), since October 1972, has been contained in tailing ponds and probably is noncontributing.

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 (401.361 m) above mean sea level, datum of 1929 (surveyed by Topographic Division). Prior to Aug. 24, 1944, nonrecording gage at site 50 ft (15 m) upstream at same datum.

AVERAGE DISCHARGE.--27 years, 37.8 ft<sup>3</sup>/s (1.070 m<sup>3</sup>/s), 10.14 in/yr (258 mm/yr).

EXTREMES.--Current year: Maximum discharge, 106 ft<sup>3</sup>/s (3.00 m<sup>3</sup>/s) Aug. 11 (gage height, 2.84 ft or 0.866 m); minimum daily, 9.5 ft<sup>3</sup>/s (0.27 m<sup>3</sup>/s) Dec. 17-28; minimum gage height, 1.46 ft (0.445 m) Dec. 22, 23.  
Period of record: Maximum discharge, 1,170 ft<sup>3</sup>/s (33.1 m<sup>3</sup>/s) May 7, 1950 (gage height, 7.10 ft or 2.164 m); minimum, 0.3 ft<sup>3</sup>/s (0.008 m<sup>3</sup>/s) Aug. 3, 1956; minimum gage height, 0.87 ft (0.265 m) 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	29	23	15	11	15	13	44	42	46	58	71	34
2	27	24	14	11	15	13	41	46	42	51	60	48
3	27	25	13	11	15	13	37	45	41	47	51	45
4	26	25	13	11	15	13	34	44	39	44	42	48
5	26	25	13	11	15	13	32	43	35	41	36	44
6	27	25	12	11	15	13	28	46	33	37	39	40
7	26	25	12	12	15	13	28	61	31	34	46	36
8	25	25	12	12	15	13	27	74	32	29	84	32
9	24	25	11	12	15	13	26	83	29	28	81	29
10	27	24	11	12	14	13	26	93	28	27	101	27
11	28	24	11	12	14	14	24	92	28	26	103	26
12	28	23	11	12	14	17	24	86	26	48	95	23
13	28	22	10	13	14	20	24	82	25	44	82	22
14	27	22	10	13	14	30	23	74	23	44	69	22
15	27	21	10	13	14	40	27	66	22	42	58	21
16	25	20	10	13	14	39	29	59	24	36	53	21
17	23	20	9.5	14	14	45	30	52	47	32	46	20
18	22	19	9.5	14	14	43	34	46	64	36	42	19
19	21	19	9.5	14	13	35	36	41	94	32	39	18
20	21	19	9.5	14	13	34	43	39	85	29	35	15
21	23	18	9.5	14	13	34	66	35	66	26	32	15
22	24	18	9.5	14	13	34	78	34	70	24	29	20
23	25	17	9.5	14	13	34	92	34	58	22	27	19
24	25	17	9.5	14	13	34	95	34	47	26	25	19
25	25	17	9.5	15	13	34	89	61	67	39	24	25
26	25	16	9.5	15	13	36	76	62	78	46	24	26
27	25	16	9.5	15	13	46	66	66	79	64	23	28
28	24	16	9.5	15	13	53	57	63	72	76	22	27
29	24	15	10	15	-----	51	51	58	68	80	21	26
30	24	15	10	15	-----	52	46	54	61	85	30	25
31	23	-----	10	15	-----	47	-----	52	-----	83	33	-----
TOTAL	781	620	332.0	407	391	902	1,333	1,767	1,460	1,336	1,523	820
MEAN	25.2	20.7	10.7	13.1	14.0	29.1	44.4	57.0	48.7	43.1	49.1	27.3
MAX	29	25	15	15	15	53	95	93	94	85	103	48
MIN	21	15	9.5	11	13	13	23	34	22	22	21	15
AC-FT	1,550	1,230	659	807	776	1,790	2,640	3,500	2,900	2,650	3,020	1,630
CAL YR 1972	TOTAL 15,883.0	MEAN 43.4	MAX 310	MIN 9.5	AC-FT 31,500							
WTR YR 1973	TOTAL 11,672.0	MEAN 32.0	MAX 103	MIN 9.5	AC-FT 23,150							

## 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 (30 m) downstream from highway bridge at town of Littlefork, 0.3 mi (0.5 km) downstream from bridge on State Highway 217, 1.5 mi (2.4 km) upstream from Beaver Creek, and 18 mi (29 km) upstream from mouth.

DRAINAGE AREA.--1,730 mi<sup>2</sup> (4,481 km<sup>2</sup>), 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 (327.069 m) 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 (30 m) upstream at same datum. Nonrecording gage 1.2 mi (1.9 km) upstream at datum 9.0 ft (2.7 m) higher (used as supplementary gage during periods of backwater from Rainy River.

AVERAGE DISCHARGE.--50 years (1911-16, 1928-73), 1,036 ft<sup>3</sup>/s (29.34 m<sup>3</sup>/s), 8.13 in/yr (207 mm/yr).

EXTREMES.--Current year: Maximum discharge, 3,760 ft<sup>3</sup>/s (106 m<sup>3</sup>/s) Apr. 23 (gage height, 13.74 ft or 4.188 m); maximum gage height, 13.92 ft (4.243 m) Mar. 30, backwater from ice; minimum daily discharge, 103 ft<sup>3</sup>/s (2.92 m<sup>3</sup>/s) Feb. 22, 23.

Period of record: Maximum discharge, 25,000 ft<sup>3</sup>/s (708 m<sup>3</sup>/s) Apr. 18, 1916, May 11, 1950 (gage height, 37.00 ft or 11.278 m); minimum daily, 15 ft<sup>3</sup>/s (0.42 m<sup>3</sup>/s) Feb. 9-22, 1963.

REMARKS.--Records good except those for winter periods, 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	747	650	460	170	114	105	1,900	1,480	1,500	2,180	1,600	329
2	721	650	420	160	114	107	1,650	1,340	1,290	1,810	1,570	650
3	683	657	390	150	114	110	1,440	1,260	1,140	1,460	1,280	1,330
4	647	689	365	138	112	115	1,270	1,230	1,020	1,140	985	2,140
5	620	711	330	128	112	120	1,160	1,230	934	891	790	2,340
6	600	736	305	122	112	130	1,080	1,200	858	715	881	2,210
7	597	796	280	118	112	145	1,020	1,150	796	585	768	1,810
8	637	834	260	115	110	160	975	1,110	740	489	700	1,410
9	659	851	240	112	110	170	913	1,180	690	418	703	1,100
10	674	861	220	110	110	175	854	1,480	641	364	989	888
11	713	861	210	108	108	180	796	1,900	607	324	1,650	740
12	753	838	200	108	108	200	734	2,230	576	315	1,970	628
13	824	795	190	106	106	240	684	2,380	528	305	1,890	539
14	844	686	185	106	105	370	653	2,250	484	303	1,750	473
15	816	610	182	104	105	630	715	2,000	446	388	1,460	425
16	762	530	180	104	105	950	864	1,750	440	454	1,180	385
17	705	510	180	104	105	1,640	1,250	1,520	437	446	971	354
18	652	500	180	106	105	1,400	1,520	1,330	543	396	812	327
19	608	510	180	108	105	1,200	1,630	1,180	755	352	693	307
20	560	520	180	108	105	1,050	1,760	1,050	1,050	324	564	288
21	575	530	182	110	105	1,030	2,230	961	1,240	301	516	283
22	559	520	185	110	103	1,000	3,060	897	1,350	301	440	332
23	558	510	190	110	103	1,000	3,650	927	1,440	301	423	446
24	589	490	190	110	105	1,050	3,670	1,050	1,370	296	385	588
25	634	480	190	112	105	1,120	3,350	1,160	1,280	287	362	783
26	651	490	192	112	105	1,250	2,960	1,590	1,220	283	339	1,040
27	648	500	192	112	105	1,500	2,600	2,380	1,630	315	322	1,260
28	676	515	193	114	105	1,850	2,220	2,660	2,380	687	308	1,310
29	673	505	192	116	-----	2,250	1,910	2,500	2,580	1,280	298	1,250
30	653	485	190	116	-----	2,420	1,660	2,130	2,490	1,510	289	1,120
31	654	-----	182	116	-----	2,270	-----	1,780	-----	1,570	283	-----
TOTAL	20,692	18,820	7,215	3,623	3,013	25,937	50,178	48,285	32,455	20,790	27,171	27,085
MEAN	667	627	233	117	108	837	1,673	1,558	1,082	671	876	903
MAX	844	861	460	170	114	2,420	3,670	2,660	2,580	2,180	1,970	2,340
MIN	558	480	180	104	103	105	653	897	437	283	283	283
CFSM	.39	.36	.13	.07	.06	.48	.97	.90	.63	.39	.51	.52
IN.	.44	.40	.16	.08	.06	.56	1.08	1.04	.70	.45	.58	.58

CAL YR 1972 TOTAL 431,801 MEAN 1,180 MAX 12,400 MIN 130 CFSM .68 IN 9.28  
WTR YR 1973 TOTAL 285,264 MEAN 782 MAX 3,670 MIN 103 CFSM .45 IN 6.13

## 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.15S N., R.25 W., Koochiching County, on left bank at village of Big Falls, 700 ft (213 m) downstream from falls, 0.3 mi (0.5 km) downstream from bridge on U.S. Highway 71, and 4.8 mi (7.7 km) upstream from Sturgeon River.

DRAINAGE AREA.--1,460 mi<sup>2</sup> (3,780 km<sup>2</sup>), 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 (348.908 m) above mean sea level, datum of 1929. Prior to June 10, 1911, nonrecording gage at railroad bridge about 0.4 mi (0.6 km) 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 (61 m) upstream at same datum.

AVERAGE DISCHARGE.--45 years (1928-1973), 690 ft<sup>3</sup>/s (19.5 m<sup>3</sup>/s), 6.42 in/yr (163 mm/yr).

EXTREMES.--Current year: Maximum discharge, 1,860 ft<sup>3</sup>/s (52.7 m<sup>3</sup>/s) May 12 (gage height, 5.63 ft or 1.716 m); maximum gage height, 5.71 ft (1.740 m) Mar. 16 (backwater from ice); minimum daily discharge, 135 ft<sup>3</sup>/s (3.82 m<sup>3</sup>/s) Mar. 1; minimum gage height, 3.05 ft (0.930 m) July 22.  
Period of record: Maximum discharge, 14,800 ft<sup>3</sup>/s (419 m<sup>3</sup>/s) May 8, 9, 1950; maximum gage height, 17.08 ft (5.206 m) May 8, 1950; minimum discharge recorded, 7 ft<sup>3</sup>/s (0.20 m<sup>3</sup>/s) Aug. 7, 1939.

REMARKS.--Records good except those for winter periods, which are fair. Prior to 1971, a powerplant, located 0.3 mi (0.5 km) 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	545	584	370	220	175	135	1,440	924	754	589	643	270
2	537	597	360	210	172	136	1,360	888	688	500	581	519
3	525	617	345	200	172	138	1,170	856	645	422	516	881
4	514	625	330	190	170	140	970	810	637	360	458	1,040
5	507	627	310	180	170	142	886	774	606	312	405	1,050
6	520	641	295	175	170	142	844	742	569	276	487	1,120
7	529	679	280	170	168	142	830	735	539	248	629	1,220
8	534	696	270	165	165	145	804	729	493	223	584	1,130
9	526	706	260	160	162	145	772	762	452	200	604	904
10	540	727	245	157	160	145	739	1,190	412	183	708	738
11	578	731	235	155	160	145	700	1,600	382	168	830	632
12	612	724	230	152	158	147	661	1,830	346	189	746	553
13	618	698	228	152	155	150	642	1,780	314	268	671	492
14	625	534	228	150	152	170	622	1,610	288	293	619	447
15	606	447	230	150	150	330	642	1,410	262	242	559	411
16	584	285	230	150	145	850	732	1,230	266	207	513	382
17	567	325	230	150	142	1,000	893	1,090	267	180	459	358
18	546	370	235	150	142	970	970	988	288	167	411	341
19	532	440	237	150	140	860	984	894	329	168	372	318
20	516	455	240	152	140	760	1,060	814	352	166	340	303
21	511	460	240	152	138	690	1,240	756	381	165	313	304
22	530	450	240	152	138	670	1,470	746	401	157	288	456
23	555	420	242	155	138	660	1,580	895	413	159	274	586
24	569	395	245	157	138	690	1,550	943	413	166	262	600
25	570	400	250	160	137	720	1,450	1,040	410	201	252	734
26	574	410	250	162	137	820	1,330	1,230	490	237	250	1,000
27	589	405	250	168	136	970	1,210	1,280	666	308	244	1,130
28	611	395	250	170	136	1,120	1,120	1,200	786	491	238	1,100
29	587	385	245	172	-----	1,210	1,050	1,070	765	544	231	1,050
30	581	380	240	175	-----	1,260	977	930	685	592	228	965
31	586	-----	230	175	-----	1,360	-----	830	-----	649	217	-----
TOTAL	17,324	15,608	8,070	5,136	4,266	16,962	30,698	32,576	14,299	9,030	13,932	21,034
MEAN	559	520	260	166	152	547	1,023	1,051	477	291	449	701
MAX	625	731	370	220	175	1,360	1,580	1,830	786	649	830	1,220
MIN	507	285	228	150	136	135	622	729	262	157	217	270
CFSM	.38	.36	.18	.11	.10	.37	.70	.72	.33	.20	.31	.48
IN.	.44	.40	.21	.13	.11	.43	.78	.83	.36	.23	.35	.54
CAL YR 1972	TOTAL 293,290		MEAN 801		MAX 6,330		MIN 197		CFSM .55		IN 7.47	
WTR YR 1973	TOTAL 188,935		MEAN 518		MAX 1,830		MIN 135		CFSM .35		IN 4.81	

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 mi (5.6 km) east of Manitou Post Office and 4 mi (6 km) west of Indus.

DRAINAGE AREA.--19,400 mi<sup>2</sup> (50,246 km<sup>2</sup>), 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 (323.844 m) above mean sea level, datum of 1929. Prior to Nov. 10, 1934, nonrecording gage at site near Birchdale 7 mi (11 km) downstream at different datum.

AVERAGE DISCHARGE.--45 years, 12,780 ft<sup>3</sup>/s (361.9 m<sup>3</sup>/s), 8.94 in/yr (227 mm/yr).

EXTREMES.--Current year: Maximum discharge, 20,700 ft<sup>3</sup>/s (586 m<sup>3</sup>/s) Sept. 6 (gage height, 9.14 ft or 2.786 m); minimum, 4,660 ft<sup>3</sup>/s (132 m<sup>3</sup>/s) July 11 (gage height, 2.39 ft or 0.728 m).  
Period of record: Maximum discharge, 71,600 ft<sup>3</sup>/s (2,030 m<sup>3</sup>/s) May 12, 1950 (gage height, 21.04 ft or 6.413 m); minimum daily, 928 ft<sup>3</sup>/s (26.3 m<sup>3</sup>/s) 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8,930	8,230	10,500	8,080	7,800	7,640	10,400	9,020	8,880	8,470	11,600	11,900
2	8,840	8,130	10,800	8,270	7,540	7,270	10,500	8,680	7,660	7,910	12,300	12,700
3	9,100	8,420	11,300	8,640	7,680	7,700	10,900	8,620	6,670	6,940	12,200	15,100
4	8,940	7,810	11,200	8,190	6,420	6,840	10,200	8,530	5,980	6,300	11,600	18,500
5	8,380	8,080	11,100	8,310	6,350	6,020	9,740	7,880	4,930	6,010	11,600	20,300
6	7,740	7,700	11,200	7,770	6,830	6,250	9,190	7,620	5,040	5,710	13,100	20,600
7	7,260	7,850	11,000	7,900	8,830	6,160	8,820	7,310	5,190	5,510	15,400	20,100
8	6,620	8,090	11,100	7,830	8,550	6,470	8,830	7,350	5,350	5,360	16,500	18,200
9	6,750	8,860	11,100	8,560	7,870	6,270	8,200	7,240	5,940	5,150	17,100	16,600
10	6,970	9,900	11,000	9,190	7,470	6,670	8,370	7,350	5,860	4,980	18,500	15,300
11	6,760	10,200	11,000	8,120	8,500	7,030	7,750	8,400	5,760	4,770	18,300	14,800
12	7,640	10,300	11,000	8,350	6,410	6,060	7,620	9,740	5,680	4,920	18,000	14,200
13	8,480	10,400	11,100	8,840	7,910	6,660	8,470	10,200	5,120	6,210	17,600	13,700
14	8,680	10,700	11,000	8,250	7,120	6,870	9,020	10,300	4,910	7,320	16,600	13,500
15	8,020	10,500	11,000	6,890	7,280	6,470	8,830	9,770	4,720	7,490	15,600	13,100
16	7,340	10,700	11,100	7,380	6,990	6,890	8,590	9,240	4,810	7,720	14,900	12,900
17	8,120	10,800	11,200	7,080	8,050	7,780	8,940	8,910	4,940	7,740	14,500	12,800
18	8,240	10,600	10,900	6,950	7,530	8,290	8,600	8,740	4,900	7,660	14,000	12,700
19	7,340	10,300	9,660	8,710	7,090	8,310	8,750	8,540	5,400	7,310	13,600	12,600
20	7,530	10,400	9,250	8,050	8,000	8,540	9,010	7,850	5,640	6,830	13,300	12,400
21	8,010	10,600	8,900	6,680	7,150	8,360	9,460	7,090	5,790	6,560	13,100	12,400
22	8,800	10,700	10,600	6,960	7,260	8,020	11,300	6,980	6,100	6,470	12,900	12,800
23	8,410	11,100	10,600	7,150	7,230	8,110	13,400	7,010	6,230	6,440	12,600	13,600
24	7,950	11,300	10,600	7,000	7,220	8,200	13,000	7,020	6,350	6,510	12,500	14,200
25	8,080	11,300	8,770	6,960	6,860	7,890	12,000	7,450	6,500	6,680	12,300	14,800
26	7,580	11,300	9,010	6,520	6,410	7,790	11,500	7,970	6,610	6,960	12,300	15,200
27	8,120	11,300	9,610	6,640	6,060	8,870	11,600	8,660	6,940	7,360	12,200	17,200
28	8,310	11,000	9,580	6,980	6,850	9,450	11,400	9,330	7,530	7,790	12,200	17,300
29	8,360	10,200	8,200	6,480	-----	9,840	10,900	9,480	8,380	8,560	12,100	16,900
30	8,310	10,500	8,100	6,330	-----	10,300	9,860	9,170	8,580	9,820	11,800	16,300
31	8,580	-----	6,500	6,390	-----	10,700	-----	8,690	-----	10,800	11,600	-----
TOTAL	248,190	297,270	317,980	235,450	205,260	237,720	295,150	260,140	182,390	214,260	431,900	452,900
MEAN	8,006	9,909	10,260	7,595	7,331	7,668	9,838	8,392	6,080	6,912	13,930	15,100
MAX	9,100	11,300	11,300	9,190	8,830	10,700	13,400	10,300	8,880	10,800	18,500	20,600
MIN	6,620	7,700	6,500	6,330	6,060	6,020	7,620	6,980	4,720	4,770	11,600	11,900
CF8M	.41	.51	.53	.39	.38	.40	.51	.43	.31	.36	.72	.78
IN.	.48	.57	.61	.45	.39	.46	.57	.50	.35	.41	.83	.87
CAL YR 1972	TOTAL 5,098,590		MEAN 13,930		MAX 35,800		MIN 6,500		CF8M .72		IN 9.78	
WTR YR 1973	TOTAL 3,378,610		MEAN 9,256		MAX 20,600		MIN 4,720		CF8M .48		IN 6.48	

## 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 (6 m) upstream from bridge on State Highway 72, 1.2 mi (1.9 km) downstream from North Branch Rapid River, and 12 mi (19 km) south of Baudette.

DRAINAGE AREA.--543 mi<sup>2</sup> (1,406 km<sup>2</sup>).

PERIOD OF RECORD.--October 1956 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,093.92 ft (333.427 m) above mean sea level, datum of 1929 (Minnesota Highway Department bench mark).

AVERAGE DISCHARGE.--17 years, 331 ft<sup>3</sup>/s (9.374 m<sup>3</sup>/s), 8.28 in/yr (210 mm/yr).

EXTREMES.--Current year: Maximum discharge, 1,730 ft<sup>3</sup>/s (49.0 m<sup>3</sup>/s) Sept. 5 (gage height, 8.64 ft or 2.633 m, from floodmark); minimum, 4.4 ft<sup>3</sup>/s (0.12 m<sup>3</sup>/s) July 22 (gage height, 1.56 ft or 0.475 m).  
Period of record: Maximum discharge, 5,500 ft<sup>3</sup>/s (156 m<sup>3</sup>/s) Apr. 14, 1969 (gage height, 17.86 ft or 5.444 m); minimum, 0.1 ft<sup>3</sup>/s (0.003 m<sup>3</sup>/s) Aug. 13, 1961 (gage height, 1.18 ft or 0.360 m).  
Flood of May 11, 1950, reached a stage of 21.1 ft (6.431 m), from information by local residents and Minnesota Highway Department (discharge, about 7,000 ft<sup>3</sup>/s or 198 m<sup>3</sup>/s).

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

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	106	121	32	9.2	8.6	8.5	195	193	126	143	127	165
2	100	130	28	9.0	8.6	9.0	181	180	119	112	113	472
3	97	130	26	8.7	8.4	9.5	164	165	104	86	94	968
4	91	130	24	8.5	8.4	10	141	131	95	69	78	1,530
5	90	135	22	8.3	8.4	11	132	142	91	56	66	1,710
6	99	162	21	8.0	8.4	14	117	158	85	44	160	1,620
7	123	227	19	7.8	8.4	18	119	191	75	39	488	1,460
8	113	257	18	7.6	8.4	23	105	192	67	35	588	1,300
9	106	252	17	7.6	8.2	30	96	178	65	30	659	1,130
10	98	261	16	7.6	8.2	45	84	183	60	29	738	988
11	108	273	15	7.6	8.2	55	79	217	52	27	712	863
12	166	263	14	7.6	8.2	70	74	234	46	27	618	753
13	175	198	14	7.6	8.2	110	74	214	41	29	542	661
14	166	151	13	7.6	8.2	230	70	192	34	27	470	598
15	158	135	13	7.8	8.0	330	69	174	29	17	462	552
16	146	123	13	7.8	8.0	390	82	152	32	13	428	515
17	132	116	12	8.0	8.0	420	81	137	43	12	398	482
18	117	108	12	8.2	8.0	410	79	129	63	10	355	435
19	93	102	12	8.2	8.0	360	84	119	86	10	312	388
20	103	96	12	8.4	7.8	310	121	114	116	8.9	303	348
21	100	93	12	8.6	7.8	265	364	105	163	5.8	263	335
22	127	88	11	8.8	7.8	260	443	101	214	5.3	224	615
23	143	84	11	8.8	7.8	255	406	147	219	5.8	200	930
24	134	80	11	9.0	7.8	250	380	182	198	5.8	184	1,000
25	123	75	11	9.0	7.8	250	345	182	159	6.3	172	1,220
26	122	68	11	9.0	7.8	270	307	187	138	11	170	1,440
27	123	58	11	9.0	8.0	285	281	201	167	34	162	1,570
28	119	50	10	8.8	8.0	275	252	184	203	86	154	1,580
29	114	42	10	8.8	-----	255	233	156	194	92	142	1,500
30	111	36	9.8	8.8	-----	230	209	133	170	114	127	1,380
31	112	-----	9.5	8.6	-----	215	-----	124	-----	132	111	-----
TOTAL	3,715	4,044	470.3	258.3	227.4	5,673.0	5,367	5,117	3,254	1,321.9	9,620	28,508
MEAN	120	135	15.2	8.33	8.12	183	179	165	108	42.6	310	950
MAX	175	273	32	9.2	8.6	420	443	234	219	143	738	1,710
MIN	90	36	9.5	7.6	7.8	8.5	69	101	29	5.3	66	165
CF8M	.22	.25	.03	.02	.02	.34	.33	.30	.20	.08	.57	1.75
IN.	.25	.28	.03	.02	.02	.39	.37	.35	.22	.09	.66	1.95
CAL YR 1972	TOTAL 92,009.3	MEAN 251	MAX 3,180	MIN 9.5	CF8M .46	IN 6.30						
WTR YR 1973	TOTAL 67,575.9	MEAN 185	MAX 1,710	MIN 5.3	CF8M .34	IN 4.63						

05139500 West Branch Warroad River near Warroad, Minn.

LOCATION.--Lat  $48^{\circ}51'57''$ , long  $95^{\circ}21'07''$ , in ~~GRAND~~  $SW\frac{1}{4}NW\frac{1}{4}sec.7$ , T.162 N., R.57 W., Roseau County, on downstream handrail of bridge near center of span, 0.6 mi (0.8 km) upstream from Bulldog Run and 2.5 mi (4.0 km) south of Warroad. 36

DRAINAGE AREA.--~~110~~  $162$   $mi^2$  (285  $km^2$ ), 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 (326.362 m) above mean sea level, datum of 1929 (levels by Stanley Johnson, consulting engineer and instructor at University of North Dakota).

AVERAGE DISCHARGE.--27 years, 43.5  $ft^3/s$  (1.232  $m^3/s$ ), 5.37 in/yr (136 mm/yr).

EXTREMES.--Current year: Maximum discharge, 156  $ft^3/s$  (4.42  $m^3/s$ ) Sept. 28 (gage height, 4.98 ft or 1.518 m); no flow July 22, 23, 24; minimum gage height, 1.52 ft (0.463 m) July 24.  
Period of record: Maximum discharge, 1,780  $ft^3/s$  (50.4  $m^3/s$ ) Apr. 15, 1965 (gage height, 9.95 ft or 3.033 m); 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.0	2.8	.50	.20	.60	.90	14	12	12	5.6	2.4	1.1
2	1.2	2.7	.50	.20	.60	.90	14	12	10	6.1	2.9	2.7
3	1.0	2.5	.40	.20	.60	1.0	13	11	9.6	6.1	2.2	13
4	1.0	2.1	.40	.20	.70	1.0	12	9.6	9.0	6.1	1.4	24
5	1.3	2.5	.30	.10	.70	1.1	12	10	8.0	3.9	1.6	60
6	1.5	2.5	.30	.10	.80	1.3	11	11	5.9	2.7	1.6	55
7	1.7	2.7	.30	.10	.80	1.7	11	12	4.4	2.6	3.2	50
8	1.7	3.4	.30	.10	.80	3.0	10	12	4.7	2.2	2.9	41
9	1.7	4.1	.30	.10	.80	6.0	9.5	13	4.4	1.6	4.2	35
10	1.4	4.9	.30	.10	.80	8.0	9.0	14	4.4	1.4	3.5	30
11	.90	5.2	.30	.10	.90	11	8.5	17	4.2	1.3	3.6	26
12	1.3	4.1	.20	.10	.90	14	8.5	20	4.2	1.2	3.9	24
13	1.6	4.1	.20	.10	.90	16	8.0	21	3.6	.90	4.9	22
14	2.2	3.8	.20	.20	.90	16	8.0	27	3.0	.90	6.6	20
15	1.8	3.5	.20	.20	.90	16	8.0	24	2.6	.90	6.6	20
16	1.9	3.1	.20	.20	.90	16	8.0	18	2.4	.80	6.9	19
17	2.3	2.8	.20	.20	.90	15	8.5	16	2.5	.60	5.4	17
18	2.7	2.6	.20	.20	.90	14	8.8	16	2.6	.40	4.9	15
19	2.9	2.3	.20	.20	.90	13	12	15	3.8	.40	3.5	15
20	3.2	2.2	.20	.30	.90	12	13	13	8.5	.30	3.2	16
21	3.5	2.0	.20	.30	.90	11	18	13	9.2	.20	3.2	20
22	3.5	1.8	.20	.40	.90	12	22	12	8.8	0	2.3	25
23	3.2	1.6	.20	.40	.90	13	25	13	8.2	0	1.9	31
24	3.2	1.5	.20	.50	.90	15	30	15	5.9	0	1.4	50
25	2.7	1.3	.20	.50	.90	20	25	15	5.2	.10	.70	91
26	2.5	1.2	.20	.50	.90	21	22	14	4.9	.10	.70	116
27	2.3	1.0	.20	.50	.90	20	20	14	3.4	.40	.70	144
28	2.3	.80	.20	.50	.90	19	18	15	3.6	.60	.60	156
29	2.1	.70	.20	.50	-----	17	17	15	3.9	.70	.50	151
30	1.8	.60	.20	.60	-----	16	15	15	4.2	1.3	.30	149
31	1.8	-----	.20	.60	-----	15	-----	14	-----	2.2	.30	-----
TOTAL	63.20	76.40	7.90	8.50	23.40	346.90	418.8	458.6	167.1	51.60	88.00	1,438.8
MEAN	2.04	2.55	.25	.27	.84	11.2	14.0	14.8	5.57	1.66	2.84	48.0
MAX	3.5	5.2	.50	.60	.90	21	30	27	12	6.1	6.9	156
MIN	.90	.60	.20	.10	.60	.90	8.0	9.6	2.4	0	.30	1.1
CFSM	.02	.02	.002	.003	.008	.10	.13	.13	.05	.02	.03	.44
IN.	.02	.03	.002	.002	.007	.12	.14	.16	.06	.02	.03	.49

CAL YR 1972 TOTAL 12,210.00 MEAN 33.4 MAX 714 MIN .10 CFSM .30 IN 4.13  
WTR YR 1973 TOTAL 3,149.20 MEAN 8.63 MAX 156 MIN 0 CFSM .08 IN 1.07

## LAKE OF THE WOODS BASIN

05140000 Bulldog Run near Warroad, Minn.

LOCATION.--Lat 48°51'30", long 95°20'20", in SE 1/4 sec. 7, T.162 N., R.36 W., Roseau County, near right bank 5 ft (2 m) downstream from culvert on county highway, 0.8 mi (1.3 km) upstream from mouth and 3 mi (5 km) south of Warroad. 2 mi.

DRAINAGE AREA.--11.1 mi<sup>2</sup> (36.8 km<sup>2</sup>).

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 (332 m), from topographic map.

AVERAGE DISCHARGE.--12 years (1946-51, 1967-73), 3.39 ft<sup>3</sup>/s (0.0960 m<sup>3</sup>/s), 3.24 in/yr (82 mm/yr).

EXTREMES.--Current year: Maximum discharge, 4.5 ft<sup>3</sup>/s (0.13 m<sup>3</sup>/s) Mar. 14 (gage height, 3.93 ft or 1.198 m); maximum gage height, 4.01 ft (1.222 m) Mar. 16 (backwater from ice); no flow for many days.  
 Period of record: Maximum discharge, 420 ft<sup>3</sup>/s (11.9 m<sup>3</sup>/s) June 10, 1947 (gage height, 6.91 ft or 2.106 m); maximum gage height, 7.04 ft (2.146 m) 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1						0	.10	.20	.10			0
2						0	.10	.20	.10			0
3						0	.10	.10	.10			0
4						0	.10	.10	.10			0
5						0	.10	.10	0			0
6						.10	.10	.30	0			0
7						.20	.10	.40	0			0
8						.60	.10	.40	0			0
9						2.0	.10	.50	0			0
10						3.0	.10	.50	0			0
11						4.0	.10	.50	0			0
12						4.3	.10	.60	0			0
13						4.4	.10	.40	0			0
14						4.4	.10	.30	0			0
15						4.0	.10	.20	0			0
16						2.0	.10	.20	0			0
17						1.0	.10	.20	0			0
18						.70	.10	.10	0			0
19						.50	.10	.10	0			0
20						.30	.10	.10	0			0
21						.30	.50	.10	0			.60
22						.40	.60	.20	0			1.0
23						.50	.50	.20	0			1.2
24						.60	.60	.20	0			1.2
25						.70	.50	.20	0			1.0
26						.70	.40	.10	0			1.0
27						.50	.30	.10	0			.90
28						.40	.30	.10	0			.90
29						.30	.20	.10	0			.80
30						.20	.20	.10	0			.80
31						.10		.10				
TOTAL	0	0	0	0	0	36.20	6.10	7.00	.40	0	0	9.40
MEAN	0	0	0	0	0	1.17	.20	.23	.013	0	0	.31
MAX	0	0	0	0	0	4.4	.60	.60	.10	0	0	1.2
MIN	0	0	0	0	0	0	.10	.10	0	0	0	0
CFSM	0	0	0	0	0	.08	.01	.02	.0009	0	0	.02
IN.	0	0	0	0	0	.09	.02	.02	.001	0	0	.02
CAL YR 1972	TOTAL 744.80	MEAN 2.04	MAX 65	MIN 0	CFSM .14	IN 1.95						
WTR YR 1973	TOTAL 59.10	MEAN .16	MAX 4.4	MIN 0	CFSM .01	IN .15						



05140500 East Branch Warroad River near Warroad, Minn.

LOCATION.--Lat <sup>29'</sup>48°51'30", long <sup>NE 1/4 NE 1/4 sec. 17</sup>95°18'40", in ~~sec. 17~~ <sup>sec. 17</sup>, T.162 N., R.36 W., Roseau County, near right bank on piling at upstream side of highway bridge, <sup>2.5</sup>2 mi (3 km) upstream from mouth and <sup>2.5</sup>2 mi (3 km) south of Warroad.

DRAINAGE AREA.--<sup>45.8</sup>102 mi<sup>2</sup> (264 km<sup>2</sup>).

PERIOD OF RECORD.--March 1946 to September 1954, June 1966 to current year. Monthly discharge only for some periods prior to April 1947, published in WSP 1308.

GAGE.--Nonrecording gage read once daily and crest-stage gage. Altitude of gage is 1,080 ft (329 m) from topographic map).

AVERAGE DISCHARGE.--15 years (1946-54, 1966-73), 2.66 ft<sup>3</sup>/s (0.640 m<sup>3</sup>/s), 3.01 in/yr (76 mm/yr).

EXTREMES.--Current year: Maximum discharge, 99 ft<sup>3</sup>/s (2.80 m<sup>3</sup>/s) Sept. 28 (gage height, 5.90 ft or 1.798 m); no flow Dec. 6 to Mar. 2, July 23, 24.

Period of record: Maximum discharge, 1,340 ft<sup>3</sup>/s (37.9 m<sup>3</sup>/s) June 11, 1947 (gage height, 9.36 ft or 2.853 m, from floodmark); no flow at times in most years.

REMARKS.--Records fair.

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.50	1.6	.20			0	8.5	7.8	9.7	11	3.0	1.5
2	.80	1.6	.20			0	8.0	7.2	6.6	9.0	2.5	2.1
3	.80	1.6	.10			.10	7.5	6.5	9.5	7.7	1.7	4.5
4	.90	1.6	.10			.20	7.0	6.1	11	4.9	2.1	31
5	1.2	1.6	.10			.30	6.6	6.1	7.0	4.0	2.2	44
6	1.2	1.6	0			.60	6.2	6.5	5.5	3.3	2.4	41
7	.90	1.6	0			1.0	5.9	6.8	4.5	3.2	2.6	38
8	.80	1.6	0			2.0	5.6	8.2	4.0	2.9	4.0	35
9	.70	1.6	0			3.5	5.4	7.8	3.7	2.1	2.6	29
10	.60	1.6	0			5.0	5.2	8.5	3.5	2.3	2.1	26
11	.70	1.6	0			7.0	5.0	14	3.5	1.9	1.5	22
12	.80	1.6	0			9.0	5.0	16	3.5	1.5	6.3	18
13	.70	1.5	0			9.5	5.0	15	3.0	1.4	13	17
14	.70	1.4	0			10	5.0	13	2.5	1.3	16	16
15	.90	1.3	0			9.5	5.0	11	2.2	1.4	11	14
16	.90	1.2	0			9.0	5.0	10	2.1	1.0	5.0	12
17	1.0	1.1	0			8.5	5.0	9.7	2.5	1.4	4.0	12
18	1.2	1.0	0			8.0	5.5	8.7	3.5	1.0	3.5	12
19	1.3	.90	0			7.5	7.0	7.3	4.8	.60	3.0	13
20	1.6	.80	0			7.2	9.5	6.0	5.8	.20	2.5	14
21	1.6	.70	0			7.0	15	5.3	6.6	.10	2.2	13
22	2.2	.60	0			7.0	17	8.0	8.7	.10	1.8	19
23	1.8	.60	0			7.0	16	9.0	9.9	0	1.7	41
24	1.2	.50	0			7.5	16	9.4	9.0	0	1.5	59
25	1.2	.50	0			9.0	15	10	7.3	.30	1.5	71
26	1.2	.40	0			12	13	11	6.8	1.2	1.5	83
27	1.2	.40	0			12	11	11	7.2	1.2	1.4	94
28	1.3	.30	0			11	9.5	10	9.5	2.0	1.4	98
29	1.3	.20	0		-----	10	9.2	9.0	12	2.4	1.5	86
30	1.4	.20	0		-----	9.5	8.5	9.7	11	2.9	1.3	73
31	1.5	-----	0		-----	9.0	-----	9.4	-----	3.0	1.2	-----
TOTAL	34.10	32.80	.70	0	0	198.90	253.1	284.0	186.4	75.30	108.0	1,039.1
MEAN	1.10	1.09	.023	0	0	6.42	8.44	9.16	6.21	2.43	3.48	34.6
MAX	2.2	1.6	.20	0	0	12	17	16	12	11	16	98
MIN	.50	.20	0	0	0	0	5.0	5.3	2.1	0	1.2	1.5
CFSM	.01	.01	.0002	0	0	.06	.08	.09	.06	.02	.03	.34
IN.	.01	.01	0	0	0	.07	.09	.10	.07	.03	.04	.38

CAL YR 1972 TOTAL 5,191.50 MEAN 14.2 MAX 255 MIN 0 CFSM .14 IN 1.89  
WTR YR 1973 TOTAL 2,212.40 MEAN 6.06 MAX 98 MIN 0 CFSM .06 IN .81

## 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 mi (1.6 km) northwest of Little Winnibigoshish Lake, 14 mi (22 km) northwest of town of Deer River, and at mile 1,248 (2,008 km) upstream from Ohio River.

DRAINAGE AREA.--1,442 mi<sup>2</sup> (3,735 km<sup>2</sup>).

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 at mean sea level, datum of 1929. Prior to July 8, 1949, non-recording gage at same site, and July 9, 1949 to June 30, 1973, water-stage recorder at same site and at datum 1,289.47 ft (393.03 m) above mean sea level, adjustment of 1912.

EXTREMES.--Current year: Maximum contents, 555,500 acre-ft (685 hm<sup>3</sup>) Oct. 8 (elevation, 1,298.79 ft or 395.87 m); minimum, 444,300 acre-ft (548 m) Mar. 2, 4-6 (elevation, 1,297.10 ft or 395.36 m).  
Period of record: Maximum contents observed, 996,500 acre-ft (1,229 hm<sup>3</sup>) July 30, 1905 (elevation, 1,303.39 ft or 397.27 m); minimum observed, 33,680 acre-ft (41.5 hm<sup>3</sup>) below zero of capacity table Oct. 20, 1931 (elevation, 1,288.25 ft or 392.87 m).

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 elevations 1,294.94 ft (394.70 m) and 1,303.14 ft (397.20 m) (maximum allowable range) is 653,570 acre-ft (806 hm<sup>3</sup>) of which 416,270 acre-ft (513 hm<sup>3</sup>) is controlled storage between elevations 1,294.94 ft (394.70 m) and 1,300.94 ft (396.53 m) (normal operating range). Contents shown herein are contents above elevation 1,288.94 ft (392.87 m). 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).

## MONTHEND ELEVATION AND CONTENTS, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30.....	98.77	553,800	-
Oct. 31.....	98.40	529,800	-24,000
Nov. 30.....	98.20	516,600	-13,200
Dec. 31.....	97.91	497,400	-19,200
CAL YR 1972.....	-	-	-42,700
Jan. 31.....	97.47	468,600	-28,800
Feb. 28.....	97.11	444,900	-23,700
Mar. 31.....	97.44	466,600	+21,700
Apr. 30.....	97.78	488,900	+22,300
May 31.....	97.99	502,700	+13,800
June 30.....	98.13	511,900	+9,200
July 31.....	98.20	516,600	+4,700
Aug. 31.....	98.13	511,900	-4,700
Sept. 30.....	98.47	534,400	+22,500
WTR YR 1973.....	-	-	-19,400

NOTE.--Add 1,200.00 ft to obtain elevation above mean sea level.

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 mi (2 km) northwest of Little Winnibigoshish Lake, 14 mi (23 km) northwest of town of Deer River, and at mile 1,248 (2,008 km) upstream from Ohio River.

DRAINAGE AREA.--1,442 mi<sup>2</sup> (3,735 km<sup>2</sup>).

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 at mean sea level, datum of 1929. Prior to June 30, 1973, gages at same sites with datum at 1,289.47 ft (393.03 m) above mean sea level, adjustment of 1912. Prior to July 8, 1949, nonrecording headwater gage at same site and datum in use.

AVERAGE DISCHARGE (unadjusted).--89 years, 509 ft<sup>3</sup>/s (14.4 m<sup>3</sup>/s), 4.79 in/yr (122 mm/yr).

EXTREMES.--Current year: Maximum daily discharge, 800 ft<sup>3</sup>/s (244 m<sup>3</sup>/s) Jan. 17-27; minimum daily, 150 ft<sup>3</sup>/s (4.25 m<sup>3</sup>/s) June 5 to Sept. 1.

Period of record: Maximum daily discharge, 4,370 ft<sup>3</sup>/s (124 m<sup>3</sup>/s) 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; six discharge measurements made and records reviewed by Geological Survey.

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	585	463	680	678	795	567	152	153	153	150	150	150
2	585	462	680	678	795	567	152	153	153	150	150	151
3	585	462	680	678	795	450	152	153	153	150	150	151
4	585	463	680	678	795	450	152	153	153	150	150	151
5	585	462	680	676	795	450	152	153	150	150	150	151
6	585	462	680	676	795	361	152	153	150	150	150	151
7	585	463	680	676	795	361	152	153	150	150	150	151
8	587	462	680	676	795	361	152	153	150	150	150	151
9	584	462	680	676	795	361	152	153	150	150	150	151
10	580	462	680	675	795	361	152	153	150	150	150	151
11	585	463	680	675	795	361	152	153	150	150	150	151
12	584	462	680	675	795	361	152	154	150	150	150	151
13	584	462	678	717	795	361	152	153	150	150	150	151
14	585	462	678	717	795	361	152	153	150	150	150	151
15	585	462	678	717	795	361	153	153	150	150	150	151
16	584	462	678	775	795	361	153	154	150	150	150	151
17	584	462	678	800	795	261	153	153	150	150	150	151
18	583	580	678	800	795	244	153	153	150	150	150	151
19	583	580	678	800	795	244	153	153	150	150	150	151
20	582	580	678	800	795	244	152	153	150	150	150	151
21	463	682	678	800	795	187	153	153	150	150	150	151
22	463	682	678	800	737	152	153	153	150	150	150	151
23	463	682	678	800	737	152	153	153	150	150	150	151
24	463	682	678	800	680	152	153	153	150	150	150	151
25	463	682	678	800	680	152	153	153	150	150	150	151
26	463	682	678	800	680	152	153	153	150	150	150	151
27	462	682	678	800	623	152	153	153	150	150	150	151
28	464	682	678	797	623	152	153	153	150	150	150	151
29	462	680	678	796	-----	152	153	153	150	150	150	151
30	462	680	678	796	-----	152	153	153	150	150	150	151
31	462	-----	678	796	-----	152	-----	153	-----	150	150	-----
TOTAL	16,775	16,414	21,042	23,028	21,455	9,155	4,575	4,745	4,512	4,650	4,650	4,529
MEAN	541	547	679	743	766	295	153	153	150	150	150	151
MAX	587	682	680	800	795	567	153	154	153	150	150	151
MIN	462	462	678	675	623	152	152	153	150	150	150	150
CFSM	.38	.38	.47	.52	.53	.20	.11	.11	.10	.10	.10	.10
IN.	.43	.42	.54	.59	.55	.24	.12	.12	.12	.12	.12	.12

CAL YR 1972 TOTAL 107,052 MEAN 292 MAX 995 MIN 90 CFSM .20 IN 2.76  
WTR YR 1973 TOTAL 135,530 MEAN 371 MAX 800 MIN 150 CFSM .26 IN 3.50

## 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 mi (8 km) southwest of town of Federal Dam.

DRAINAGE AREA.--1,163 mi<sup>2</sup> (3,012 km<sup>2</sup>).

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 at mean sea level, datum of 1929. Prior to Dec. 31, 1884, nonrecording gage 0.5 mi (0.8 m) north of outlet to Leech Lake River at datum 5.76 ft (1.76 m) lower. Dec. 31, 1884, to May 24, 1931, nonrecording gage 0.5 mi (0.8 m) north of outlet to Leech Lake River and May 25, 1931, to June 30, 1973, water-stage recorder at same site and at datum 1,293.23 ft (394.18 m) above mean sea level, adjustment of 1912.

EXTREMES.--Current year: Maximum contents, 301,400 acre-ft (372 hm<sup>3</sup>) Oct. 11 (elevation, 1,294.84 ft or 394.67 m); minimum, 143,000 acre-ft (176 hm<sup>3</sup>) Mar. 5, 6 (elevation, 1,293.53 ft or 394.27 m).  
Period of record: Maximum contents observed, 734,300 acre-ft (905 hm<sup>3</sup>) June 30, 1916 (elevation, 1,297.88 ft or 395.59 m); minimum observed, 72,830 acre-ft (89.8 hm<sup>3</sup>) below zero of capacity table Sept. 30, Nov. 19, 1934, Jan. 9, 1935 (elevation, 1,291.52 ft or 393.66 m).

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 elevation 1,292.70 ft (394.02 m) and 1,297.94 ft (395.61 m) (maximum allowable range) is 689,780 acre-ft (850 hm<sup>3</sup>) of which 356,570 acre-ft (440 hm<sup>3</sup>) is controlled storage between elevations 1,292.70 ft (394.02 m) and 1,295.70 ft (394.92 m) (normal operating range). Contents shown herein are contents above elevation 1,292.20 ft (393.86 m). 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 ELEVATION AND CONTENTS, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30.....	94.76	291,400	-
Oct. 31.....	94.52	261,700	-29,700
Nov. 30.....	94.16	217,700	-44,000
Dec. 31.....	93.97	194,500	-23,200
CAL YR 1972.....	-	-	-36,200
Jan. 31.....	93.78	171,300	-23,200
Feb. 28.....	93.56	146,200	-25,100
Mar. 31.....	93.84	178,600	+32,400
Apr. 30.....	94.05	204,300	+25,700
May 31.....	94.20	222,600	+18,300
June 30.....	94.22	225,000	+2,400
July 31.....	94.38	244,600	+19,600
Aug. 31.....	94.33	238,500	-6,100
Sept. 30.....	94.46	254,400	+15,900
WTR YR 1973.....	-	-	-37,000

NOTE.--Add 1,200 ft to obtain elevation above mean sea level.

## 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 mi (3 km) downstream from natural outlet of Leech Lake.

DRAINAGE AREA.--1,163 mi<sup>2</sup> (3,012 km<sup>2</sup>)

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 at mean sea level, datum of 1929. Prior to June 30, 1973, gages (nonrecording headwater gage prior to July 3, 1948) at same sites with datum at 1,293.23 ft (394.18 m) above mean sea level, adjustment of 1912. May 27 to Nov. 30, 1929, nonrecording gage at site 600 ft downstream at different datum.

AVERAGE DISCHARGE(unadjusted).--89 years, 351 ft<sup>3</sup>/s (9.94 m<sup>3</sup>/s), 4.10 in/yr (104 mm/yr).

EXTREMES.--Current year: Maximum daily discharge, 870 ft<sup>3</sup>/s (24.6 m<sup>3</sup>/s) Oct. 13, 15; minimum daily, 110 ft<sup>3</sup>/s (3.12 m<sup>3</sup>/s) Mar. 16-27.

Period of record: Maximum daily discharge, 2,520 ft<sup>3</sup>/s (71.4 m<sup>3</sup>/s) June 7, 1957 (result of dam failure); no flow at times.

REMARKS.--Discharge computed on basis of modified weir formula, the head being obtained from readings on tailwater gage and mean gage height from recording headwater gage. Flow completely regulated by Leech Lake (see preceding page).

COOPERATION.--Computations of daily discharge furnished by Corps of Engineers; five discharge measurements made and records reviewed by Geological Survey.

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	815	840	800	790	710	558	111	112	113	113	114	114
2	815	810	800	750	710	558	111	112	113	113	114	114
3	815	830	790	750	710	465	111	112	113	114	114	114
4	815	840	790	730	710	465	111	112	114	113	114	116
5	815	830	790	750	690	465	111	112	114	112	114	116
6	815	830	790	730	710	349	111	113	114	113	114	115
7	825	840	790	730	690	353	111	113	113	112	114	114
8	815	830	790	730	690	353	111	113	114	113	114	114
9	805	830	790	730	690	297	111	112	114	114	115	114
10	815	830	770	730	690	297	111	113	114	113	115	115
11	815	830	770	730	670	297	111	114	114	113	114	114
12	860	830	770	730	670	300	111	113	114	113	114	114
13	870	810	770	730	675	300	111	113	113	113	114	114
14	860	810	770	730	695	297	111	113	114	112	114	114
15	870	830	770	730	675	202	112	114	113	112	114	114
16	860	830	770	730	675	110	112	113	113	112	114	114
17	860	810	750	730	675	110	112	113	114	112	114	114
18	840	810	770	730	675	110	111	113	112	112	114	114
19	840	810	770	750	695	110	111	112	114	112	114	114
20	840	810	770	730	675	110	111	112	114	112	114	114
21	840	810	770	730	675	110	112	112	113	112	114	113
22	840	810	750	730	695	110	113	113	113	112	114	115
23	830	810	770	790	695	110	113	112	113	112	114	114
24	840	810	750	710	650	110	112	112	113	113	114	113
25	840	810	750	730	650	110	112	112	113	114	114	114
26	840	810	750	710	645	110	113	113	114	114	114	114
27	830	810	750	730	615	110	112	112	113	114	114	114
28	840	810	750	790	610	111	112	113	113	114	115	114
29	830	800	750	690	-----	111	112	113	113	115	114	114
30	830	810	750	710	-----	111	112	113	113	114	114	114
31	840	-----	770	690	-----	111	-----	113	-----	114	114	-----
TOTAL	25,865	24,580	23,890	22,750	19,015	7,320	3,346	3,492	3,402	3,501	3,537	3,425
MEAN	834	819	771	734	679	236	112	113	113	113	114	114
MAX	870	840	800	790	710	558	113	114	114	115	115	116
MIN	805	800	750	690	610	110	111	112	112	112	114	113
CFSM	.72	.70	.66	.63	.58	.20	.10	.10	.10	.10	.10	.10
IN.	.83	.79	.76	.73	.61	.23	.11	.11	.11	.11	.11	.11

CAL YR 1972 TOTAL 209,243 MEAN 572 MAX 975 MIN 99 CFSM .49 IN 6.69  
WTR YR 1973 TOTAL 144,123 MEAN 395 MAX 870 MIN 110 CFSM .34 IN 4.61

## 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 mi (6 km) south of Grand Rapids and at mi 1,184 (1,905 km) upstream from Ohio River.

DRAINAGE AREA.--3,265 mi<sup>2</sup> (8,456 km<sup>2</sup>).

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 at mean sea level, datum of 1929. Prior to May 30, 1949, non-recording gage at Pooles Arm of Pokegama Lake 5 mi (8 km) northwest and May 31, 1949, to June 30, 1973, water-stage recorder at same site and at datum 1,264.89 ft (385.54 m) above mean sea level, adjustment of 1912.

EXTREMES.--Current year: Maximum contents, 60,840 acre-ft (75.0 hm<sup>3</sup>) July 26 (elevation, 1,273.68 ft or 388.22 m); minimum, 30,430 acre-ft (37.5 hm<sup>3</sup>) Dec. 18 (elevation, 1,271.38 ft or 387.52 m).  
Period of record: Maximum contents, 121,400 acre-ft (150 hm<sup>3</sup>) May 8, 1897 (elevation, 1,277.92 ft or 389.51 m); minimum observed, 4,520 acre-ft (5.57 hm<sup>3</sup>) below zero of capacity table Sept. 30, 1934 (elevation, 1,268.54 ft or 386.65 m).

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 elevation 1,270.42 ft (387.22 m) and 1,276.42 ft (389.05 m) (maximum allowable range) is 81,720 acre-ft (101 hm<sup>3</sup>) of which 53,150 acre-ft (65.5 m) is controlled storage between elevations 1,270.42 ft (387.22 m) and 1,274.42 ft (388.44 m) (normal operating range). Contents shown herein are contents above elevation 1,268.92 ft (386.77 m). 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 ELEVATION AND CONTENTS, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30.....	73.36	56,330	-
Oct. 31.....	73.13	53,210	-3,120
Nov. 30.....	72.32	42,530	-10,680
Dec. 31.....	71.47	31,580	-10,950
CAL YR 1972.....	-	-	-6,300
Jan. 31.....	71.39	30,560	-1,020
Feb. 28.....	71.52	32,210	+1,650
Mar. 31.....	72.99	51,320	+19,110
Apr. 30.....	73.59	59,550	+8,230
May 31.....	73.50	58,270	-1,280
June 30.....	73.62	59,980	+1,710
July 31.....	73.61	59,840	-140
Aug. 31.....	73.42	57,120	-2,720
Sept. 30.....	73.52	58,550	+1,430
WTR YR 1973.....	-	-	+2,220

NOTE.--Add 1,200.00 ft to obtain elevation above mean sea level.

## MISSISSIPPI RIVER MAIN STEM

107

05211000 Mississippi River at Grand Rapids, Minn.

LOCATION.--Lat 47°13'56", long 93°31'48", in SW¼NW¼ sec.21, T.55 N., R.25 W., Itasca County, in super-calendar room of Blandin Paper Mill in Grand Rapids, 400 ft (122 m) upstream from bridge on U.S. Highway 169, 2.5 mi (4.0 km) upstream from Prairie River, and at mile 1,182 (1,902 km) upstream from Ohio River.

DRAINAGE AREA.--3,370 mi<sup>2</sup> (8,730 km<sup>2</sup>), 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 1,242.03 ft (378.57 m) above mean sea level, adjustment of 1929. See WSP 1914 for history of changes prior to Jan. 17, 1951.

AVERAGE DISCHARGE.--90 years, 1,144 ft<sup>3</sup>/s (32.40 m<sup>3</sup>/s).

EXTREMES.--Current year: Maximum discharge, 2,010 ft<sup>3</sup>/s (56.9 m<sup>3</sup>/s) Mar. 15 (gage height, 6.53 ft or 1.990 m); maximum gage height, 6.67 ft (2.033 m) Dec. 5 (backwater from ice); minimum daily discharge, 168 ft<sup>3</sup>/s (4.76 m<sup>3</sup>/s) July 20.

Period of record: Maximum discharge, 12,500 ft<sup>3</sup>/s (354 m<sup>3</sup>/s) Sept. 3, 1948 (gage height, 15.2 ft or 4.633 m, from floodmark), caused by dam failure at gage, from rating curve extended above 4,500 ft<sup>3</sup>/s (127 m<sup>3</sup>/s by logarithmic plotting; maximum daily, 5,250 ft<sup>3</sup>/s (149 m<sup>3</sup>/s) Sept. 5, 8, 1905; no flow at times in several years.

REMARKS.--Records good except those for winter periods and those for periods of no gage-height record, 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1,730	1,870	1,700	1,600	1,570	1,510	943	730	527	306	637	339
2	1,620	1,840	1,700	1,600	1,540	1,420	944	730	416	315	466	341
3	1,660	1,830	1,700	1,600	1,520	1,420	680	730	468	307	420	344
4	1,690	1,820	1,700	1,600	1,570	1,380	620	730	459	348	324	308
5	1,700	1,860	1,700	1,600	1,530	1,400	520	560	447	294	317	321
6	1,720	1,860	1,650	1,600	1,540	1,410	470	520	448	274	322	323
7	1,670	1,860	1,650	1,600	1,640	1,400	470	450	452	294	337	367
8	1,640	1,870	1,650	1,600	1,720	1,260	470	420	462	306	352	432
9	1,660	1,870	1,650	1,600	1,690	1,210	470	492	424	321	354	438
10	1,620	1,850	1,650	1,600	1,770	1,200	470	624	477	306	354	446
11	1,640	1,850	1,600	1,610	1,740	1,290	470	667	467	328	409	436
12	1,680	1,830	1,600	1,610	1,720	1,260	470	801	445	336	476	430
13	1,660	1,830	1,600	1,610	1,670	1,330	470	627	435	314	457	402
14	1,630	1,780	1,600	1,610	1,670	1,580	470	572	407	297	528	360
15	1,620	1,800	1,600	1,610	1,660	1,920	430	392	377	282	532	365
16	1,660	1,780	1,600	1,610	1,770	1,900	430	541	318	246	517	387
17	1,730	1,770	1,600	1,610	1,740	1,860	430	449	315	289	488	369
18	1,730	1,920	1,600	1,610	1,720	1,640	450	490	328	287	438	320
19	1,840	1,940	1,600	1,610	1,670	1,630	500	477	308	283	476	293
20	1,820	1,900	1,600	1,610	1,680	1,100	530	478	311	168	440	253
21	1,820	1,900	1,600	1,620	1,650	962	670	429	339	171	443	234
22	1,840	1,900	1,600	1,620	1,640	891	730	374	330	168	434	278
23	1,820	1,860	1,600	1,620	1,610	531	730	407	316	218	430	231
24	1,820	1,840	1,600	1,600	1,580	419	730	375	335	243	456	236
25	1,830	1,840	1,600	1,570	1,560	387	730	523	335	192	483	293
26	1,830	1,820	1,600	1,610	1,550	406	730	615	339	266	424	272
27	1,810	1,780	1,600	1,710	1,540	389	730	596	332	530	430	333
28	1,820	1,750	1,600	1,770	1,530	374	730	599	325	697	443	331
29	1,820	1,710	1,600	1,770	-----	574	730	583	324	671	420	310
30	1,830	1,700	1,600	1,720	-----	770	730	592	315	678	427	287
31	1,860	-----	1,600	1,600	-----	941	-----	586	-----	686	420	-----
TOTAL	53,820	55,030	50,350	50,310	45,790	35,964	17,947	17,159	11,581	10,421	13,454	10,079
MEAN	1,736	1,834	1,624	1,623	1,635	1,160	598	554	386	336	434	336
MAX	1,860	1,940	1,700	1,770	1,770	1,920	944	801	527	697	637	446
MIN	1,620	1,700	1,600	1,570	1,520	374	430	374	308	168	317	231

CAL YR 1972 TOTAL 580,815 MEAN 1,587 MAX 2,650 MIN 309  
WTR YR 1973 TOTAL 371,905 MEAN 1,019 MAX 1,940 MIN 168

## 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 (38 m) upstream from highway bridge, 1.5 mi (2.4 km) downstream from outlet of Lawrence Lake and 5 mi (8 km) north of Taconite.

DRAINAGE AREA.--360 mi<sup>2</sup> (932 km<sup>2</sup>), approximately.

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

GAGE.--Water-stage recorder. Datum of gage is 1,294.81 ft (394.66 m) above mean sea level, datum of 1929. Prior to Aug. 31, 1967, nonrecording gage at site 125 ft (38 m) downstream at same datum.

AVERAGE DISCHARGE.--6 years, 233 ft<sup>3</sup>/s (6.60 m<sup>3</sup>/s), 8.79 in/yr (223 mm/yr).

EXTREMES.--Current year: Maximum discharge, 500 ft<sup>3</sup>/s (14.2 m<sup>3</sup>/s) May 16 (gage height, 5.53 ft or 1.686 m); minimum, 47 ft<sup>3</sup>/s (1.33 m<sup>3</sup>/s) July 23 (gage height, 2.51 ft or 0.765 m).  
Period of record: Maximum discharge, 3,250 ft<sup>3</sup>/s (92.3 m<sup>3</sup>/s) Apr. 17, 1969 (gage height, 11.81 ft or 3.600 m); minimum, 7.0 ft<sup>3</sup>/s (0.20 m<sup>3</sup>/s) Oct. 5, 1970 (gage height, 1.75 ft or 0.533 m).

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

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	148	148	104	72	76	57	302	341	424	260	145	123
2	148	152	100	72	75	57	298	335	408	246	149	141
3	149	153	95	72	74	58	291	316	397	227	150	154
4	152	154	91	72	73	59	281	298	373	209	151	168
5	152	155	88	72	72	60	269	285	341	188	147	182
6	152	157	83	72	71	60	260	282	305	172	146	191
7	144	162	81	72	70	61	249	286	272	158	142	193
8	142	163	80	73	69	61	240	282	249	142	139	191
9	136	163	78	73	68	62	231	276	224	132	143	185
10	137	165	76	74	67	62	221	314	208	126	151	177
11	143	166	74	75	66	64	213	383	193	114	160	168
12	142	166	73	75	65	66	210	429	176	103	172	159
13	141	164	70	76	65	74	202	453	160	95	185	150
14	144	160	70	78	64	90	190	471	144	87	194	142
15	141	151	69	78	64	135	200	483	132	80	200	136
16	144	147	68	76	63	160	211	496	150	71	204	129
17	140	145	68	79	63	175	212	486	158	65	201	122
18	137	143	69	79	63	192	216	470	161	63	193	115
19	132	140	69	79	62	210	222	442	165	60	187	111
20	131	137	69	80	62	223	236	406	171	56	178	104
21	136	133	69	80	61	234	255	368	179	52	168	101
22	139	129	69	81	60	242	276	338	187	50	160	103
23	139	125	69	81	60	250	298	327	239	48	155	98
24	137	123	69	82	59	260	319	314	242	51	146	93
25	136	121	69	81	58	267	341	338	246	58	140	106
26	140	121	69	80	58	276	356	365	296	69	135	112
27	142	119	70	80	58	281	368	385	315	77	129	117
28	144	117	70	79	57	297	371	397	303	93	122	121
29	143	112	71	78	-----	301	366	404	289	102	118	125
30	142	107	71	77	-----	302	355	411	275	125	115	127
31	148	-----	72	76	-----	304	-----	424	-----	139	115	-----
TOTAL	4,401	4,298	2,343	2,376	1,823	5,000	8,059	11,605	7,382	3,518	4,840	4,144
MEAN	142	143	75.6	76.6	65.1	161	269	374	246	113	156	138
MAX	152	166	104	82	76	304	371	496	424	260	204	193
MIN	131	107	68	72	57	57	190	276	132	48	115	93
CFSM	.39	.40	.21	.21	.18	.45	.75	1.04	.68	.31	.43	.38
IN.	.45	.44	.24	.25	.19	.52	.83	1.20	.76	.36	.50	.43

CAL YR 1972 TOTAL 80,688 MEAN 220 MAX 1,520 MIN 55 CFSM .61 IN 8.34  
WTR YR 1973 TOTAL 59,789 MEAN 164 MAX 496 MIN 48 CFSM .46 IN 6.18

NOTE.--No gage-height record Dec. 29 to Jan. 21, Jan. 26 to Feb. 27.



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 mi (1.6 km) downstream from Snowball Creek, 2.1 mi (3.4 km) downstream from bridge on U.S. Highway 65 at outlet of Swan Lake and 3.1 mi (5.0 km) southeast of Calumet.

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

GAGE.--Water-stage recorder. Datum of gage is 1,331.19 ft (405.75 m) above mean sea level, datum of 1929. Prior to June 5, 1964, reference point at same site and datum.

AVERAGE DISCHARGE.--9 years, 64.0 ft<sup>3</sup>/s (1.8 m<sup>3</sup>/s).

EXTREMES.--Current year: Maximum discharge, 146 ft<sup>3</sup>/s (4.13 m<sup>3</sup>/s) May 27 (gage height, 5.06 ft or 1.542 m); minimum, 7.2 ft<sup>3</sup>/s (0.20 m<sup>3</sup>/s) Oct. 16 (gage height, 4.39 ft or 1.338 m).

Period of record: Maximum discharge, 773 ft<sup>3</sup>/s (21.9 m<sup>3</sup>/s) Apr. 15, 1969 (gage height, 5.83 ft or 1.777 m); Minimum, 0.7 ft<sup>3</sup>/s (0.020 m<sup>3</sup>/s) Oct. 3, 6, 1970 (gage height, 4.23 ft or 1.290 m).

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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	24	38	37	54	47	33	86	81	120	70	57	42
2	28	42	37	54	46	29	81	81	113	62	57	45
3	26	41	36	55	46	29	78	81	113	56	56	48
4	26	40	36	55	45	28	76	81	106	52	53	44
5	28	44	36	54	44	27	72	81	98	50	52	40
6	31	43	36	52	43	26	71	81	98	46	60	38
7	26	44	38	52	42	27	68	87	98	45	59	38
8	25	48	39	50	43	29	66	94	94	42	62	37
9	27	48	40	49	43	29	64	106	91	44	59	37
10	28	47	38	48	43	28	58	117	91	43	59	32
11	26	46	38	48	43	32	56	128	87	41	58	29
12	25	47	38	48	43	38	56	138	81	36	56	28
13	23	48	38	47	42	46	48	138	79	28	53	26
14	19	46	38	47	43	62	46	138	76	29	51	21
15	17	45	40	48	41	77	50	128	70	26	51	19
16	14	43	40	47	43	86	51	120	70	22	54	17
17	15	41	40	48	43	93	55	120	65	18	51	17
18	16	41	40	47	43	95	59	113	62	19	52	15
19	15	39	41	46	41	95	65	109	54	17	53	14
20	17	38	42	46	41	90	73	106	54	15	54	13
21	25	40	43	45	40	87	76	98	54	14	52	15
22	27	38	43	45	39	86	81	98	57	12	49	14
23	28	37	43	47	38	85	87	102	62	12	47	15
24	27	38	42	46	39	83	87	106	62	18	45	16
25	27	37	43	46	38	85	87	117	67	27	43	24
26	30	38	43	45	36	85	87	128	76	31	45	31
27	29	36	43	46	34	86	87	138	79	34	44	34
28	31	35	43	45	34	90	87	138	76	43	39	36
29	34	36	45	45	-----	88	84	133	73	46	39	38
30	35	36	53	45	-----	88	81	124	70	54	40	41
31	40	-----	54	47	-----	88	-----	124	-----	58	41	-----
TOTAL	789	1,240	1,263	1,497	1,163	1,950	2,123	3,434	2,396	1,110	1,591	864
MEAN	25.5	41.3	40.7	48.3	41.5	62.9	70.8	111	79.9	35.8	51.3	28.8
MAX	40	48	54	55	47	95	87	138	120	70	62	48
MIN	14	35	36	45	34	26	46	81	54	12	39	13

CAL YR 1972 TOTAL 21,359 MEAN 58.4 MAX 454 MIN 13  
WTR YR 1973 TOTAL 19,420 MEAN 53.2 MAX 138 MIN 12

## SANDY RIVER BASIN

05218500 Sandy Lake at Libby, Minn.

LOCATION.--Lat 46°47'20", long 93°19'10", in sec.25, T.50 N., R.24 W., Aitkin County, on dam on Sandy River at Libby, 1.2 mi (1.9 km) above mouth, and 14 mi (23 m) north of McGregor.

DRAINAGE AREA.--421 mi<sup>2</sup> (1,090 km<sup>2</sup>).

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 at mean sea level, datum of 1929. Prior to Sept. 23, 1949, non-recording gage at same site and Sept. 24, 1949, to June 30, 1973, water-stage recorder at same site at datum 1,207.71 ft (368.11 m) above mean sea level, adjustment of 1912.

EXTREMES.--Current year: Maximum contents, 55,260 acre-ft (68.1 hm<sup>3</sup>) Aug. 6 (elevation, 1,216.60 ft or 370.82 m); minimum, 34,390 acre-ft (42.4 hm<sup>3</sup>) Feb. 12 (elevation, 1,214.24 ft or 370.10 m).  
Period of record: Maximum contents, 167,200 acre-ft (206 hm<sup>3</sup>) May 19, 1950 (elevation, 1,224.82 ft or 373.33 m); minimum observed, 5,950 acre-ft (7.34 hm<sup>3</sup>) below zero of capacity table Jan. 20, 1921 (elevation, 1,207.96 ft or 368.19 m).

REMARKS.--Lake is formed by concrete dam which controls Sandy, Flowage, Snake, and Aitkin Lakes. Storage began in 1893; original timber crib dam completed in 1895, replaced by present structure in 1911. Capacity between elevation 1,214.31 ft (370.12 m) and 1,221.31 ft (372.26 m) (top of structure) is 73,330 acre-ft (90.4 hm<sup>3</sup>), of which 37,550 (46.3 m) acre-ft is controlled storage between elevations 1,214.31 ft (370.12 m) and 1,218.31 ft (371.34 m) (normal operating range). Contents shown herein are contents above elevation 1,209.03 ft (368.51 m). 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 ELEVATION AND CONTENTS, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30.....	16.57	54,940	-
Oct. 31.....	15.86	48,350	-6,590
Nov. 30.....	15.32	43,550	-4,800
Dec. 31.....	14.59	37,280	-6,270
CAL YR 1972.....	-	-	-2,790
Jan. 31.....	14.30	34,870	-2,410
Feb. 28.....	14.29	34,790	-80
Mar. 31.....	15.80	47,790	+13,000
Apr. 30.....	16.28	52,260	+4,471
May 31.....	16.31	52,540	+280
June 30.....	16.33	52,730	+190
July 31.....	16.49	54,220	+1,492
Aug. 31.....	16.17	51,240	-2,980
Sept. 30.....	16.40	53,380	+2,140
WTR YR 1973.....	-	-	-1,560

NOTE.--Add 1,200.00 ft to obtain elevation above mean sea level.

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 mi (1.9 km) above mouth, and 14 mi (2.3 km) north of McGregor.

DRAINAGE AREA.--421 mi<sup>2</sup> (1,090 km<sup>2</sup>).

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 at mean sea level, datum of 1929. Prior to June 30, 1973, gages (nonrecording gages prior to June 20, 1949) at same site with datum at 1,207.71 ft (368.11 m) above mean sea level, adjustment of 1912.

AVERAGE DISCHARGE (unadjusted).--78 years (1895-1973), 213 ft<sup>3</sup>/s (6.03 m<sup>3</sup>/s), 6.87 in/yr (173 mm/yr).

EXTREMES.--Current year: Maximum daily discharge, 975 ft<sup>3</sup>/s (27.6 m<sup>3</sup>/s) Nov. 9; minimum daily, no flow July 23. Period of record: Maximum daily discharge, 3,740 ft<sup>3</sup>/s (106 m<sup>3</sup>/s) 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.--Five 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	775	316	234	183	62	15	770	421	400	104	309	404
2	770	312	231	183	61	15	740	372	405	107	306	404
3	336	300	204	186	61	15	600	368	410	108	306	404
4	344	376	192	126	60	15	474	368	414	109	210	408
5	344	426	192	126	60	15	378	372	414	110	216	408
6	344	438	189	126	60	15	267	372	418	56	112	408
7	340	584	186	126	61	15	190	376	285	57	618	408
8	336	828	180	128	62	15	196	774	294	58	582	408
9	336	975	180	128	48	15	198	720	294	58	690	408
10	340	960	180	126	48	15	101	729	294	58	660	408
11	340	960	180	126	48	15	104	720	300	59	675	408
12	340	960	180	126	47	15	105	900	303	59	698	408
13	340	945	180	126	47	118	107	864	306	59	698	408
14	336	945	180	124	31	162	108	852	208	59	698	408
15	336	945	183	124	31	288	108	608	214	59	698	309
16	336	780	183	93	31	468	108	640	110	59	698	312
17	336	792	183	93	31	384	107	456	111	59	698	312
18	336	420	186	93	31	540	210	528	112	60	564	109
19	336	444	186	93	31	576	309	528	113	60	570	112
20	332	444	189	90	31	648	306	534	113	60	570	112
21	328	438	189	90	31	702	582	372	112	30	570	113
22	324	432	192	90	31	735	546	285	112	30	564	113
23	320	365	192	61	31	576	534	285	112	0	564	113
24	320	365	192	61	15	548	534	285	112	25	396	114
25	316	360	192	61	15	593	774	282	113	24	588	114
26	316	360	189	61	15	623	756	522	110	24	570	114
27	316	360	189	61	15	738	604	615	105	119	570	113
28	316	292	189	60	15	729	534	600	104	324	570	113
29	316	304	189	60	-----	800	534	600	104	324	570	114
30	316	234	186	61	-----	790	534	608	103	315	396	114
31	316	-----	186	62	-----	790	-----	383	-----	312	404	-----
TOTAL	11,137	16,660	5,883	3,254	1,110	10,988	11,418	16,339	6,605	2,945	16,338	8,101
MEAN	359	555	190	105	39.6	354	381	527	220	95.0	527	270
MAX	775	975	234	186	62	800	774	900	418	324	698	408
MIN	316	234	180	60	15	15	101	282	103	0	112	109
CFSM	.85	1.32	.45	.25	.09	.84	.91	1.25	.52	.23	1.25	.64
IN.	.98	1.47	.52	.29	.10	.97	1.01	1.44	.58	.26	1.44	.72
CAL YR 1972	TOTAL 172,492	MEAN 471	MAX 1,880	MIN 32	CFSM 1.12	IN 15.24						
WTR YR 1973	TOTAL 110,778	MEAN 304	MAX 975	MIN 0	CFSM .72	IN 9.79						

## MISSISSIPPI RIVER MAIN STEM

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

LOCATION.--Lat 46°47'23", long 93°19'43", in SE¼NE¼ sec.25, T.50 N., R.24 W., Aitkin County, on right bank 600 ft (183 m) downstream from Sandy River, 0.8 mi (1.3 km) northwest of Libby, and at mile 1,106 (1,780 km) upstream from Ohio River.

DRAINAGE AREA.--5,060 mi<sup>2</sup> (13,100 km<sup>2</sup>), approximately.

PERIOD OF RECORD.--April 1930 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,204.06 ft (367.00 m) above mean sea level, datum of 1929. Prior to July 28, 1931, nonrecording gage at site 600 ft (783 m) upstream at datum 3.16 ft (0.96 m) higher.

AVERAGE DISCHARGE.--43 years, 1,969 ft<sup>3</sup>/s (55.76 m<sup>3</sup>/s), 5.28 in/yr (134 mm/yr).

EXTREMES.--Current year: Maximum discharge, 4,050 ft<sup>3</sup>/s (115 m<sup>3</sup>/s) Mar. 19 (gage height, 10.08 ft or 3.072 m, backwater from ice); maximum gage height, 10.21 ft (3.112 m) Mar. 18 (backwater from ice); minimum discharge, 474 ft<sup>3</sup>/s (13.4 m<sup>3</sup>/s) July 23 (gage height, 2.44 ft or 0.744 m).

Period of record: Maximum discharge, 16,000 ft<sup>3</sup>/s (453 m<sup>3</sup>/s) May 17, 1950 (gage height, 20.02 ft or 6.102 m); minimum, 83 ft<sup>3</sup>/s (2.35 m<sup>3</sup>/s) Nov. 16, 1936 (gage height, 1.44 ft or 0.439 m).

REMARKS.--Records good except those for winter periods, which are fair. Flow regulated by powerplants and Winnibigoshish, Leech, Pokegama, and Sandy Lakes (see p. 102, 104, 106, 110).

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

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2,930	2,620	1,970	1,850	1,870	1,680	2,600	1,960	2,160	1,350	1,500	1,170
2	2,750	2,770	1,900	1,850	1,860	1,680	2,630	1,980	2,110	1,240	1,510	1,170
3	2,520	3,110	1,860	1,850	1,860	1,690	2,470	2,020	2,020	1,150	1,420	1,140
4	2,450	3,230	1,850	1,850	1,850	1,690	2,220	2,010	1,990	1,060	1,220	1,120
5	2,470	3,190	1,840	1,850	1,840	1,690	1,960	1,960	1,980	997	1,030	1,110
6	2,530	3,210	1,830	1,850	1,820	1,700	1,700	1,860	1,870	951	1,210	1,160
7	2,560	3,390	1,830	1,850	1,810	1,700	1,500	2,120	1,750	897	1,450	1,170
8	2,570	3,580	1,830	1,860	1,800	1,720	1,470	2,620	1,730	854	1,710	1,180
9	2,530	3,650	1,830	1,860	1,790	1,720	1,390	2,660	1,750	850	2,300	1,190
10	2,510	3,620	1,830	1,860	1,780	1,710	1,280	2,650	1,680	828	2,180	1,200
11	2,510	3,580	1,830	1,860	1,760	1,700	1,250	2,900	1,540	803	1,940	1,200
12	2,480	3,550	1,830	1,860	1,730	1,780	1,180	3,090	1,450	776	1,780	1,210
13	2,470	3,510	1,830	1,860	1,720	1,900	1,120	3,120	1,370	720	1,740	1,190
14	2,490	3,450	1,830	1,860	1,710	2,200	1,100	3,030	1,240	744	1,750	1,110
15	2,470	3,310	1,830	1,860	1,700	2,500	1,140	2,710	1,120	772	1,730	1,030
16	2,450	3,170	1,840	1,860	1,700	2,900	1,220	2,470	1,020	721	1,740	990
17	2,430	3,010	1,840	1,860	1,700	3,450	1,330	2,210	982	643	1,690	894
18	2,420	2,770	1,840	1,870	1,680	3,800	1,430	2,200	938	594	1,620	802
19	2,460	2,720	1,840	1,870	1,670	4,020	1,470	2,120	929	593	1,590	781
20	2,490	2,680	1,840	1,880	1,660	3,950	1,630	2,010	954	590	1,570	718
21	2,570	2,630	1,840	1,880	1,660	3,770	1,930	1,870	942	581	1,610	683
22	2,620	2,600	1,840	1,880	1,650	3,380	2,130	1,820	951	513	1,600	671
23	2,640	2,540	1,840	1,870	1,650	2,870	2,220	1,830	968	484	1,450	662
24	2,640	2,500	1,840	1,860	1,650	2,530	2,290	1,850	965	532	1,380	681
25	2,630	2,460	1,840	1,850	1,650	2,280	2,410	2,180	1,020	589	1,420	710
26	2,630	2,400	1,840	1,860	1,660	2,190	2,360	2,570	1,320	650	1,430	769
27	2,640	2,300	1,840	1,870	1,670	2,240	2,160	2,720	1,440	754	1,440	883
28	2,620	2,200	1,840	1,880	1,680	2,320	2,110	2,710	1,440	974	1,420	916
29	2,610	2,100	1,840	1,880	-----	2,380	2,100	2,630	1,470	1,240	1,310	941
30	2,590	2,030	1,840	1,880	-----	2,340	2,080	2,440	1,440	1,410	1,210	945
31	2,600	-----	1,850	1,870	-----	2,430	-----	2,240	-----	1,460	1,170	-----
TOTAL	79,260	87,880	57,170	57,750	48,580	73,910	53,880	72,560	42,539	26,320	48,120	29,396
MEAN	2,557	2,929	1,844	1,863	1,735	2,384	1,796	2,341	1,418	849	1,552	980
MAX	2,930	3,650	1,970	1,880	1,870	4,020	2,630	3,120	2,160	1,460	2,300	1,210
MIN	2,420	2,030	1,830	1,850	1,650	1,680	1,100	1,820	929	484	1,030	662
CFSM	.51	.58	.36	.37	.34	.47	.35	.46	.28	.17	.31	.19
IN.	.58	.65	.42	.42	.36	.54	.40	.53	.31	.19	.35	.22

CAL YR 1972 TOTAL 993,769 MEAN 2,715 MAX 7,000 MIN 741 CFSM .54 IN 7.31  
WTR YR 1973 TOTAL 677,385 MEAN 1,856 MAX 4,020 MIN 484 CFSM .37 IN 4.98

## 05227500 Mississippi River at Aitkin, Minn.

LOCATION.--Lat 46°32'26", long 93°42'26", in W½ sec.24, T.47 N., R.27 W., Aitkin County, on right bank at upstream side of highway bridge at north edge of Aitkin, 1 mi (1.6 km) downstream from Mud River and at mile 1,055.9 (1,698.9 km) upstream from Ohio River.

DRAINAGE AREA.--6,140 mi<sup>2</sup> (15,900 km<sup>2</sup>), approximately.

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

GAGE.--Water-stage recorder. Datum of gage is 1,182.41 ft (360.40 m) 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 (0.9 m) higher. Diversion channel: Nonrecording gage. Datum of gage is 1,182.02 ft (360.28 m) above mean sea level, datum of 1929. Apr. 9, 1955, to Apr. 10, 1956, nonrecording gage at site 4 mi (6 km) downstream at different datum. Apr. 11, 1956, to Sept. 30, 1967, nonrecording gage at same site at datum 3.0 (0.9 m) ft higher.

AVERAGE DISCHARGE.--28 years, 2,892 ft<sup>3</sup>/s (81.9 m<sup>3</sup>/s), 6.40 in/yr (163 mm/yr).

EXTREMES.--Current year: Maximum daily discharge, 6,980 ft<sup>3</sup>/s (198 m<sup>3</sup>/s) Mar. 24; minimum, 786 ft<sup>3</sup>/s (22.3 m<sup>3</sup>/s) Sept. 24. River gage: Maximum discharge, 4,540 ft<sup>3</sup>/s (129 m<sup>3</sup>/s) Mar. 22 (gage height, 2.13 ft or 3.697 m, backwater from ice); minimum, 786 ft<sup>3</sup>/s (22.3 m<sup>3</sup>/s) Sept. 24 (gage height, 2.94 ft or 0.896 m). Diversion gage: Maximum discharge, 2,670 ft<sup>3</sup>/s (75.6 m<sup>3</sup>/s) Mar. 24 (gage height, 11.70 ft or 3.566 m, backwater from ice); no flow on many days.

Period of record: Maximum discharge, 20,000 ft<sup>3</sup>/s (566 m<sup>3</sup>/s) May 20, 1950 (gage height, 22.49 ft or 6.855 m, present datum); minimum, 151 ft<sup>3</sup>/s (4.28 m<sup>3</sup>/s) Sept. 1, 1961 (gage height, 0.60 ft or 0.183 m).

REMARKS.--Records good except those for winter periods, which are fair. Slight regulation by powerplants and by Winnibigoshish, Leech, Pokegama, and Sandy Lakes (see p. 102, 104, 106, 110). Water diverted at medium and high stages into Aitkin diversion channel 6.5 mi (10.5 km) above station, bypasses station and returns to river 15.5 mi (24.9 km) below station. Diversion began Apr. 2, 1955. These records include flow in diversion channel.

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3,610	3,190	2,540	2,200	2,070	1,950	3,510	2,580	3,270	1,820	2,230	2,000
2	3,530	3,350	2,500	2,200	2,060	1,950	3,570	2,500	3,070	1,900	2,250	1,940
3	3,350	3,910	2,480	2,200	2,060	1,950	3,570	2,470	3,000	1,890	2,210	1,980
4	3,120	4,400	2,450	2,190	2,060	1,960	3,420	2,470	2,920	1,770	2,110	2,100
5	2,980	4,630	2,400	2,190	2,060	1,980	3,180	2,480	2,810	1,620	1,920	2,050
6	2,930	4,700	2,340	2,200	2,060	1,980	2,880	2,500	2,760	1,530	1,970	1,910
7	2,940	4,830	2,320	2,190	2,060	1,990	2,690	2,660	2,630	1,450	2,460	1,850
8	2,970	5,000	2,300	2,190	2,050	2,000	2,500	3,020	2,540	1,390	2,950	1,810
9	2,960	5,180	2,280	2,200	2,050	2,010	2,280	3,450	2,490	1,360	3,530	1,770
10	2,960	5,230	2,270	2,190	2,050	2,040	2,160	3,680	2,460	1,440	3,970	1,730
11	2,880	5,190	2,260	2,190	2,040	2,070	2,010	3,820	2,390	1,400	3,890	1,690
12	2,910	5,100	2,250	2,190	2,030	2,120	1,880	4,000	2,220	1,320	3,570	1,650
13	2,870	4,910	2,240	2,180	2,020	2,170	1,780	4,140	2,060	1,250	3,540	1,620
14	2,880	4,710	2,240	2,190	2,010	2,280	1,690	4,210	1,820	1,180	3,340	1,570
15	2,840	4,380	2,240	2,200	2,000	2,450	1,670	4,040	1,700	1,140	3,410	1,490
16	2,790	4,160	2,250	2,210	1,980	2,720	1,740	3,760	1,540	1,140	3,600	1,390
17	2,820	4,030	2,240	2,200	1,970	3,110	1,850	3,380	1,400	1,110	3,560	1,260
18	2,740	3,880	2,240	2,190	1,960	3,560	1,990	3,050	1,330	1,040	3,250	1,110
19	2,710	3,620	2,230	2,180	1,950	4,040	2,120	2,850	1,290	977	3,240	1,060
20	2,660	3,480	2,220	2,160	1,950	4,850	2,200	2,690	1,270	934	3,550	978
21	2,700	3,400	2,230	2,150	1,950	5,730	2,340	2,510	1,270	912	3,330	898
22	2,790	3,290	2,220	2,140	1,950	6,440	2,600	2,380	1,260	894	3,140	852
23	2,890	3,170	2,230	2,130	1,950	6,820	2,780	2,300	1,250	866	2,990	817
24	2,970	3,080	2,220	2,120	1,950	6,980	2,890	2,360	1,250	855	2,770	789
25	2,980	2,980	2,220	2,110	1,950	6,270	3,000	2,680	1,270	963	2,610	841
26	3,050	2,880	2,220	2,100	1,950	4,750	3,070	3,150	1,320	1,100	2,590	920
27	3,110	2,800	2,220	2,090	1,950	3,870	3,020	3,580	1,550	1,240	2,570	1,120
28	3,150	2,700	2,210	2,080	1,950	3,640	2,930	3,790	1,780	1,450	2,500	1,300
29	3,180	2,640	2,200	2,080	-----	3,580	2,720	3,780	1,830	1,810	2,430	1,320
30	3,180	2,580	2,200	2,070	-----	3,550	2,620	3,690	1,850	2,120	2,310	1,280
31	3,180	-----	2,200	2,070	-----	3,510	-----	3,510	-----	2,210	2,080	-----
TOTAL	92,630	117,400	70,660	66,980	56,090	104,320	76,660	97,480	59,600	42,081	89,870	43,095
MEAN	2,988	3,913	2,279	2,161	2,003	3,365	2,555	3,145	1,987	1,357	2,899	1,437
MAX	3,610	5,230	2,540	2,210	2,070	6,980	3,570	4,210	3,270	2,210	3,970	2,100
MIN	2,660	2,580	2,200	2,070	1,950	1,950	1,670	2,300	1,250	855	1,920	789
CFSM	.49	.64	.37	.35	.33	.55	.42	.51	.32	.22	.47	.23
IN.	.56	.71	.43	.41	.34	.63	.46	.59	.36	.25	.54	.26

CAL YR 1972 TOTAL 1,395,275 MEAN 3,812 MAX 10,500 MIN 954 CFSM .62 IN 8.45  
WTR YR 1973 TOTAL 916,866 MEAN 2,512 MAX 6,980 MIN 789 CFSM .41 IN 5.55

## PINE RIVER BASIN

05230500 Pine River Reservoir at Cross Lake, Minn.

LOCATION.--Lat 46°40'09", long 94°06'44", in SW¼NW¼ sec.21, T.137 N., R.27 W., Crow Wing County, at dam on Pine River, at outlet of Cross Lake at village of Cross Lake.

DRAINAGE AREA.--562 mi<sup>2</sup> (1,456 km<sup>2</sup>).

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 at 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, 99,710 acre-ft (122 hm<sup>3</sup>) July 10 (elevation, 1,229.42 ft or 374.73 m); minimum, 72,760 acre-ft (89.7 hm<sup>3</sup>) Feb. 26 (elevation, 1,227.40 ft or 374.11 m).  
Period of record: Maximum contents observed, 173,600 acre-ft (214 hm<sup>3</sup>) July 10, 1916 (elevation, 234.56 ft or 376.29 m); minimum observed, 1,310 acre-ft (1.62 hm<sup>3</sup>) below zero of capacity table Aug. 20, 1918 (elevation, 1,217.67 ft or 371.15 m).

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 elevations 1,226.32 ft (373.78 m) and 1,234.82 ft (376.37 m) (maximum allowable range) is 118,710 acre-ft (146 hm<sup>3</sup>) of which 53,280 acre-ft (65.7 hm<sup>3</sup>) is controlled storage between elevations 1,226.32 ft (373.78 m) and 1,230.32 ft (375.00 m) (normal operating range). Contents shown herein are contents above an elevation 1,218.67 ft (371.45 m). 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 ELEVATION AND CONTENTS, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30.....	29.16	96,200	-
Oct. 31.....	29.00	94,000	-2,200
Nov. 30.....	28.67	89,550	-4,450
Dec. 31.....	28.15	82,610	-6,940
CAL YR 1972.....	-	-	+690
Jan. 31.....	27.58	75,110	-7,500
Feb. 28.....	27.42	73,020	-2,090
Mar. 31.....	28.48	87,010	+13,990
Apr. 30.....	29.34	98,610	+11,600
May 31.....	29.12	95,620	-2,990
June 30.....	29.33	98,480	+2,860
July 31.....	29.24	97,250	-1,230
Aug. 31.....	29.16	96,160	-1,090
Sept. 30.....	29.22	96,970	+810
WTR YR 1973.....	-	-	+770

NOTE.--Add 1,200.00 ft to obtain elevation above mean sea level.

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

LOCATION.--Lat 45°40'09", long 94°06'44", in SW¼NW¼ sec.21, T.137 N., R.27 W., Crow Wing County, at dam at outlet of Cross Lake at Village of Cross Lake.

DRAINAGE AREA.--562 mi<sup>2</sup> (1455 km<sup>2</sup>).

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 (370.73 m) 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 (0.49 m) 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).--87 years, 215 ft<sup>3</sup>/s (6.09 m<sup>3</sup>/s), 5.20 in/yr (132 mm/yr).

EXTREMES.--Current year: Maximum daily discharge, 520 ft<sup>3</sup>/s (14.7 m<sup>3</sup>/s) May 13-15; minimum daily, 20 ft<sup>3</sup>/s (0.57 m<sup>3</sup>/s) Apr. 10-20.

Period of record: Maximum daily discharge, 2,250 ft<sup>3</sup>/s (63.7 m<sup>3</sup>/s) 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; five discharge measurements made and records reviewed by Geological Survey.

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	285	285	425	320	400	145	170	250	250	200	512	175
2	285	298	425	320	400	145	170	250	250	200	397	175
3	285	340	425	320	400	145	170	250	200	200	340	175
4	285	360	425	320	400	145	170	303	200	200	221	175
5	285	360	425	320	400	145	107	320	200	200	190	175
6	285	360	425	320	322	145	95	320	200	200	190	175
7	285	370	425	320	315	145	64	320	200	200	190	175
8	285	410	425	320	315	145	60	320	200	200	190	175
9	285	425	425	320	315	145	60	320	200	200	190	175
10	285	425	425	320	223	145	20	320	200	283	190	175
11	285	435	425	320	210	145	20	320	200	300	234	175
12	285	435	425	320	210	145	20	487	200	300	240	175
13	285	435	425	320	210	241	20	520	200	300	240	175
14	285	440	425	320	210	250	20	520	200	300	240	175
15	285	440	425	320	210	250	20	520	200	300	240	175
16	285	435	425	393	210	250	20	350	200	300	315	175
17	285	435	425	400	210	250	20	350	200	225	340	175
18	285	435	425	400	210	250	20	254	200	200	253	175
19	285	430	425	400	210	250	20	250	200	200	230	175
20	285	425	425	400	210	250	20	250	200	200	230	109
21	285	430	330	400	210	250	56	250	200	171	230	100
22	285	430	330	400	210	250	87	210	200	165	230	55
23	285	430	330	400	210	183	90	210	200	165	230	50
24	285	430	330	400	210	170	133	464	200	165	230	50
25	285	425	330	400	210	170	186	500	200	165	187	50
26	285	425	330	400	210	170	246	500	200	165	175	50
27	285	425	330	400	156	170	250	500	200	261	175	50
28	285	425	320	400	145	170	250	500	200	375	175	50
29	285	425	320	400	-----	170	250	250	200	512	175	50
30	285	425	320	400	-----	170	250	250	200	512	175	50
31	285	-----	320	400	-----	170	-----	250	-----	512	175	-----
TOTAL	8,835	12,248	12,090	11,193	7,151	5,774	3,084	10,678	6,100	7,876	7,329	3,989
MEAN	285	408	390	361	255	186	103	344	203	254	236	133
MAX	285	440	425	400	400	250	250	520	250	512	512	175
MIN	285	285	320	320	145	145	20	210	200	165	175	50
CFSM	.51	.73	.69	.64	.45	.33	.18	.61	.36	.45	.42	.24
IN.	.58	.81	.80	.74	.47	.38	.20	.71	.40	.52	.49	.26
CAL YR 1972	TOTAL 147,833		MEAN 404	MAX 1,220	MIN 130	CFSM .72	IN 9.79					
WTR YR 1973	TOTAL 96,347		MEAN 264	MAX 520	MIN 20	CFSM .47	IN 6.38					





## 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 (27 m) upstream from bridge on First Avenue at Long Prairie and 400 ft (122 m) downstream from Venewitz Creek.

PERIOD OF RECORD.--October 1971 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,281.74 ft (390.67 m) above mean sea level, datum of 1929.

EXTREMES.--Maximum discharge, 924 ft<sup>3</sup>/s (26.2 m<sup>3</sup>/s) Mar. 15 (gage height, 5.71 ft or 1.756 m); minimum, 54 ft<sup>3</sup>/s (1.53 m<sup>3</sup>/s) July 19 (gage height, 1.48 ft or 0.451 m).

Period of record: Maximum discharge, 3,270 ft<sup>3</sup>/s (92.6 m<sup>3</sup>/s) July 22, 1972 (gage height, 9.37 ft or 2.856 m); minimum daily, 49 ft<sup>3</sup>/s (1.39 m<sup>3</sup>/s) Oct. 12, 1971; minimum gage height, 1.48 ft (0.451 m) July 19, 1973.

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

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	282	223	146	120	94	77	377	223	219	72	60	80
2	279	262	145	120	93	77	362	244	196	75	60	77
3	275	295	144	119	91	79	348	250	210	72	59	74
4	273	300	143	118	90	81	337	248	198	68	59	73
5	269	302	141	118	88	85	329	240	189	66	60	73
6	277	306	141	117	88	91	314	261	182	64	78	71
7	273	313	140	116	86	98	298	301	177	64	87	70
8	269	322	140	115	84	109	286	269	182	61	92	69
9	264	326	140	115	83	129	273	255	167	65	86	67
10	258	328	139	114	82	169	261	258	156	67	81	67
11	259	316	139	113	81	247	253	258	141	67	80	66
12	254	312	137	113	80	321	243	251	123	66	82	65
13	252	304	136	112	80	600	237	240	118	62	110	65
14	245	280	136	112	79	851	240	226	113	61	91	67
15	238	166	135	111	79	910	244	215	106	60	86	69
16	238	170	134	111	77	878	255	198	106	60	82	71
17	234	180	133	110	77	789	264	186	114	59	76	70
18	227	180	132	109	76	744	255	177	99	58	73	67
19	224	178	131	109	76	690	247	165	94	51	73	63
20	223	173	130	108	76	622	267	153	94	57	72	62
21	231	172	129	107	76	570	279	147	92	56	73	62
22	231	170	128	106	76	520	277	147	91	56	73	62
23	229	164	128	106	76	495	280	147	90	61	71	62
24	224	160	127	105	76	473	272	169	88	68	70	62
25	223	157	126	105	76	455	263	217	92	64	69	62
26	223	153	125	103	76	445	250	233	90	62	69	68
27	220	151	124	102	76	435	240	251	83	60	69	70
28	217	149	123	101	76	429	228	266	80	59	67	66
29	212	148	123	99	-----	419	217	277	74	61	65	64
30	210	147	122	97	-----	407	209	283	73	67	72	62
31	220	-----	121	95	-----	391	-----	260	-----	63	80	-----
TOTAL	7,553	6,807	4,138	3,406	2,268	12,686	8,205	7,015	3,837	1,952	2,325	2,026
MEAN	244	227	133	110	81.0	409	274	226	128	63.0	75.0	67.5
MAX	282	328	146	120	94	910	377	301	219	75	110	80
MIN	210	147	121	95	76	77	209	147	73	51	59	62
AC-FT	14,980	13,500	8,210	6,760	4,500	25,160	16,270	13,910	7,610	3,870	4,610	4,020

CAL YR 1972 TOTAL 130,772 MEAN 357 MAX 2,900 MIN 85 AC-FT 259,400  
WTR YR 1973 TOTAL 62,218 MEAN 170 MAX 910 MIN 51 AC-FT 123,400

## 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 (244 m) south of outlet of Gull Lake, 0.2 mi (0.3 km) upstream from Gull Lake Dam, and 8 mi (13 km) northwest of Brainerd.

DRAINAGE AREA.--287 mi<sup>2</sup> (743 km<sup>2</sup>).

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 at mean sea level, datum of 1929. Prior to Aug. 10, 1949, non-recording gage 800 ft (244 m) north of present site at same datum. Aug. 11, 1949 to June 30, 1973, water-stage recorder at present site and at datum 1,188.13 ft (362.1 m) above mean sea level, adjustment of 1912.

EXTREMES.--Current year: Maximum contents, 63,240 acre-ft (78.0 hm<sup>3</sup>) Aug. 6 (elevation, 1,194.17 ft or 363.98 m); minimum, 43,560 acre-ft (53.7 hm<sup>3</sup>) Feb. 9, 10 (elevation, 1,192.64 ft or 363.52 m).  
Period of record: Maximum contents, 74,800 acre-ft (92.2 hm<sup>3</sup>) June 30, 1914 (elevation, 1,195.05 ft or 364.25 m); minimum observed, 22,250 acre-ft (27.4 hm<sup>3</sup>) Mar. 20, 1924 (elevation, 1,190.75 ft or 362.94 m).

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 elevation 1,192.75 ft (363.55 m) and 1,195.75 ft (364.46 m) (maximum allowable range and normal operating range) is 26,020 acre-ft (32.1 m). Contents shown herein are contents above elevation 1,188.75 ft (362.33 m). 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 ELEVATION AND CONTENTS, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)
Sept. 30.....	93.84	58,910	-
Oct. 31.....	93.83	58,810	-104
Nov. 30.....	93.14	49,850	-8,960
Dec. 31.....	92.86	46,240	-3,610
CAL YR 1972.....	-	-	-770
Jan. 31.....	92.66	43,790	-2,450
Feb. 29.....	92.70	44,240	+450
Mar. 31.....	93.39	53,100	+8,860
Apr. 30.....	93.88	59,450	+6,350
May 31.....	93.79	58,280	-1,170
June 30.....	93.84	58,940	+660
July 31.....	94.14	62,840	+3,900
Aug. 31.....	93.96	60,490	-2,350
Sept. 30.....	93.95	60,360	-130
WTR YR 1973.....	-	-	+1,450

NOTE.--Add 1,100.00 ft to obtain elevation above mean sea level.

## CROW WING RIVER BASIN

119

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 mi (13 km) northwest of Brainerd.

DRAINAGE AREA.--287 mi<sup>2</sup> (743 km<sup>2</sup>).

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 at mean sea level, datum of 1929. August 1911 to May 23, 1929, and Dec. 1, 1929, to Aug. 1, 1949, both gages were non-recording gages at same site and datum. May 24 to Nov. 30, 1929, nonrecording gage 500 ft downstream at different datum. Aug. 2, 1949, to June 30, 1973, at present sites with datum of gage at 1,188.14 ft (362.15 m) above mean sea level, adjustment of 1912.

AVERAGE DISCHARGE (unadjusted).--62 years, 106 ft<sup>3</sup>/s (3.00 m<sup>3</sup>/s), 5.02 in/yr (128 mm/yr).

EXTREMES.--Current year: Maximum daily discharge, 500 ft<sup>3</sup>/s (14.2 m<sup>3</sup>/s) May 26; minimum daily, 16 ft<sup>3</sup>/s (0.45 m<sup>3</sup>/s) Sept. 21-24.  
Period of record: Maximum daily discharge, 1,120 ft<sup>3</sup>/s (31.7 m<sup>3</sup>/s) 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; five discharge measurements made and records reviewed by Geological Survey.

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	71	230	240	150	101	40	106	139	140	17	133	71
2	71	235	240	161	101	40	106	142	140	17	133	71
3	71	410	234	161	101	40	83	199	140	17	133	133
4	70	410	234	150	101	40	58	199	140	17	133	133
5	70	410	234	154	101	40	58	140	140	17	71	133
6	71	410	234	154	99	40	59	140	140	17	73	71
7	70	450	222	158	101	40	59	269	140	17	390	71
8	70	450	234	158	101	40	59	346	140	17	390	71
9	70	450	185	158	72	40	59	199	140	17	390	71
10	69	450	185	154	72	40	31	199	140	76	370	71
11	71	425	185	154	72	40	31	202	140	76	225	71
12	71	425	161	154	72	108	31	199	140	76	133	71
13	70	425	161	158	72	158	31	199	74	76	133	71
14	70	425	158	158	72	169	31	199	74	75	133	31
15	69	425	158	158	72	315	17	143	47	75	133	31
16	70	400	158	158	74	360	17	143	47	74	308	31
17	69	400	158	158	74	360	17	140	47	46	308	31
18	69	400	158	158	75	370	17	76	47	47	308	31
19	69	400	158	158	75	308	17	76	47	46	225	31
20	69	400	158	132	74	308	17	76	17	46	308	31
21	69	278	158	132	71	220	75	76	17	17	225	16
22	69	246	158	132	75	176	116	76	17	17	225	16
23	69	246	158	126	77	125	118	76	17	17	128	16
24	69	246	154	132	75	127	143	76	17	17	128	16
25	69	246	154	132	77	127	199	388	17	47	125	17
26	69	240	154	132	77	127	199	500	17	47	125	17
27	133	240	158	132	77	127	199	255	17	46	70	73
28	235	216	158	111	77	127	140	338	17	73	70	73
29	235	240	158	132	-----	127	140	344	17	73	70	73
30	230	240	161	132	-----	106	140	255	17	133	70	73
31	235	-----	161	132	-----	106	-----	140	-----	133	70	-----
TOTAL	2,882	10,468	5,587	4,529	2,288	4,391	2,373	5,949	2,250	1,486	5,736	1,716
MEAN	93.0	349	180	146	81.7	142	79.1	192	75.0	47.9	185	57.2
MAX	235	450	240	161	101	370	199	500	140	133	390	133
MIN	69	216	154	111	71	40	17	76	17	17	70	16
CFSM	.32	1.22	.63	.51	.28	.49	.28	.67	.26	.17	.64	.20
IN.	.37	1.36	.72	.59	.30	.57	.31	.77	.29	.19	.74	.22

CAL YR 1972 TOTAL 76,384 MEAN 209 MAX 595 MIN 42 CFSM .73 IN 9.90  
WTR YR 1973 TOTAL 49,655 MEAN 136 MAX 500 MIN 16 CFSM .47 IN 6.44

## CROW WING RIVER BASIN

05247500 Crow Wing River near Pillager, Minn.

LOCATION.--Lat 46°18'18", long 94°22'38", in SW¼NE¼ sec.30, T.133 N., R.29 W., Cass County, at Sylvan dam power-plant of Minnesota Power & Light Co., 3.6 mi (5.8 km) above mouth and 4.9 mi (7.9 km) 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.--Current year: Maximum daily discharge, 6,140 ft<sup>3</sup>/s (174 m<sup>3</sup>/s) Mar. 16; minimum daily, 416 ft<sup>3</sup>/s (11.8 m<sup>3</sup>/s) July 21.

Period of record: Maximum daily discharge, 16,600 ft<sup>3</sup>/s (470 m<sup>3</sup>/s) Apr. 12, 13, 1969; minimum daily, 152 ft<sup>3</sup>/s (4.30 m<sup>3</sup>/s) Sept. 21, 1970.

Maximum daily discharge since 1924, 18,300 ft<sup>3</sup>/s (518 m<sup>3</sup>/s) 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. 118).

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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1,230	1,590	1,190	838	801	632	2,520	1,700	1,450	562	1,020	936
2	1,370	1,900	1,190	756	820	622	2,240	1,700	1,430	845	998	912
3	1,350	2,280	1,060	865	905	557	2,120	1,890	1,610	865	1,030	1,040
4	1,270	2,500	1,000	883	835	666	2,120	1,790	1,750	742	777	973
5	1,200	2,460	1,180	843	737	734	2,090	1,580	1,750	663	905	976
6	1,200	2,490	1,020	808	733	931	2,020	1,690	1,680	535	888	1,050
7	1,220	2,420	988	877	750	353	1,940	1,910	1,470	704	925	917
8	1,020	2,370	972	852	804	1,000	1,980	1,940	1,620	587	1,160	977
9	1,460	2,400	1,100	847	656	1,300	1,650	1,710	1,400	940	1,120	952
10	1,360	2,360	1,070	823	674	1,510	1,560	1,790	1,410	1,060	1,050	967
11	1,270	2,210	1,040	868	622	1,900	1,570	2,100	1,250	1,270	1,200	975
12	1,190	2,250	945	824	588	2,440	1,660	2,040	962	1,200	875	845
13	1,080	2,100	949	809	622	3,150	1,430	2,010	1,050	1,040	1,240	901
14	955	1,750	842	713	622	4,190	1,520	2,010	961	977	991	818
15	1,480	1,780	847	813	590	5,130	1,540	1,730	738	862	1,340	763
16	1,320	1,530	937	875	650	6,140	1,850	1,680	847	880	1,220	741
17	1,240	1,760	897	866	595	5,940	1,550	1,580	534	741	1,420	677
18	1,190	1,770	917	747	622	5,660	1,700	1,400	737	641	1,270	684
19	1,110	1,830	853	859	622	5,050	1,670	1,350	671	443	1,220	601
20	1,090	1,790	851	814	527	4,720	2,000	1,240	710	550	1,180	640
21	1,230	1,580	818	850	623	4,980	2,050	1,170	681	416	1,220	688
22	1,360	1,420	920	908	594	3,980	2,150	1,120	681	462	1,240	617
23	1,400	1,400	933	800	621	3,530	1,990	1,180	652	508	1,140	625
24	1,400	1,200	879	878	528	3,610	1,930	1,480	616	757	1,200	828
25	1,400	1,560	950	888	657	3,340	2,120	1,780	793	795	1,070	930
26	1,400	1,470	932	950	608	2,720	2,020	2,100	715	960	1,070	941
27	1,240	1,340	923	954	660	2,270	1,930	2,260	690	914	1,050	974
28	1,150	816	913	933	657	2,660	1,810	2,190	577	1,160	945	980
29	1,150	823	935	860	-----	2,960	1,840	2,100	554	1,160	946	1,000
30	1,440	1,180	922	823	-----	2,590	1,600	1,860	718	1,100	990	927
31	1,830	-----	840	800	-----	2,470	-----	1,740	-----	1,100	899	-----
TOTAL	39,605	54,329	29,813	26,224	18,883	88,332	55,150	53,820	30,807	25,439	33,599	25,855
MEAN	1,278	1,811	962	846	674	2,849	1,872	1,736	1,027	821	1,084	862
MAX	1,830	2,500	1,190	954	905	6,140	2,520	2,260	1,750	1,270	1,420	1,050
MIN	955	816	818	713	527	622	1,430	1,120	554	416	777	601
CAL YR 1972	TOTAL	852,432	MEAN	2,329	MAX	11,700	MIN	680				
WTR YR 1973	TOTAL	482,856	MEAN	1,323	MAX	6,140	MIN	416				

05267000 Mississippi River near Royalton, Minn.

LOCATION.--Lat 45°51'40", long 94°21'30", in lot 2, sec.20, T.39 N., R.32 W., Morrison County, at plant of Minnesota Power & Light Co., 4 mi (6.4 km) northwest of Royalton, 4.5 mi (7.2 km) downstream from Swan River, and at mile 956 (1,538 km) upstream from Ohio River.

DRAINAGE AREA.--11,600 sq mi (30,000 km<sup>2</sup>), approximately.

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

AVERAGE DISCHARGE.--49 years, 4,299 ft<sup>3</sup>/s (122 m<sup>3</sup>/s), 5.03 in/yr (128 mm/yr).

EXTREMES.--Current year: Maximum daily discharge, 15,500 ft<sup>3</sup>/s (439 m<sup>3</sup>/s) Mar. 17, minimum daily, 1,550 ft<sup>3</sup>/s (43.9 m<sup>3</sup>/s) July 22.  
Period of record: Maximum daily discharge, 37,700 ft<sup>3</sup>/s (1,070 m<sup>3</sup>/s) Apr. 16, 1965; minimum daily, 254 ft<sup>3</sup>/s (7.19 m<sup>3</sup>/s) Nov. 25, 1936.

REMARKS.--Records good. Discharge computed on basis of powerplant records. Flow partly regulated by powerplants and Winnibigoshish, Leech, Pokegama, Sandy, and Gull Lakes and by Pine River Reservoir (see p. 102, 104, 106, 110, 114, 118).

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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7,000	6,610	4,270	3,300	3,340	2,900	8,250	5,890	7,760	3,230	3,630	4,030
2	6,970	7,120	4,230	3,280	3,480	2,900	8,440	5,990	6,880	3,580	4,720	4,310
3	7,000	7,870	3,310	3,560	3,360	2,980	8,290	6,110	6,660	3,680	4,050	4,090
4	7,000	8,730	3,330	3,300	3,430	2,980	7,990	5,680	6,660	3,500	4,160	4,210
5	6,230	9,290	2,950	3,360	3,430	3,200	7,580	5,680	6,660	3,230	3,260	4,210
6	6,560	9,750	2,980	3,360	3,430	3,440	7,090	6,050	6,420	3,230	3,960	4,230
7	5,730	9,820	3,880	3,300	3,430	3,810	6,190	6,200	5,860	3,070	3,730	4,230
8	5,960	10,000	4,130	3,280	3,300	3,980	5,740	7,000	6,070	2,900	4,620	3,730
9	5,800	9,820	4,230	3,230	3,430	3,980	5,690	7,200	5,690	2,790	5,210	3,830
10	5,990	10,100	4,260	3,160	3,230	4,880	5,180	7,920	5,570	3,600	5,680	3,700
11	5,900	10,200	4,400	3,230	3,100	5,620	5,570	7,880	5,590	3,260	5,490	3,560
12	5,680	10,200	4,710	3,210	3,020	6,440	4,710	8,440	5,030	3,650	6,220	3,510
13	5,420	10,000	4,320	3,230	2,860	8,780	4,710	8,540	4,710	3,270	6,130	3,510
14	5,840	9,310	3,860	3,100	2,960	10,300	4,380	8,720	4,230	3,230	6,190	3,250
15	5,400	8,520	4,160	3,200	2,970	12,800	3,710	8,370	3,840	2,660	6,110	2,930
16	5,510	8,430	3,890	3,410	3,030	14,700	4,230	7,890	3,960	2,770	6,440	3,290
17	5,210	7,470	3,830	3,460	3,030	15,500	5,420	7,700	4,010	2,590	6,560	3,150
18	5,310	7,460	3,830	3,530	2,970	15,200	4,710	7,240	3,470	2,690	6,560	2,800
19	5,210	7,460	4,010	3,460	3,040	14,700	4,710	6,660	3,150	2,200	6,330	2,640
20	5,210	6,990	3,860	3,630	2,970	14,800	5,120	5,960	3,100	2,300	6,070	2,590
21	4,980	7,190	3,900	3,630	3,030	12,700	6,110	5,680	3,350	2,030	6,180	2,500
22	5,440	6,860	3,630	3,630	2,790	13,000	5,850	5,470	3,010	1,550	6,110	2,400
23	5,680	5,540	3,700	3,630	3,030	12,100	6,250	5,210	2,800	1,760	5,680	2,380
24	5,590	5,740	3,680	3,540	2,950	12,100	6,600	5,640	2,930	2,110	5,290	2,440
25	5,680	5,420	3,630	3,590	2,940	12,000	6,560	6,150	3,030	2,340	5,210	2,520
26	5,680	5,740	3,500	3,610	3,080	12,100	6,630	6,560	3,080	2,090	5,210	3,000
27	5,680	5,360	3,880	3,560	2,860	11,500	6,810	7,680	3,130	2,370	4,710	3,180
28	5,680	3,670	3,470	3,360	2,900	9,980	6,690	8,270	2,800	2,590	4,710	3,640
29	5,680	4,230	3,540	3,630	-----	8,140	6,460	8,890	2,980	3,500	4,290	3,480
30	5,680	4,570	3,590	3,520	-----	7,980	6,410	8,200	3,240	3,750	4,230	3,750
31	6,160	-----	3,520	3,630	-----	7,990	-----	7,990	-----	3,760	4,530	-----
TOTAL	180,860	229,470	118,680	105,920	87,390	273,480	182,080	216,860	135,670	89,280	161,270	101,090
MEAN	5,834	7,649	3,828	3,417	3,121	8,822	6,069	6,995	4,522	2,880	5,202	3,370
MAX	7,000	10,200	4,710	3,630	3,480	15,500	8,440	8,890	7,760	3,760	6,560	4,310
MIN	4,980	3,670	2,950	3,100	2,790	2,900	3,710	5,210	2,800	1,550	3,260	2,380
CFSM	.50	.66	.33	.29	.27	.76	.52	.60	.39	.25	.45	.29
IN.	.58	.74	.38	.34	.28	.88	.58	.70	.44	.29	.52	.32

CAL YR 1972 TOTAL 3,105,700 MEAN 8,486 MAX 30,100 MIN 2,500 CFSM .73 IN 9.96

WTR YR 1973 TOTAL 1,882,050 MEAN 5,156 MAX 15,500 MIN 1,550 CFSM .44 IN 6.04

## SAUK RIVER BASIN

05270500 Sauk River near St. Cloud, Minn.

LOCATION.--Lat 45°33'35", long 94°14'00", in SE¼SW¼ sec.8, T.124 N., R.28 W., Stearns County, on right bank 0.5 mi (0.8 km) northwest of Waite Park, 3 mi (4.8 km) west of St. Cloud, and 5 mi (8.0 km) upstream from mouth.

DRAINAGE AREA.--925 mi<sup>2</sup> (2,396 km<sup>2</sup>).

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 (315.45 m) above mean sea level, adjustment of 1912. Prior to Nov. 22, 1934, nonrecording gage on highway bridge 1 mi (1.6 km) downstream at datum 6.77 ft (2.06 m) lower.

AVERAGE DISCHARGE.--43 years (1909-12, 1930-31, 1934-73), 268 ft<sup>3</sup>/s (7.59 m<sup>3</sup>/s), 3.93 in/yr (100 mm/yr).

EXTREMES.--Current year: Maximum discharge, 2,000 ft<sup>3</sup>/s (56.6 m<sup>3</sup>/s) Mar. 17 (gage height, 5.26 ft or 1.60 m); minimum, 96 ft<sup>3</sup>/s (2.72 m<sup>3</sup>/s) June 28, 29 (gage height, 1.02 ft or 0.31 m).

Period of record: Maximum discharge, 9,100 ft<sup>3</sup>/s (258 m<sup>3</sup>/s) Apr. 13, 1965 (gage height, 10.68 ft or 3.26 m); minimum, 0.3 ft<sup>3</sup>/s (0.008 m<sup>3</sup>/s) Nov. 25, 1936.

REMARKS.--Records good except those for winter periods and those for periods of no gage-height record, which are fair. Flor 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	447	371	330	275	185	145	1,040	531	474	135	182	209
2	438	437	330	270	185	150	1,010	539	459	135	180	220
3	476	495	340	270	180	160	972	539	485	132	167	230
4	480	529	340	270	180	170	920	519	463	130	156	241
5	470	544	345	270	170	180	899	500	441	156	149	250
6	486	571	340	265	170	195	866	496	419	156	179	242
7	479	573	330	265	165	210	816	489	398	138	203	237
8	463	551	330	265	160	230	771	477	388	141	226	227
9	434	535	325	260	160	270	734	481	371	138	229	219
10	426	542	320	255	155	350	734	496	354	135	230	210
11	464	538	314	245	150	460	722	481	326	134	230	202
12	441	518	310	240	150	660	690	466	336	132	228	196
13	430	497	310	235	145	880	670	448	326	130	218	200
14	408	493	310	235	145	1,270	651	434	322	130	210	203
15	392	485	310	230	140	1,600	682	430	319	130	230	204
16	392	459	310	223	140	1,830	655	419	340	130	233	201
17	365	444	310	223	135	1,960	632	402	340	130	237	201
18	346	444	310	220	135	1,950	599	392	354	132	230	195
19	334	442	310	215	135	1,900	566	381	466	126	222	185
20	321	433	305	215	130	1,840	635	371	332	123	212	163
21	333	419	305	210	130	1,740	651	371	144	114	209	160
22	321	411	305	210	135	1,660	647	375	125	109	220	185
23	322	400	300	210	135	1,570	616	365	118	133	219	166
24	329	388	300	205	135	1,520	595	463	108	170	212	145
25	337	382	300	205	135	1,440	579	500	110	186	210	201
26	338	378	300	200	135	1,380	566	508	104	195	200	198
27	336	368	300	200	135	1,340	550	504	102	197	198	205
28	334	360	295	195	140	1,270	527	527	98	185	190	194
29	314	352	290	190	-----	1,220	500	527	98	174	187	188
30	317	345	285	190	-----	1,170	496	519	100	198	185	181
31	369	-----	280	185	-----	1,110	-----	500	-----	191	197	-----
TOTAL	12,142	13,704	9,689	7,146	4,195	31,830	20,971	14,450	8,820	4,545	6,378	6,058
MEAN	392	457	313	231	150	1,027	699	466	294	147	206	202
MAX	486	573	345	275	185	1,960	1,040	539	485	198	237	250
MIN	314	345	280	185	130	145	496	365	98	109	149	145
CFSM	.42	.49	.34	.25	.16	1.11	.76	.50	.32	.16	.22	.22
IN.	.49	.55	.39	.29	.17	1.28	.84	.58	.35	.18	.26	.24

CAL YR 1972 TOTAL 245,886 MEAN 672 MAX 1,800 MIN 165 CFSM .73 IN 9.89  
WTR YR 1973 TOTAL 139,928 MEAN 383 MAX 1,960 MIN 98 CFSM .41 IN 5.63

NOTE.--No gage-height record, Aug. 11 to Sept. 18.

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 mi (6 km) east of Big Lake and 4 mi (6 km) downstream from St. Francis River.

DRAINAGE AREA.--615 mi<sup>2</sup> (1,593 km<sup>2</sup>).

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 (274.20 m) 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.--45 years (1911-17, 1934-73), 256 ft<sup>3</sup>/s (7.25 m<sup>3</sup>/s), 5.65 in/yr (144 mm/yr).

EXTREMES.--Current year: Maximum discharge, 2,440 ft<sup>3</sup>/s (69.1 m<sup>3</sup>/s) Mar. 18 (gage height, 6.44 ft or 1.96 m); minimum, 101 ft<sup>3</sup>/s (2.86 m<sup>3</sup>/s) July 22 (gage height, 0.90 ft or 0.3 m).  
Period of record: Maximum discharge, 7,360 ft<sup>3</sup>/s (208 m<sup>3</sup>/s) Apr. 16, 1965 (gage height, 10.86 ft or 3.31 m); minimum, 3.6 ft<sup>3</sup>/s (0.102 m<sup>3</sup>/s) 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	260	355	240	150	150	150	663	311	587	186	147	199
2	260	418	220	150	150	155	631	329	603	199	139	208
3	298	464	210	150	150	155	598	330	644	204	132	195
4	333	488	200	150	150	160	563	328	626	189	126	188
5	333	502	190	150	150	165	528	338	586	177	121	177
6	342	520	180	150	150	175	504	340	561	169	116	165
7	347	543	170	150	150	200	488	338	551	160	119	155
8	335	549	160	150	150	230	468	334	525	151	124	158
9	321	540	150	150	150	280	445	334	475	147	145	155
10	319	529	145	150	150	350	420	344	417	141	158	149
11	338	524	143	150	148	435	398	347	372	135	178	142
12	347	521	143	150	148	600	373	342	341	127	213	137
13	343	512	143	150	146	740	351	334	311	124	249	132
14	335	495	143	150	146	890	332	331	282	124	250	129
15	327	470	143	150	146	1,100	341	323	257	121	235	126
16	326	449	145	150	146	1,390	365	312	238	118	244	127
17	324	432	145	150	146	2,030	368	300	250	115	244	127
18	315	413	145	150	146	2,400	364	287	254	109	228	124
19	298	394	145	150	146	2,390	364	276	254	108	217	121
20	297	376	145	150	146	2,160	376	266	240	107	206	117
21	318	357	145	150	146	1,860	380	263	230	106	198	122
22	325	338	145	150	146	1,580	368	270	224	104	200	137
23	323	346	145	150	146	1,350	357	260	233	147	218	146
24	318	318	145	150	146	1,210	349	355	224	168	211	150
25	314	304	145	150	147	1,090	339	499	246	158	196	151
26	311	294	150	150	148	981	326	538	273	151	190	182
27	306	292	150	150	150	895	312	555	248	150	184	208
28	301	273	150	150	150	840	300	570	226	144	170	208
29	295	272	150	150	-----	794	288	595	210	147	159	206
30	293	260	150	150	-----	745	280	606	198	152	158	207
31	328	-----	150	150	-----	701	-----	594	-----	152	162	-----
TOTAL	9,830	12,548	4,930	4,650	4,143	28,201	12,239	11,549	10,686	4,490	5,639	4,748
MEAN	317	418	159	150	148	910	408	373	356	145	182	158
MAX	347	549	240	150	150	2,400	663	606	644	204	250	208
MIN	240	260	143	150	146	150	280	260	198	104	116	117
CFSM	.52	.68	.26	.24	.24	1.48	.66	.61	.58	.24	.30	.26
IN.	.59	.76	.30	.28	.25	1.71	.74	.70	.65	.27	.34	.29

CAL YR 1972 TOTAL 152,047 MEAN 415 MAX 1,900 MIN 109 CFSM .67 IN 9.20  
WTR YR 1973 TOTAL 113,653 MEAN 311 MAX 2,400 MIN 104 CFSM .51 IN 6.87

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 (23 m) upstream from highway bridge, 1.5 mi (2.4 km) downstream from Lake Calhoun, 3 mi (4.8 km) downstream from Green Lake, and 6.8 mi (10.9 km) northeast of Spicer.

DRAINAGE AREA.--179 mi<sup>2</sup> (464 km<sup>2</sup>), 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 (349.89 m) above mean sea level, datum of 1929 (Kandiyohi County Highway Department bench mark). Prior to July 20, 1950, nonrecording gage at bridge 75 ft (23 m) downstream at same datum.

AVERAGE DISCHARGE.--24 years, 53.4 ft<sup>3</sup>/s (1.512 m<sup>3</sup>/s), 4.05 in/yr (103 mm/yr).

EXTREMES.--Current year: Maximum discharge, 189 ft<sup>3</sup>/s (5.35 m<sup>3</sup>/s) Mar. 30 (gage height, 4.19 ft or 1.277 m); minimum, 6.0 ft<sup>3</sup>/s (0.17 m<sup>3</sup>/s) Sept. 24 (gage height, 2.18 ft or 0.664 m).  
Period of record: Maximum discharge, 408 ft<sup>3</sup>/s (11.6 m<sup>3</sup>/s) June 29, 1953 (gage height, 6.52 ft or 1.987 m); maximum gage height, 6.67 ft (2.033 m) 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 periods, 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	73	71	76	52	44	47	171	137	119	25	24	19
2	69	85	75	51	44	48	163	138	112	32	22	23
3	72	89	72	50	44	52	160	138	111	30	20	27
4	71	90	69	49	44	60	154	132	110	28	19	30
5	73	87	69	49	44	66	148	125	107	26	17	30
6	72	87	68	48	45	69	147	123	102	25	25	29
7	70	91	66	47	45	74	159	131	100	25	27	27
8	70	90	65	46	45	77	163	145	96	25	29	26
9	64	89	64	46	45	75	161	151	92	25	33	24
10	62	95	63	45	45	75	157	141	86	25	30	24
11	67	98	64	45	45	93	155	128	83	23	27	23
12	65	99	65	45	45	107	150	122	77	23	26	20
13	65	100	62	45	45	111	145	118	70	24	32	19
14	65	92	61	44	45	123	145	116	64	25	30	19
15	61	103	60	44	45	136	151	127	60	24	27	19
16	64	105	59	44	46	141	151	131	60	21	26	17
17	61	107	59	44	46	140	142	125	59	19	24	17
18	59	107	57	45	46	142	138	122	54	20	23	16
19	57	107	56	43	46	145	134	116	53	20	23	15
20	58	106	56	44	46	150	140	110	52	18	22	12
21	62	104	56	44	46	153	141	108	47	16	20	10
22	63	101	55	44	46	157	124	104	43	15	24	12
23	63	100	55	44	46	159	105	102	42	18	33	9.4
24	61	97	54	44	46	169	117	124	38	19	33	6.7
25	62	95	54	44	46	175	132	143	36	19	33	7.9
26	63	76	53	44	46	176	137	142	36	19	44	12
27	62	86	52	44	46	176	140	133	34	18	97	12
28	62	82	52	44	47	175	138	124	31	16	80	12
29	58	76	53	44	-----	176	131	125	28	18	72	10
30	61	78	54	44	-----	186	127	125	26	30	67	8.7
31	71	-----	52	44	-----	182	-----	123	-----	27	44	-----
TOTAL	2,006	2,793	1,876	1,410	1,269	3,815	4,326	3,929	2,028	698	1,053	536.7
MEAN	64.7	93.1	60.5	45.5	45.3	123	144	127	67.6	22.5	34.0	17.9
MAX	73	107	76	52	47	186	171	151	119	32	97	30
MIN	57	71	52	43	44	47	105	102	26	15	17	6.7
CFSM	.36	.52	.34	.25	.25	.69	.80	.71	.38	.13	.19	.10
IN.	.42	.58	.39	.29	.26	.79	.90	.82	.42	.15	.22	.11

CAL YR 1972 TOTAL 44,327.0 MEAN 121 MAX 284 MIN 52 CFM 68 IN 9.21  
WTR YR 1973 TOTAL 25,739.7 MEAN 70.5 MAX 186 MIN 6.7 CFM 39 IN 5.35



05278930 Buffalo Creek near Glencoe, Minn.

LOCATION.--Lat 44°45'50", long 94°05'27", in SW¼SW¼ Sec.16, T.115 N., R.27 W., McLeod County, on right bank, 20 ft (6 m) downstream from bridge on County Highway 1, 2.6 mi (4.2 km) east of Glencoe.

PERIOD OF RECORD.--Annual maximum, water year 1972, October 1972 to September 1973.

GAGE.--Water-stage recorder and crest-stage gage. Datum of gage is 969.60 ft (295.53 m) above mean sea level, datum of 1929. October 1, 1971, to September 30, 1972, crest-stage gage at present site and datum.

EXTREMES.--Maximum discharge during period, October 1972 to September 1973, 728 ft<sup>3</sup>/s (20.6 m<sup>3</sup>/s) Mar. 15 (gage height, 5.96 ft or 1.817 m); minimum, 3.6 ft<sup>3</sup>/s (0.10 m<sup>3</sup>/s) Sept. 20, 23 (gage height, 0.94 ft or 0.287 m).  
Period of record (1971-73): Maximum discharge, 2,370 ft<sup>3</sup>/s (67.1 m<sup>3</sup>/s) May 28, 1972 (gage height, 10.01 ft or 3.051 m) from crest-stage gage.

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

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	48	150	73	20	15	4.6	190	145	291	40	22	54
2	46	180	69	19	15	4.6	188	146	279	53	22	47
3	47	185	63	19	15	4.7	179	148	264	50	21	40
4	46	190	59	18	15	5.1	172	158	235	49	19	35
5	43	200	55	18	15	5.5	169	171	200	49	18	30
6	44	190	52	18	15	6.0	171	180	171	50	18	26
7	44	180	47	16	14	6.5	166	183	149	45	19	23
8	43	170	42	18	13	8.2	157	177	133	42	18	20
9	40	160	37	18	12	9.6	148	168	120	36	17	17
10	40	150	33	18	11	14	140	157	109	31	16	15
11	39	140	30	18	11	21	134	147	98	30	17	12
12	37	135	27	18	10	80	128	137	86	27	19	10
13	35	125	24	17	9.5	305	123	127	77	24	22	10
14	34	120	22	17	9.1	467	121	119	70	22	24	9.2
15	33	115	21	17	8.5	689	128	112	63	20	25	8.7
16	32	110	21	17	8.0	691	127	102	61	19	24	7.2
17	31	106	20	17	7.5	673	125	96	55	15	23	7.7
18	29	104	20	17	7.0	659	126	92	62	13	22	7.2
19	30	100	20	17	6.5	552	129	87	71	13	22	6.3
20	37	97	20	17	6.0	442	139	82	81	14	23	5.1
21	41	94	20	17	5.7	355	137	84	90	14	25	6.3
22	41	92	20	17	5.6	289	143	79	93	14	27	6.7
23	40	90	20	17	5.4	241	155	74	92	14	30	4.7
24	40	89	20	17	5.0	222	163	82	86	15	32	8.7
25	40	87	20	17	4.8	212	165	114	76	15	36	20
26	40	86	20	17	4.6	200	158	121	66	16	39	42
27	39	84	20	17	4.6	194	148	137	58	17	42	32
28	39	81	20	17	4.8	197	138	164	53	18	46	25
29	42	78	20	16	-----	197	129	193	46	20	50	23
30	61	76	20	15	-----	156	125	238	40	21	56	20
31	100	-----	20	15	-----	190	-----	276	-----	22	58	-----
TOTAL	1,301	3,764	975	538	263.6	7,100.8	4,421	4,296	3,375	828	852	578.8
MEAN	42.0	125	31.5	17.4	9.41	229	147	139	113	26.7	27.5	19.3
MAX	100	200	73	20	15	691	190	276	291	53	58	54
MIN	29	76	20	15	4.6	4.6	121	74	40	13	16	4.7

WTR YR 1973 TOTAL 28,293.2 MEAN 77.5 MAX 691 MIN 4.6

NOTE.--No gage-height record Oct. 26 to Nov. 28 and July 18 to Sept. 10.

## CROW RIVER BASIN

05279000 South Fork Crow River near Mayer, Minn.

LOCATION.--Lat 44°54'20", long 93°53'05", in SW¼SW¼ sec.30, T.117 N., R.25 W., Carver County, near center of span on downstream side of bridge on State Highway 7, 1.3 mi (2.1 km) north of Mayer, 4.3 mi (6.9 km) southwest of Watertown, and 16 mi (26 km) upstream from confluence with North Fork.

DRAINAGE AREA.--1,170 mi<sup>2</sup> (3,030 km<sup>2</sup>), 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 (282.18 m) above mean sea level, datum of 1929 (levels by Minnesota Highway Department).

AVERAGE DISCHARGE.--39 years, 254 ft<sup>3</sup>/s (7.19 m<sup>3</sup>/s), 2.95 in/yr (75 mm/yr).

EXTREMES.--Current year: Maximum discharge, 2,280 ft<sup>3</sup>/s (64.6 m<sup>3</sup>/s) Mar. 17 (gage height, 8.97 ft or 2.734 m); minimum, 26 ft<sup>3</sup>/s (0.74 m<sup>3</sup>/s) Aug. 11, 12, 26 (gage height, 0.95 ft or 0.290 m).  
Period of record: Maximum discharge, 16,100 ft<sup>3</sup>/s (456 m<sup>3</sup>/s) Apr. 13, 1965 (gage height, 19.23 ft or 5.861 m, from floodmark); no flow at times.

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

REVISIONS (WATER YEARS).--WSP 1508: 1935-36.

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	221	228	193	66	59	68	826	441	970	116	70	200
2	208	352	181	66	59	81	803	546	1,000	120	58	269
3	197	553	168	66	58	106	792	586	1,010	134	49	307
4	192	632	157	66	58	141	770	603	967	105	59	292
5	184	648	147	66	58	177	734	624	947	132	44	274
6	177	677	136	66	58	225	700	648	826	122	48	240
7	175	710	128	66	58	290	677	658	704	115	40	194
8	165	670	119	66	58	360	644	639	603	113	36	164
9	160	639	112	66	58	470	610	596	509	109	34	147
10	148	603	105	66	57	584	560	569	426	98	32	126
11	143	574	98	67	57	745	539	528	356	96	26	117
12	138	509	93	67	57	960	495	479	312	87	26	106
13	131	479	87	67	57	1,200	479	441	283	81	34	88
14	128	433	82	67	57	1,500	444	383	262	74	32	81
15	123	406	78	67	57	1,950	466	358	223	69	32	80
16	120	364	75	66	57	2,160	486	324	202	58	30	73
17	115	350	72	66	57	2,270	488	298	194	54	49	60
18	117	338	69	65	57	2,260	495	271	192	53	35	67
19	110	330	67	65	57	2,140	470	248	221	48	33	63
20	109	314	66	64	58	1,960	477	235	242	45	26	58
21	120	305	66	64	58	1,740	516	276	252	40	42	53
22	125	289	66	64	58	1,530	532	267	245	41	39	53
23	141	299	66	63	58	1,300	550	216	236	41	70	53
24	146	281	66	63	58	1,060	562	233	228	53	75	56
25	151	272	66	62	59	956	562	322	221	51	130	72
26	148	252	66	62	59	936	532	488	190	48	144	154
27	146	242	66	62	60	912	502	586	176	46	146	192
28	145	231	66	61	62	915	466	687	158	44	142	192
29	145	215	66	61	-----	899	417	732	147	39	141	176
30	141	200	66	60	-----	876	383	826	128	50	144	202
31	160	-----	66	60	-----	844	-----	894	-----	84	136	-----
TOTAL	4,629	12,395	2,959	2,003	1,624	31,615	16,977	15,002	12,430	2,366	2,002	4,209
MEAN	149	413	95.5	64.6	58.0	1,020	566	484	414	76.3	64.6	140
MAX	221	710	193	67	62	2,270	826	894	1,010	134	146	307
MIN	109	200	66	60	57	68	383	216	128	39	26	53
CFSM	.13	.35	.08	.06	.05	.87	.48	.41	.35	.07	.06	.12
IN.	.15	.39	.09	.06	.05	1.01	.54	.48	.40	.08	.06	.13
CAL YR 1972	TOTAL 229,198	MEAN 626	MAX 5,200	MIN 66	CFSM .54	IN 7.29						
WTR YR 1973	TOTAL 108,211	MEAN 296	MAX 2,270	MIN 26	CFSM .25	IN 3.44						

## 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 (46 m) downstream from bridge on State Highway 55 and 1 mi (1.6 km) downstream from confluence of North and South Forks.

DRAINAGE AREA.--2,520 mi<sup>2</sup> (6,530 km<sup>2</sup>), 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 (272.21 m) above mean sea level, datum of 1929. Apr. 13 to July 21, 1906, nonrecording gage at Berning Mill 14 mi (22.5 km) downstream at different datum. June 4, 1909, to Sept. 30, 1917, nonrecording gage at site 600 ft (183 m) downstream at different datum. Apr. 23, 1929, to Aug. 21, 1934, nonrecording gage at site 600 ft (183 m) downstream at present datum.

AVERAGE DISCHARGE.--48 years (1909-17, 1930-31, 1934-73), 625 ft<sup>3</sup>/s (17.7 m<sup>3</sup>/s), 3.37 in/yr (86 mm/yr).

EXTREMES.--Current year: Maximum discharge, 4,270 ft<sup>3</sup>/s (121 m<sup>3</sup>/s) Mar. 19 (gage height, 8.01 ft or 2.44 m); minimum, 151 ft<sup>3</sup>/s (4.28 m<sup>3</sup>/s) July 22 (gage height, 2.21 ft or 0.67 m).  
Period of record: Maximum discharge, 22,400 ft<sup>3</sup>/s (634 m<sup>3</sup>/s) Apr. 16, 1965 (gage height, 19.27 ft or 5.87 m), from floodmark; minimum, 1.8 ft<sup>3</sup>/s (0.051 m<sup>3</sup>/s) Nov. 15, 1936 (gage height, 1.05 ft or 0.32 m), caused by ice jam upstream.

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

REVISIONS (WATER YEARS).--WSP 1115: 1932. WSP 1508: 1933.

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	875	705	780	305	270	258	2,810	1,440	2,020	415	220	460
2	826	896	750	302	268	258	2,760	1,510	2,070	430	218	568
3	784	1,120	720	301	265	280	2,710	1,570	2,140	425	212	598
4	757	1,300	700	300	262	340	2,640	1,600	2,150	425	220	598
5	738	1,420	660	300	260	440	2,550	1,620	2,140	415	209	580
6	738	1,500	620	300	258	620	2,470	1,650	2,080	397	195	532
7	724	1,550	580	299	255	950	2,400	1,680	1,970	374	189	482
8	705	1,560	550	298	253	1,250	2,330	1,680	1,840	346	178	435
9	679	1,560	520	297	251	1,500	2,260	1,640	1,680	334	170	392
10	646	1,540	500	295	250	1,800	2,170	1,590	1,530	323	172	358
11	628	1,500	470	292	249	2,100	2,060	1,530	1,390	302	197	330
12	622	1,460	450	290	247	2,350	1,990	1,470	1,270	285	203	309
13	604	1,390	435	290	246	2,700	1,900	1,400	1,150	276	215	285
14	586	1,320	420	290	245	3,100	1,790	1,340	1,040	257	206	263
15	562	1,260	405	292	244	3,700	1,760	1,280	938	235	212	254
16	544	1,210	395	290	244	3,880	1,730	1,200	854	220	257	235
17	514	1,170	385	290	244	4,040	1,720	1,130	798	200	248	229
18	492	1,120	375	290	244	4,210	1,680	1,060	777	181	254	220
19	476	1,080	365	290	244	4,260	1,640	988	777	175	238	206
20	465	1,050	360	290	244	4,220	1,640	938	784	170	232	197
21	487	1,010	350	290	244	4,120	1,630	903	770	165	232	200
22	532	973	345	289	244	3,940	1,630	896	731	151	248	203
23	568	931	340	288	244	3,710	1,640	882	698	170	292	192
24	574	924	335	287	244	3,480	1,650	980	660	200	326	195
25	562	917	330	286	244	3,280	1,660	1,120	622	212	362	212
26	562	882	325	285	250	3,160	1,630	1,320	592	197	420	254
27	562	868	320	283	269	3,080	1,580	1,500	556	186	440	334
28	550	855	320	281	263	3,040	1,500	1,640	514	183	420	402
29	538	845	320	280	-----	2,980	1,440	1,750	465	183	384	402
30	532	840	315	278	-----	2,940	1,380	1,860	440	183	379	402
31	586	-----	310	274	-----	2,870	-----	1,960	-----	192	425	-----
TOTAL	19,018	34,756	14,050	9,022	7,045	78,856	58,750	43,127	35,446	8,207	8,173	10,327
MEAN	613	1,159	453	291	252	2,544	1,958	1,391	1,182	265	264	344
MAX	875	1,560	780	305	270	4,260	2,810	1,960	2,150	430	440	598
MIN	465	705	310	274	244	258	1,380	882	440	151	170	192
CFSM	.24	.46	.18	.12	.10	1.01	.78	.55	.47	.11	.10	.14
IN.	.28	.51	.21	.13	.10	1.16	.87	.64	.52	.12	.12	.15
CAL YR 1972	TOTAL	582,837	MEAN	1,592	MAX	7,360	MIN	243	CFSM	.63	IN	8.60
WTR YR 1973	TOTAL	326,777	MEAN	895	MAX	4,260	MIN	151	CFSM	.36	IN	4.82

## RUM RIVER BASIN

05284000 Mille Lacs Lake at Garrison, Minn.

LOCATION.--Lat 46°18'05", long 93°49'05", in SW¼SE¼ sec.12, T.44 N., R.28 W., Crow Wing County, at pumphouse of Minnesota Division of Game and Fish, 0.2 mi (0.3 km) southwest of Borden Lake outlet and 0.8 mi (1.3 km) northeast of Garrison.

PERIOD OF RECORD.--June 1931 to current year. Monthend records for the period October 1939 to September 1953 published in WSP 1278 (fragmentary 1940-41). Prior to October 1939, published as "at Wealthwood".

GAGE.--Water-stage recorder. Datum of gage is 1,240.40 ft (378.074 m) above mean sea level, datum of 1929. Prior to Oct. 1, 1941, nonrecording gage at Wealthwood, 8.3 mi (13.4 km) northeast of present site, 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 (378.104 m) above mean sea level, adjustment of 1912. To convert these records to datum of 1929, subtract 0.10 ft (0.030 m).

EXTREMES.--Current year: Maximum elevation, 1,253.01 ft (381.917 m) Oct. 10 (affected by wind action and seiche action); maximum daily, 1,252.88 ft (381.878 m) Oct. 2; minimum, 1,251.57 ft (381.479 m) Sept. 22 (affected by wind action and seiche action); minimum daily, 1,251.67 ft (381.509 m) Sept. 22.

Period of record: Maximum elevation, 1,253.87 ft (382.180 m) Aug. 14, 1972 (affected by wind action and seiche action); maximum daily, 1,253.43 ft (382.045 m) Aug. 22, 1972; minimum observed, 1,245.74 ft (379.702 m) Oct. 16-19, 1936.

REMARKS.--Water level affected by fixed-crest spillway constructed in 1939 at outlet of Ogechie Lake, 30.7 mi (49.4 km) downstream, with crest at elevation 1,250.50 ft (381.152 m). Water level subject to fluctuation caused by change in direction and velocity of wind and by seiches.

## MONTHEND ELEVATION, IN FEET, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

Oct. 31 .....	1,252.53	Feb. 28 .....	1,252.15	June 30 .....	1,252.13
Nov. 30 .....	1,252.37	Mar. 31 .....	1,252.30	July 31 .....	1,252.15
Dec. 31 .....	1,252.36	Apr. 30 .....	1,252.22	Aug. 31 .....	1,252.15
Jan. 31 .....	1,252.29	May 31 .....	1,252.24	Sept.30 .....	1,251.78

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

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 mi (6.4 km) south of St. Francis and 15.8 mi (25.4 km) upstream from mouth.

DRAINAGE AREA.--1,360 mi<sup>2</sup> (3,520 km<sup>2</sup>), 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 (262.35 m) above mean sea level, datum of 1929 (Levels by Anoka County Highway Department). Prior to Nov. 9, 1933, nonrecording gage at site 50 ft (15.2 m) downstream at same datum.

AVERAGE DISCHARGE.--41 years (1930-31, 1933-73), 585 ft<sup>3</sup>/s (16.6 m<sup>3</sup>/s), 5.84 in/yr (148 mm/yr).

EXTREMES.--Current year: Maximum discharge, 5,640 ft<sup>3</sup>/s (160 m<sup>3</sup>/s) Mar. 19 (gage height, 8.25 ft or 2.51 m); minimum, 383 ft<sup>3</sup>/s (10.8 m<sup>3</sup>/s) July 21 (gage height, 2.94 ft or 0.90 m)  
Period of record: Maximum discharge, 10,100 ft<sup>3</sup>/s (286 m<sup>3</sup>/s) Apr. 20, 1965, Apr. 13, 1969; maximum gage height, 11.63 ft (3.54 m) Apr. 13, 1969; minimum discharge, 29 ft<sup>3</sup>/s (0.82 m<sup>3</sup>/s) Aug. 18, 1934 (gage height, 1.91 ft or 0.58 ft).

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. 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	803	908	740	564	519	520	1,780	919	2,310	520	488	512
2	795	1,010	720	560	519	530	1,700	963	2,150	560	474	547
3	835	1,130	710	557	519	540	1,630	1,010	1,880	530	457	577
4	897	1,270	700	554	519	560	1,560	1,040	1,580	520	444	587
5	942	1,410	690	550	519	580	1,490	1,080	1,340	525	426	574
6	985	1,550	680	545	519	625	1,430	1,100	1,200	540	411	553
7	959	1,650	670	540	519	680	1,390	1,090	1,150	520	416	536
8	945	1,720	660	537	519	740	1,330	1,050	1,100	510	433	519
9	943	1,740	655	534	519	815	1,280	1,020	1,050	500	432	504
10	951	1,700	650	530	519	900	1,220	1,030	1,000	485	439	493
11	961	1,620	645	527	519	1,020	1,180	1,060	950	476	514	478
12	957	1,530	640	524	519	1,160	1,120	1,090	900	465	534	461
13	954	1,440	635	520	519	1,350	1,070	1,110	850	453	586	447
14	948	1,350	634	519	519	1,600	1,020	1,140	800	444	579	439
15	934	1,260	634	519	519	2,030	1,030	1,170	750	433	593	433
16	927	1,190	625	519	519	3,280	1,050	1,190	720	424	603	426
17	912	1,120	620	519	519	4,540	1,060	1,160	710	417	594	421
18	893	1,040	615	519	519	5,320	1,070	1,110	750	416	585	415
19	871	1,020	610	519	519	5,570	1,090	1,040	800	405	591	400
20	864	1,030	605	519	519	5,460	1,080	978	870	392	579	390
21	870	1,030	600	519	519	5,050	1,090	932	920	387	550	395
22	893	994	597	519	519	4,490	1,070	914	870	392	554	420
23	910	944	594	519	519	3,940	1,060	904	800	425	610	460
24	911	937	590	519	519	3,490	1,060	987	750	436	612	450
25	911	912	587	519	519	3,070	1,050	1,200	670	472	602	440
26	914	893	584	519	519	2,720	1,030	1,470	640	474	599	470
27	912	873	580	519	519	2,420	996	1,660	600	470	590	520
28	900	834	577	519	519	2,190	957	1,780	580	480	572	540
29	891	805	574	519	-----	2,040	922	1,940	560	488	551	560
30	874	766	570	519	-----	1,940	895	2,110	540	490	534	580
31	877	-----	567	519	-----	1,860	-----	2,270	-----	491	510	-----
TOTAL	28,185	35,676	19,566	16,364	14,532	71,030	35,710	37,517	29,790	14,540	16,462	14,547
MEAN	909	1,189	631	529	519	2,291	1,190	1,210	993	469	531	485
MAX	945	1,740	740	564	519	5,570	1,780	2,270	2,310	560	612	587
MIN	765	700	567	519	519	520	895	904	540	387	411	390
CFSM	.67	.87	.46	.39	.38	1.68	.88	.89	.73	.34	.39	.36
IN	.77	.94	.53	.45	.40	1.94	.98	1.03	.81	.40	.45	.40
AC-FT	55,900	70,700	38,790	32,500	28,820	140,900	70,830	74,410	59,090	28,840	32,650	28,850
CAL YR 1972	TOTAL 420,984	MEAN 1,150	MAX 9,470	MIN 330	CFSM .85	IN 11.52	AC-FT 835,000					
YR 1973	TOTAL 373,441	MEAN 915	MAX 5,570	MIN 387	CFSM .67	IN 9.13	AC-FT 662,400					

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 mi (0.8 km) downstream from Coon Creek, 1.5 mi (2.4 km) downstream from Coon Rapids Dam at Coon Rapids, 6.5 mi (10.5 km) downstream from Anoka, and at mile 864.8 (1,391.5 km) upstream from Ohio River.

EXTREMES.--Current year: Maximum discharge, 36,100 ft<sup>3</sup>/s (1,020 m<sup>3</sup>/s) Mar. 18 (gage height, 10.62 ft or 3.237 m); minimum, 2,600 ft<sup>3</sup>/s (73.6 m<sup>3</sup>/s) July 24, 25 (1.76 ft or 0.533 m).  
Period of record: Maximum discharge, 91,000 ft<sup>3</sup>/s (2,580 m<sup>3</sup>/s) Apr. 17, 1965 (gage height, 19.53 ft or 5.953 m); minimum, 586 ft<sup>3</sup>/s (16.6 m<sup>3</sup>/s) Sept. 13, 1934 (gage height, 0.37 ft or 0.113 m); minimum gage height, 0.13 ft (0.040 m) Nov. 28, 1967.

REMARKS.--Records good. Flow slightly regulated by six reservoirs on headwaters; total usable capacity, 1,640,600 acre-ft (2.02 km<sup>3</sup>). Diurnal regulation caused by dam above station.

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10,700	10,000	7,870	7,200	6,620	5,060	17,300	11,200	14,800	5,160	5,740	6,770
2	10,400	11,400	7,210	7,000	6,300	5,210	16,800	11,300	14,500	5,660	5,250	6,780
3	10,600	12,000	6,840	7,300	5,770	5,280	16,300	11,300	13,800	5,880	5,650	6,900
4	10,300	13,000	4,400	7,200	5,890	5,610	15,700	11,100	13,700	5,920	5,920	7,070
5	10,500	14,700	4,300	6,500	5,770	5,900	15,300	10,900	13,200	5,650	5,410	6,560
6	10,200	15,300	4,300	6,100	5,910	6,300	15,000	11,400	12,600	5,650	5,180	7,070
7	9,950	16,200	4,000	6,000	5,730	7,000	14,300	11,000	12,400	5,420	5,880	6,500
8	9,510	15,800	5,000	6,000	5,500	7,750	13,700	11,000	11,600	4,920	6,010	6,480
9	9,880	15,500	5,800	6,000	5,600	8,680	12,800	12,500	11,400	5,360	6,420	6,280
10	9,410	16,400	6,700	6,000	5,800	9,390	12,600	12,400	10,400	5,170	7,230	6,250
11	9,370	15,700	7,100	6,100	5,700	11,000	11,800	13,300	9,910	4,670	7,650	6,010
12	9,740	16,000	7,300	6,400	6,000	13,300	11,500	13,100	9,610	4,590	7,880	5,660
13	9,450	15,700	7,600	6,600	5,800	16,400	10,900	13,600	9,520	4,990	8,670	5,380
14	9,580	15,300	7,700	6,700	5,150	20,800	10,300	13,900	8,610	5,280	8,710	4,910
15	9,490	14,500	7,500	6,700	4,890	25,300	10,300	13,400	7,750	5,170	8,860	5,240
16	8,740	13,400	5,800	6,600	4,500	28,000	10,200	12,900	7,730	4,730	8,340	4,950
17	9,060	13,100	6,200	6,650	5,000	33,300	10,000	12,600	7,690	4,050	8,620	4,810
18	8,900	12,100	6,300	6,800	6,000	34,900	11,000	11,800	7,670	3,940	8,530	4,750
19	8,370	12,100	7,000	6,700	5,700	34,900	10,500	11,200	7,580	4,430	8,690	4,680
20	8,390	11,700	7,600	6,700	5,120	33,600	10,600	10,600	7,350	3,870	8,360	4,490
21	8,680	11,200	7,600	7,000	5,170	31,400	11,100	9,750	6,880	3,250	8,170	4,430
22	8,700	11,200	7,600	7,300	5,070	28,700	11,900	10,000	6,540	3,250	8,270	4,270
23	9,050	10,500	7,900	7,150	5,070	27,000	11,500	9,900	6,490	3,450	8,890	4,090
24	9,380	9,930	7,800	6,800	4,800	25,300	11,800	10,100	5,820	3,090	7,670	4,110
25	8,820	9,950	7,600	6,700	4,700	24,300	12,200	11,000	5,490	3,430	7,940	4,150
26	8,880	9,410	7,300	6,700	4,800	23,500	11,800	12,400	5,250	4,070	7,530	4,430
27	9,380	8,910	7,300	6,600	4,800	22,600	11,800	12,900	5,600	3,910	7,240	4,880
28	9,210	8,640	7,300	6,200	4,900	21,500	11,800	14,800	6,110	3,800	7,670	5,750
29	9,170	7,980	7,200	6,000	-----	19,900	11,300	15,000	5,690	3,960	6,860	6,350
30	9,100	7,260	7,500	6,300	-----	17,900	11,200	15,500	5,220	4,380	6,390	6,260
31	9,770	-----	7,800	6,500	-----	17,200	-----	15,100	-----	5,790	6,750	-----
TOTAL	292,800	374,880	209,420	204,500	152,060	576,980	373,300	376,950	270,910	142,890	226,380	166,090
MEAN	9,445	12,500	6,755	6,597	5,431	18,610	12,440	12,160	9,030	4,609	7,303	5,336
MAX	10,700	16,400	7,900	7,300	6,620	34,900	17,300	15,500	14,800	5,920	8,890	7,070
MIN	8,370	7,260	4,000	6,000	4,500	5,060	10,000	9,750	5,220	3,090	5,180	4,090
CF8M	.49	.65	.35	.35	.28	.97	.65	.64	.47	.24	.38	.29
IN,	.57	.73	.41	.40	.30	1.12	.73	.73	.53	.28	.44	.32
CAL YR 1972	TOTAL 5,258,120		MEAN 14,370		MAX 44,500		MIN 4,000		CF8M .75		IN 10,24	
NTR YR 1973	TOTAL 3,367,160		MEAN 9,225		MAX 34,900		MIN 3,090		CF8M .48		IN 6,56	

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 mi (3 km) northwest of town of Browns Valley, Minn., 3.2 mi (5.1 km) upstream from proposed Lake Traverse diversion, 5.3 mi (8.5 km) northeast of Peever, 7.2 mi (11.6 km) downstream from Jorgenson River, and 8 mi (13 km) upstream from Big Stone Lake.

DRAINAGE AREA.--447 mi<sup>2</sup> (1158 km<sup>2</sup>).

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

GAGE.--Water-stage recorder. Altitude of gage is 1,000 ft (305 m) (from topographic map). Oct. 1, 1939, to Mar. 20, 1940, nonrecording gage at site 4.5 mi (7.2 km) downstream at different datum. Mar. 21 to Apr. 12, 1940, nonrecording gage at site 100 ft (30 m) downstream at present datum. April 13 to Aug. 27, 1940, nonrecording gage at present site and datum.

AVERAGE DISCHARGE.--34 years, 45.6 ft<sup>3</sup>/s (1.29 m<sup>3</sup>/s), 1.39 in/yr (35 mm/yr), 33,040 acre-ft/yr (40.7 km<sup>3</sup>/yr).

EXTREMES.--Current year: Maximum discharge, 352 ft<sup>3</sup>/s (9.97 m<sup>3</sup>/s) May 25 (gage height, 4.41 ft or 1.344 m); minimum, 0.05 ft<sup>3</sup>/s (0.001 m<sup>3</sup>/s) Aug. 8, 9 (gage height, 2.04 ft or 0.622 m); minimum gage height, 2.02 ft (0.616 m) Aug. 31, Sept. 14.  
Period of record: Maximum discharge, 4,730 ft<sup>3</sup>/s (134 m<sup>3</sup>/s) Apr. 8, 1952 (gage height, 12.16 ft or 3.706 m); maximum gage height, 13.35 ft (4.069 m) 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.90	3.5	5.3	2.8	2.7	40	64	25	63	3.1	.14	.42
2	.90	4.6	5.3	2.7	2.7	45	60	29	53	3.7	.11	.41
3	.90	5.4	5.3	2.7	2.8	47	55	40	47	2.6	.09	.35
4	.98	11	5.3	2.6	2.9	50	51	36	41	2.3	.09	.33
5	1.1	7.2	5.3	2.5	3.1	53	48	30	36	4.1	.09	.31
6	1.5	7.7	5.3	2.4	3.2	58	45	27	31	2.6	.08	.32
7	1.5	7.4	5.3	2.4	3.2	94	44	25	26	1.8	.07	.33
8	1.4	7.4	5.2	2.3	3.2	95	43	24	24	1.2	.05	.31
9	1.5	7.2	5.2	2.2	3.2	96	41	23	21	1.0	.06	.29
10	1.7	7.0	5.1	2.2	3.2	100	37	22	20	.82	.07	.33
11	2.0	6.6	5.0	2.1	3.2	140	35	19	16	.68	.06	.33
12	2.0	6.7	4.9	2.1	3.3	170	35	17	14	.55	.07	.39
13	1.6	6.1	4.8	2.1	3.6	180	33	16	13	.54	.06	.36
14	1.6	5.9	4.7	2.0	3.6	181	32	15	11	.45	.08	.34
15	1.6	5.8	4.6	2.0	3.6	264	30	14	10	.40	.14	.47
16	1.6	5.8	4.5	2.0	3.6	190	28	13	8.8	.35	.18	.55
17	1.6	5.8	4.4	2.0	3.6	154	26	12	8.2	.30	.11	.54
18	1.9	5.7	4.2	2.1	3.7	140	25	12	8.2	.27	.24	.55
19	1.9	5.6	4.1	2.1	3.7	120	26	11	7.4	.27	.16	.59
20	2.4	5.6	4.0	2.2	3.8	102	28	10	6.4	.23	.12	.56
21	2.9	5.6	3.9	2.2	3.8	88	33	11	5.8	.21	.11	.59
22	2.7	5.6	3.8	2.2	4.2	80	35	10	5.6	.22	.14	.71
23	2.7	5.6	3.7	2.3	5.2	74	30	10	5.2	.32	.18	.77
24	2.6	5.6	3.6	2.4	6.8	77	29	24	4.4	.46	.22	1.0
25	3.5	5.6	3.5	2.4	9.0	96	29	196	6.4	.32	.23	1.3
26	3.9	5.5	3.3	2.6	15	104	32	238	5.0	.43	.25	1.2
27	4.1	5.4	3.2	2.7	23	90	31	130	3.9	.28	.23	1.0
28	3.7	5.4	3.1	2.7	30	85	31	133	3.3	.21	.19	.97
29	3.3	5.4	3.0	2.7	-----	79	27	116	3.5	.25	.19	.81
30	3.9	5.3	3.0	2.7	-----	71	24	94	3.3	.31	.19	.79
31	3.9	-----	2.9	2.7	-----	67	-----	76	-----	.18	.30	-----
TOTAL	67.78	183.0	134.8	73.1	162.9	3,230	1,087	1,458	511.4	30.45	4.30	17.22
MEAN	2.19	6.10	4.35	2.36	5.82	104	36.2	47.0	17.0	.98	.14	.57
MAX	4.1	11	5.3	2.8	30	264	64	238	63	4.1	.30	1.3
MIN	.90	3.5	2.9	2.0	2.7	40	24	10	3.3	.18	.05	.29
CFSM	.005	.01	.010	.005	.01	.23	.08	.11	.04	.002	.0003	.001
IN.	.005	.02	.01	.006	.01	.27	.09	.12	.04	.002	0	.001
AC-FT	134	363	267	145	323	6,410	2,160	2,890	1,010	60	8.5	34

CAL YR 1972 TOTAL 26,117.11 MEAN 71.4 MAX 1,910 MIN .57 CFSM .16 IN 2.17 AC-FT 51,800  
WTR YR 1973 TOTAL 6,959.95 MEAN 19.1 MAX 264 MIN .05 CFSM .04 IN .58 AC-FT 13,810

PEAK DISCHARGE (BASE, 450 CFS).--No peak above base.

## MINNESOTA RIVER BASIN

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

LOCATION.--Lat 45°17'32", long 96°29'14", in SE¼NW¼ sec.18, T.121 N., R.46 W., Grant County, on right bank 20 ft (6 m) downstream from highway bridge, 1.5 mi (2.4 km) west of Big Stone City, and 4.5 mi (7.2 km) upstream from Big Stone Lake.

DRAINAGE AREA.--389 mi<sup>2</sup> (1,008 km<sup>2</sup>).

PERIOD OF RECORD.--March 1910 to November 1912 (no winter records), and March 1931 to current year. Monthly discharge only for some periods, published WSP 1308.

GAGE.--Water-stage recorder. Datum of gage is 996.96 ft (303.87 m) above mean sea level, adjustment of 1912. Mar. 8, 1910, to Nov. 30, 1912, nonrecording gage 2 mi (3 km) downstream at different datum. Mar. 18, 1931, to May 3, 1939, nonrecording gage, at site 20 ft (6 m) upstream at present datum. May 4, 1939, to Nov. 8, 1952, water-stage recorder at site 80 ft (24 m) downstream at present datum.

AVERAGE DISCHARGE.--42 years (1931-73), 48.2 ft<sup>3</sup>/s (1.37 m<sup>3</sup>/s), 1.68 in/yr (43 mm/yr), 34,920 acre-ft/yr (43.1 km<sup>3</sup>/yr).

EXTREMES.--Current year: Maximum discharge, 2,470 ft<sup>3</sup>/s (70 m<sup>3</sup>/s) May 25 (gage height, 9.23 ft or 2.813 m); minimum, 4.0 ft<sup>3</sup>/s (0.113 m<sup>3</sup>/s) Sept. 3, 11, 12, 13, 14, 15, 18 (gage height, 1.35 ft or 0.411 m).  
Period of record: Maximum discharge, 6,870 ft<sup>3</sup>/s (195 m<sup>3</sup>/s) Apr. 8, 1969 (gage height, 14.32 ft or 4.365 m) from floodmark; no flow at times in most years.  
Maximum stage known, about 26 ft (8 m) in June 1919, present site and datum, from information by local resident.

REMARKS.--Records good except 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9.3	23	16	20	16	120	111	71	141	12	5.8	5.2
2	8.6	47	17	20	16	150	103	96	116	14	5.8	4.9
3	8.2	62	21	20	17	220	94	186	101	13	5.5	4.9
4	8.7	54	22	19	18	300	86	178	89	12	5.7	4.3
5	12	59	22	18	19	340	80	133	81	11	5.8	4.4
6	15	50	21	17	20	360	77	110	72	11	5.3	4.3
7	14	46	20	15	21	375	79	94	64	11	5.5	4.3
8	12	41	19	14	22	490	79	83	59	9.8	5.2	4.4
9	10	40	19	12	25	427	79	76	54	9.2	5.2	4.6
10	10	37	18	11	28	388	75	69	49	8.4	5.8	4.6
11	11	34	18	9.8	31	420	72	62	45	8.2	4.7	4.3
12	11	31	18	9.8	33	520	69	58	39	7.4	5.0	4.1
13	11	30	18	10	35	460	66	53	37	7.1	5.3	4.1
14	12	28	18	11	35	418	62	52	34	6.9	5.0	4.1
15	13	25	18	11	35	704	63	50	31	7.4	5.0	4.6
16	13	23	18	12	35	657	61	49	29	7.1	4.9	4.7
17	13	22	17	12	35	303	59	46	26	6.7	5.0	4.7
18	13	21	17	12	35	214	57	45	24	7.4	4.6	4.6
19	12	21	17	12	35	181	55	44	21	6.9	4.6	4.3
20	14	20	17	12	36	161	64	44	21	6.7	4.9	4.3
21	18	20	17	12	36	146	71	52	20	6.1	4.6	4.6
22	19	19	17	12	36	136	79	57	18	6.3	4.7	4.6
23	19	19	17	12	39	133	75	57	17	7.1	5.0	4.6
24	20	18	17	12	50	141	70	213	16	7.6	5.2	4.6
25	20	18	17	13	65	161	69	1,890	15	7.1	5.2	4.6
26	20	18	17	13	86	201	69	1,560	14	7.1	5.2	5.2
27	17	17	17	14	94	187	70	648	13	6.7	5.0	5.0
28	16	17	18	14	100	164	69	371	12	6.5	4.6	5.0
29	16	16	19	15	-----	147	65	276	12	6.7	4.4	4.9
30	18	16	20	15	-----	132	62	223	11	6.5	5.2	5.0
31	23	-----	20	15	-----	120	-----	174	-----	6.3	4.9	-----
TOTAL	436.8	892	567	424.6	1,053	8,876	2,190	7,120	1,281	257.2	158.6	137.8
MEAN	14.1	29.7	18.3	13.7	37.6	286	73.0	230	42.7	8.30	5.12	4.59
MAX	23	62	22	20	100	704	111	1,890	141	14	5.8	5.2
MIN	8.2	16	16	9.8	16	120	55	44	11	6.1	4.4	4.1
CFSM	.04	.08	.05	.04	.10	.74	.19	.59	.11	.02	.01	.01
IN.	.04	.09	.05	.04	.10	.85	.21	.68	.12	.02	.02	.01
AC-FT	866	1,770	1,120	842	2,090	17,610	4,340	14,120	2,540	510	315	273

CAL YR 1972 TOTAL 48,941.9 MEAN 134 MAX 2,600 MIN 7.1 CFSM .34 IN 4.68 AC-FT 97,080  
WTR YR 1973 TOTAL 23,394.0 MEAN 64.1 MAX 1,890 MIN 4.1 CFSM .16 IN 2.24 AC-FT 46,400

## PEAK DISCHARGE (BASE, 200 CFS)

DATE	TIME	G. H.	DISCHARGE	DATE	TIME	G. H.	DISCHARGE
3-15	2000	6.53	967	5-3	1900	3.66	217
3-26	1630	3.61	210	5-25	2145	9.23	2,470



## 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 mi (0.8 km) north of concrete dam at outlet, 0.5 mi (0.8 km) 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 (291.90 m) above mean sea level, datum of 1929. Prior to Sept. 17, 1947, nonrecording gage at site 0.5 mi (0.8 km) south at same datum. Sept. 18, 1947, to June 30, 1963, water-stage recorder at site 0.5 mi (0.8 km) south at same datum. Sept. 21, 1959, to June 30, 1963, supplementary nonrecording gage read once daily, at present site and datum.

EXTREMES.--Current year: Maximum gage height observed, 8.08 ft (2.463 m) May 27; minimum observed, 5.96 ft (1.817 m) Sept. 24.

Period of record: Maximum gage height, 12.73 ft (3.880 m) Apr. 17, 1952; minimum observed, 3.53 ft (1.076 m) Mar. 2, 1957 (strong upstream wind in channel). Minimum observations of 3.10 ft (0.945 m) Mar. 2, 1940 and 2.20 ft (0.671 m) 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.--Natural lake with concrete dam at outlet. Fixed crest of dam is at 5.95 ft (1.81 m), with one 5-ft (1.5 m) and two 2.5-ft (0.76 m) gates with lowest sill at 0.71 ft (0.22 m). Changes in gate openings are not made.

Silt barrier dam 700 ft (213 m) upstream in outlet channel of lake completed July 7, 1958; crest at 5.9 ft (1.80 m). 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 1972 TO SEPTEMBER 1973

Oct. 31 .....	7.00	Feb. 28 .....	7.00	June 30 .....	6.95
Nov. 30 .....	6.95	Mar. 31 .....	7.58	July 31 .....	6.68
Dec. 31 .....	6.94	Apr. 30 .....	7.52	Aug. 31 .....	6.31
Jan. 31 .....	7.08	May 31 .....	7.93	Sept. 30 .....	6.18

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 (122 m) downstream from bridge on U.S. Highway 12 and 1,300 ft (396 m) downstream from dam at outlet of Big Stone Lake, at Ortonville.

DRAINAGE AREA.--1,160 mi<sup>2</sup> (3,000 km<sup>2</sup>), approximately.

PERIOD OF RECORD.--February 1938 to current year.

GAGE.--Water-stage recorder. Datum of gage is 956.38 ft (291.50 m) above mean sea level, datum of 1929. Prior to Mar. 31, 1939, nonrecording gage on downstream side of dam 1,300 ft (396 m) upstream at datum 1.31 ft (0.40 m) higher.

AVERAGE DISCHARGE.--35 years, 115 ft<sup>3</sup>/s (3.26 m<sup>3</sup>/s), 83,320 acre-ft/yr (103 km<sup>3</sup>/yr.

EXTREMES.--Current year: Maximum discharge, 775 ft<sup>3</sup>/s (21.9 m<sup>3</sup>/s) May 26 (gage height, 7.70 ft or 2.347 m); minimum, 0.82 ft<sup>3</sup>/s (0.023 m<sup>3</sup>/s) Aug. 12, 13 (gage height, 1.08 ft or 0.329 m); minimum gage height, 1.07 ft (0.326 m) Oct. 19, Dec. 15, 16, 27.

Period of record: Maximum discharge, 3,060 ft<sup>3</sup>/s (86.7 m<sup>3</sup>/s) Apr. 13, 1952 (gage height, 12.92 ft or 3.938 m); 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.6	2.7	2.1	1.7	65	190	372	154	511	16	2.1	5.9
2	1.9	4.9	2.0	1.8	65	200	376	186	466	16	2.0	6.7
3	2.3	2.2	1.9	1.8	65	210	392	165	512	11	2.4	7.0
4	2.2	1.9	1.9	1.8	66	220	331	189	485	11	2.6	7.3
5	2.9	1.7	1.8	2.0	66	234	273	169	474	10	3.3	6.9
6	2.6	2.6	1.7	1.9	66	253	216	230	441	10	3.1	6.5
7	3.0	1.7	1.6	1.8	66	262	192	223	403	10	2.9	6.4
8	3.3	1.7	1.6	1.9	66	306	135	214	412	11	2.5	6.3
9	2.8	1.7	1.7	1.9	66	343	172	259	360	13	1.8	6.3
10	2.8	1.7	1.7	1.8	66	261	94	254	367	15	1.3	6.4
11	2.3	1.7	1.6	1.8	66	299	52	238	278	13	1.0	6.3
12	1.8	1.7	1.6	3.0	66	341	15	211	116	11	.90	6.1
13	1.8	1.7	1.6	5.5	66	350	5.5	162	107	12	1.3	6.3
14	1.8	1.7	1.5	5.5	66	369	6.0	145	99	6.2	2.2	5.2
15	2.0	1.7	1.4	10	66	405	81	130	73	5.7	2.2	4.1
16	17	1.7	1.4	39	66	421	18	169	26	5.5	2.1	4.1
17	1.7	1.8	1.5	48	66	420	16	56	19	6.0	1.8	4.0
18	1.7	1.8	1.5	54	66	416	4.2	22	18	4.5	1.8	3.5
19	1.7	1.9	1.5	44	66	420	14	19	14	3.3	1.7	2.6
20	1.7	1.9	1.5	42	66	415	22	16	18	3.0	3.8	2.5
21	1.7	1.8	1.5	39	67	398	64	17	28	3.6	4.6	2.6
22	1.7	1.9	1.5	50	67	396	67	21	73	6.9	5.1	2.9
23	1.7	1.8	1.7	60	68	418	39	16	14	7.3	5.5	3.5
24	1.7	1.8	1.7	62	68	428	42	84	19	7.0	5.3	3.6
25	1.7	1.9	1.7	63	71	438	49	425	23	6.4	5.3	2.7
26	1.6	1.9	1.7	63	76	415	82	664	20	4.8	5.4	3.0
27	1.6	2.2	1.7	64	90	401	58	598	7.0	3.8	5.6	2.9
28	2.1	2.1	1.6	64	140	418	23	612	4.9	3.6	5.7	2.8
29	3.0	2.0	1.7	64	-----	394	31	583	5.0	6.9	5.7	4.0
30	3.8	2.2	1.7	64	-----	364	36	583	5.1	13	5.8	4.9
31	3.0	-----	1.7	65	-----	353	-----	555	-----	6.3	5.6	-----
TOTAL	82.5	60.0	51.3	929.2	1,964	10,758	3,277.7	7,369	5,398.0	262.8	102.40	143.3
MEAN	2.66	2.00	1.65	30.0	70.1	347	109	238	180	8.48	3.30	4.78
MAX	17	4.9	2.1	65	140	438	392	664	512	16	5.8	7.3
MIN	1.6	1.7	1.4	1.7	65	190	4.2	16	4.9	3.0	.90	2.5
AC-FT	164	119	102	1,840	3,900	21,340	6,500	14,620	10,710	521	203	284

CAL YR 1972	TOTAL	86,389.60	MEAN	236	MAX	1,160	MTN	1.4	AC-FT	171,400
WTP YR 1973	TOTAL	30,398.20	MEAN	83.3	MAX	664	MTN	.90	AC-FT	60,290

05293000 Yellow Bank River near Odessa, Minn.

LOCATION.--Lat 45°13'35", long 96°21'12", in SE¼SE¼ sec.1, T.120 N., R.46 W., Lac qui Parle County, on left bank 150 ft (46 m) downstream from highway bridge, 2.5 mi (4 km) southwest of Odessa, and 4.5 mi (7.2 km) upstream from mouth.

DRAINAGE AREA.--398 mi<sup>2</sup> (1,031 km<sup>2</sup>).

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

GAGE.--Water-stage recorder. Datum of gage is 953.34 ft (290.58 m) above mean sea level, datum of 1929 (Corps of Engineers bench mark). Prior to Aug. 28, 1940, nonrecording gage at site 150 ft (46 m) upstream at same datum.

AVERAGE DISCHARGE.--34 years, 60.2 ft<sup>3</sup>/s (1.70 m<sup>3</sup>/s), 2.05 in/yr (52 mm/yr), 43,610 acre-ft/yr (53.8 hm<sup>3</sup>/yr).

EXTREMES.--Current year: Maximum discharge, 1,040 ft<sup>3</sup>/s (29.5 m<sup>3</sup>/s) Mar. 16 (gage height, 6.96 ft or 2.121 m); maximum gage height, 7.69 ft (2.344 m) Mar. 8 (backwater from ice); minimum discharge, 0.80 ft<sup>3</sup>/s (0.023 m<sup>3</sup>/s) Sept. 3; minimum gage height, 1.61 ft (0.491 m) Aug. 18, 1965.  
Period of record: Maximum discharge, 6.970 ft<sup>3</sup>/s (197 m<sup>3</sup>/s) Apr. 9, 1969 (gage height, 19.07 ft or 5.813 m, 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7.8	28	19	11	11	33	149	73	176	15	6.3	1.3
2	7.6	48	18	10	11	40	138	88	146	15	6.0	1.3
3	7.3	66	18	10	11	50	129	129	124	14	5.4	.97
4	7.0	65	18	10	11	68	121	195	107	12	5.0	1.1
5	11	71	17	10	11	90	115	172	96	11	4.5	1.3
6	18	67	17	9.8	12	130	107	143	84	11	4.3	1.3
7	16	64	16	9.8	12	190	103	130	75	9.7	3.8	1.1
8	16	61	16	9.8	12	300	98	116	70	8.7	4.4	1.1
9	15	58	16	9.8	12	416	94	112	63	8.6	4.2	1.1
10	21	54	16	9.8	13	460	88	110	57	8.3	4.3	1.1
11	22	50	16	9.8	13	495	83	97	52	7.6	3.3	1.7
12	21	47	15	9.8	13	540	79	84	49	7.1	2.6	2.1
13	21	45	15	9.8	14	590	77	75	45	6.9	2.5	1.3
14	19	42	14	9.8	14	652	76	68	42	6.3	2.1	1.1
15	19	40	14	9.8	14	731	73	63	41	6.1	2.0	2.1
16	19	38	14	9.8	15	949	73	59	38	5.9	1.9	2.1
17	18	36	14	9.8	15	608	73	56	34	6.3	1.7	2.1
18	17	34	14	9.8	16	425	71	53	31	7.0	1.1	1.9
19	16	32	13	9.8	16	348	70	50	28	5.8	1.6	1.7
20	18	31	13	9.8	17	293	73	48	26	5.4	1.9	1.5
21	19	30	13	9.8	17	252	72	54	25	5.2	1.9	1.3
22	20	28	13	9.8	18	222	78	56	23	5.6	2.1	1.3
23	20	27	12	10	18	201	82	55	22	8.8	2.3	1.3
24	19	25	12	10	19	197	79	255	20	11	2.3	1.3
25	19	23	12	10	20	211	77	484	19	12	2.1	1.3
26	19	22	12	10	21	229	74	567	17	11	1.7	1.5
27	18	21	12	10	24	227	73	444	16	7.6	1.9	1.9
28	19	20	12	10	28	206	73	315	15	6.8	1.3	1.7
29	18	20	12	10	-----	188	67	275	15	6.6	1.3	1.5
30	22	19	11	11	-----	173	66	273	14	6.5	1.5	1.5
31	26	-----	11	11	-----	160	-----	228	-----	6.3	1.3	-----
TOTAL	535.7	1,212	445	309.6	428	9,674	2,631	4,927	1,570	265.1	88.6	43.87
MEAN	17.3	40.4	14.4	9.99	15.3	312	87.7	159	52.3	8.55	2.86	1.46
MAX	26	71	19	11	28	949	149	567	176	15	6.3	2.1
MIN	7.0	19	11	9.8	11	33	66	48	14	5.2	1.1	.97
CFSM	.04	.10	.04	.03	.04	.78	.22	.40	.13	.02	.007	.004
IN	.05	.11	.04	.03	.04	.90	.25	.46	.15	.02	.008	.004
AC-FT	1,060	2,400	883	614	849	19,190	5,220	9,770	3,110	526	176	87

CAL YR 1972 TOTAL 62,082.50 MEAN 170 MAX 2,090 MIN 6.4 CFSM .43 IN 5.80 AC-FT 123,100  
WTR YR 1973 TOTAL 22,129.87 MEAN 60.6 MAX 949 MIN .97 CFSM .15 IN 2.07 AC-FT 43,890

PEAK DISCHARGE (BASE, 300 CFS).--Mar. 16 (0915) 1,040 cfs (6.96 ft); May 26 (1400) 588 cfs (5.25 ft).

## 05294000 Pomme de Terre River at Appleton, Minn.

LOCATION.--Lat 45°12'10", long 96°01'20", in SW¼NW¼ sec.14, T.120 N., R.43 W., Swift County, on left bank 60 ft (18 m) upstream from bridge on U.S. Highway 59 and State Highway 119 at Appleton and 8 mi (13 km) upstream from mouth.

DRAINAGE AREA.--905 mi<sup>2</sup> (2,344 km<sup>2</sup>), 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 (298.09 m) above mean sea level, datum of 1929. Prior to Dec. 22, 1952, nonrecording gage at site 4 mi (6 km) upstream at datum 25.17 ft (7.67 m) higher.

AVERAGE DISCHARGE.--38 years (1935-73), 105 ft<sup>3</sup>/s (2.97 m<sup>3</sup>/s), 1.58 in/yr (40 mm/yr), 76,070 acre-ft/yr (93.8 hm<sup>3</sup>/yr).

EXTREMES.--Current year: Maximum discharge, 984 ft<sup>3</sup>/s (27.9 m<sup>3</sup>/s) Mar. 13 (gage height, 7.09 ft or 2.161 m, from floodmark); minimum, 23 ft<sup>3</sup>/s (0.65 m<sup>3</sup>/s) June 13 (gage height, 4.44 ft or 1.353 m).  
Period of record: Maximum discharge, 5,520 ft<sup>3</sup>/s (156 m<sup>3</sup>/s) Apr. 11, 1969 (gage height, 13.78 ft or 4.200 m); maximum gage height, 14.58 ft (4.444 m) 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 (152 m) upstream.

REVISIONS (WATER YEARS).--WSP 1308: 1931(M), 1937(M).

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	85	105	62	50	50	68	315	172	172	45	47	38
2	85	131	63	50	50	76	302	203	158	50	46	36
3	84	174	64	50	50	91	286	212	146	51	45	36
4	93	169	66	50	50	113	275	190	138	46	44	35
5	96	147	71	50	50	163	264	169	127	44	42	34
6	90	139	77	50	50	215	257	279	120	43	41	32
7	92	135	76	50	50	228	250	333	112	40	42	32
8	91	133	74	50	50	255	241	221	107	38	41	32
9	86	131	73	50	50	290	227	185	101	37	44	31
10	86	126	71	50	50	277	212	172	97	36	46	31
11	86	123	67	50	50	336	202	165	93	35	46	30
12	83	129	64	50	50	373	192	155	87	37	48	30
13	87	125	62	50	50	748	185	145	68	35	49	29
14	88	80	60	50	50	764	178	137	75	33	45	28
15	84	96	58	50	50	724	173	127	72	32	44	27
16	85	119	57	50	51	733	176	120	67	31	43	27
17	83	122	56	50	52	674	183	115	63	30	40	27
18	83	116	56	50	52	604	173	109	73	29	37	27
19	82	111	56	50	52	548	167	103	59	28	36	27
20	83	106	55	50	52	498	167	98	56	27	34	26
21	84	104	55	50	52	456	167	99	56	27	33	26
22	84	101	54	50	52	419	161	102	53	28	34	26
23	84	88	54	50	52	390	161	98	52	31	38	26
24	85	97	54	50	53	363	163	121	46	45	39	26
25	84	109	53	50	54	395	165	273	48	57	40	27
26	83	93	53	50	56	401	165	278	45	38	40	33
27	81	72	52	50	59	381	157	225	46	39	39	37
28	83	57	52	50	62	367	153	205	44	40	36	37
29	87	60	52	50	-----	361	147	203	45	41	34	39
30	93	61	51	50	-----	345	158	198	45	48	33	41
31	100	-----	51	50	-----	330	-----	186	-----	49	35	-----
TOTAL	2,678	3,359	1,869	1,550	1,449	12,006	6,022	5,398	2,471	1,190	1,261	933
MEAN	86.4	112	60.3	50.0	51.8	387	201	174	82.4	38.4	40.7	31.1
MAX	100	174	77	50	62	764	315	333	172	57	49	41
MIN	81	57	51	50	50	68	147	98	44	27	33	26
CFSM	.10	.12	.07	.06	.06	.43	.22	.19	.09	.04	.05	.03
IN	.11	.14	.08	.06	.06	.49	.25	.22	.10	.05	.05	.04
AC-FT	5,310	6,660	3,710	3,070	2,870	23,810	11,940	10,710	4,900	2,360	2,500	1,850

CAL YR 1972	TOTAL 90,007	MEAN 246	MAX 1,240	MIN 23	CFSM .27	IN 3.70	AC-FT 178,500
WTR YR 1973	TOTAL 40,186	MEAN 110	MAX 764	MIN 26	CFSM .12	IN 1.65	AC-FT 79,710

## PEAK DISCHARGE (BASE, 200 CFS)

DATE	TIME	G. H.	DISCHARGE	DATE	TIME	G. H.	DISCHARGE
3-13	About 1800	7.09	984	5-06	2230	6.02	432
5-03	0345	5.46	218	5-25	1715	5.79	320

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

LOCATION.--Lat°44°59'42", long 95°55'09", in SW¼SW¼ sec.27, T.118 N., R.42 W., Lac qui Parle County, on right bank 40 ft (12 m) downstream from highway bridge and 0.5 mi (0.8 km) southwest of village of Lac qui Parle.

DRAINAGE AREA.--983 mi<sup>2</sup> (2,546 km<sup>2</sup>).

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 (290.16 m) above mean sea level (Minnesota Highway Department bench mark). Apr. 27, 1910, to Nov. 15, 1914, nonrecording gage at site 2 mi (3 km) downstream at different datum. Mar. 17, 1931, to Mar. 9, 1937, nonrecording gage at site 40 ft (12 m) upstream at present datum.

AVERAGE DISCHARGE.--42 years (1912-13, 1931-32, 1933-72), 125 ft<sup>3</sup>/s (3.54 m<sup>3</sup>/s), 1.73 in/yr (44 mm/yr), 90,560 acre-ft/yr (112 hm<sup>3</sup>/yr).

EXTREMES.--Current year: Maximum discharge, 1,760 ft<sup>3</sup>/s (49.8 m<sup>3</sup>/s) Mar. 14 (gage height, 6.25 ft or 1.905 m); maximum gage height, 9.08 ft (2.768 m) Mar. 13 (backwater from ice); minimum discharge, 0.08 ft<sup>3</sup>/s (0.002 m<sup>3</sup>/s) Sept. 20, 21, 22 (gage height, 0.21 ft or 0.064 m);  
Period of record: Maximum discharge, 17,100 ft<sup>3</sup>/s (484 m<sup>3</sup>/s) Apr. 10, 1969 (gage height, 18.94 ft or 5.773 m, from floodmark); maximum gage height, 19.37 ft (5.904 m) 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP		
1	9.4	42	44	12	23	110	432	147	372	27	10	1.6		
2	11	72	42	11	23	135	413	162	311	29	9.3	1.5		
3	13	95	40	11	24	163	391	225	256	27	9.3	2.6		
4	13	138	38	11	24	200	367	316	222	24	8.4	2.8		
5	12	178	36	11	25	235	337	324	193	21	7.5	2.1		
6	15	165	34	11	25	288	311	321	174	19	6.4	1.0		
7	15	144	33	10	25	330	290	342	155	18	6.0	.82		
8	15	129	31	10	26	365	272	364	145	17	6.7	.78		
9	14	120	30	10	26	415	259	321	130	15	6.4	.91		
10	19	113	28	10	26	1,000	243	272	120	14	9.3	.81		
11	30	102	27	10	27	1,220	235	233	110	14	5.9	.68		
12	30	95	26	10	27	1,400	225	210	100	13	5.6	.75		
13	30	87	24	10	27	1,650	218	183	91	12	6.7	.91		
14	28	81	23	10	27	1,700	215	167	83	11	5.3	.88		
15	25	75	22	10	28	1,690	210	155	75	11	4.8	1.5		
16	27	71	21	10	28	1,590	198	145	73	10	4.5	1.1		
17	25	67	20	10	28	1,510	190	135	67	9.8	3.6	.93		
18	25	65	19	10	28	1,250	188	129	62	9.1	3.3	.83		
19	24	63	18	10	29	994	183	122	54	8.5	3.1	.25		
20	24	61	17	10	30	868	186	117	50	7.1	2.7	.12		
21	25	59	16	10	30	762	181	117	46	7.0	2.3	.08		
22	27	57	15	10	31	672	181	115	42	7.1	4.2	.34		
23	30	56	15	11	34	604	181	120	37	7.8	5.1	.44		
24	33	55	14	12	37	568	176	287	34	8.9	5.2	.74		
25	34	54	14	13	47	568	171	313	30	11	6.6	1.3		
26	34	53	13	14	58	568	162	235	29	12	6.0	3.6		
27	32	51	13	16	72	568	153	235	28	12	4.5	8.0		
28	31	50	13	18	92	541	149	351	28	12	3.2	9.0		
29	30	49	12	20	-----	509	143	329	27	11	2.3	5.2		
30	34	47	12	21	-----	484	141	424	27	11	1.9	4.1		
31	42	-----	12	22	-----	459	-----	440	-----	9.8	1.9	-----		
TOTAL	756.4	2,494	722	374	927	23,416	7,001	7,356	3,171	426.1	168.0	55.67		
MEAN	24.4	83.1	23.3	12.1	33.1	755	233	237	106	13.7	5.42	1.86		
MAX	42	178	44	22	92	1,700	432	440	372	29	10	9.0		
MIN	9.4	42	12	10	23	110	141	115	27	7.0	1.9	.08		
CFSM	.02	.08	.02	.01	.03	.77	.24	.24	.11	.01	.006	.002		
IN.	.03	.09	.03	.01	.04	.89	.26	.28	.12	.02	.006	.002		
AC-FT	1,500	4,950	1,430	742	1,840	46,450	13,890	14,590	6,290	845	333	110		
CAL YR 1972	TOTAL	102,861.40	MEAN	281	MAX	4,030	MIN	9.4	CFSM	.29	IN	3.89	AC-FT	204,000
WTR YR 1973	TOTAL	46,867.17	MEAN	128	MAX	1,700	MIN	.08	CFSM	.13	IN	1.77	AC-FT	92,960

## 05301000 Minnesota River near Lac qui Parle, Minn.

LOCATION.--Lat 45°01'17", long 95°52'05", in NW¼NE¼ sec.24, T.118 N., R.42 W., Chippewa County, on left bank 200 ft (61 m) downstream from dam at Lac qui Parle Outlet, 2.4 mi (3.9 km) northeast of village of Lac qui Parle, and 3.5 mi (5.6 km) west of Watson.

DRAINAGE AREA.--4,050 mi<sup>2</sup> (10,500 km<sup>2</sup>), approximately.

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

GAGE.--Water-stage recorder. Datum of gage is 900.00 ft (274.32 m) above mean sea level, datum of 1929 (levels by Corps of Engineers). Prior to Nov. 10, 1944, at datum 0.20 ft (0.06 m) lower.

AVERAGE DISCHARGE.--31 years, 658 ft<sup>3</sup>/s (18.6 m<sup>3</sup>/s), 476,700 acre-ft/yr (588 hm<sup>3</sup>/yr).

EXTREMES.--Current year: Maximum discharge, 4,650 ft<sup>3</sup>/s (132 m<sup>3</sup>/s) Mar. 17 (gage height, 32.93 ft or 10.037 m); minimum, 26 ft<sup>3</sup>/s (0.736 m) July 27 (gage height, 20.48 ft or 6.242 m).

Period of record: Maximum discharge, 29,400 ft<sup>3</sup>/s (833 m<sup>3</sup>/s) Apr. 12, 1969 (gage height, 39.75 ft or 12.116 m); no flow Nov. 17, 1942, Sept. 29, 1947, Oct. 19 to Nov. 18, 1951, Nov. 24, 1952.

REMARKS.--Records good. Part of flow from 2,050 mi<sup>2</sup> (5,310 km<sup>2</sup>) 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.

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	128	226	185	200	360	391	2,230	761	1,250	158	27	29
2	128	387	233	202	360	483	2,210	875	1,250	158	28	29
3	126	466	320	207	360	600	2,180	868	1,240	158	28	28
4	128	492	342	211	358	600	2,120	793	1,250	159	27	28
5	128	483	488	218	360	684	1,710	722	1,240	126	27	28
6	107	511	635	222	358	855	1,310	749	1,230	70	27	28
7	77	583	612	228	360	938	1,580	755	1,220	55	27	28
8	80	670	579	235	360	1,150	1,530	768	1,210	54	27	28
9	82	943	555	237	358	1,330	1,550	781	1,200	54	27	29
10	82	1,120	535	235	365	1,420	1,500	798	1,180	55	27	29
11	55	1,230	526	226	367	1,470	1,490	847	1,170	42	27	30
12	34	1,280	511	207	367	1,580	1,400	933	1,150	27	28	30
13	35	1,270	501	166	358	1,900	1,260	935	1,030	28	27	30
14	35	1,260	495	161	350	2,370	1,220	934	767	28	27	31
15	36	1,140	482	163	350	2,890	1,340	931	759	28	27	31
16	41	943	476	163	350	3,550	1,340	931	761	28	27	31
17	36	899	474	166	350	4,490	1,470	923	763	28	28	31
18	36	626	415	163	350	4,590	1,350	911	751	28	28	32
19	37	477	347	163	353	4,450	1,220	900	669	27	28	33
20	38	370	307	168	355	4,240	1,320	898	577	27	27	34
21	38	199	248	168	353	4,020	1,710	887	572	27	27	36
22	38	96	213	166	346	3,790	1,680	725	507	28	28	37
23	37	98	208	171	341	3,600	1,570	553	397	29	27	38
24	38	98	209	168	336	3,460	1,400	587	391	27	28	40
25	40	100	210	171	327	3,320	1,420	739	302	27	27	42
26	42	104	211	228	322	3,190	1,580	1,010	162	27	27	44
27	91	109	205	358	317	3,080	1,360	1,020	161	27	28	44
28	132	110	207	389	360	2,870	1,330	1,030	161	27	28	44
29	128	115	206	377	-----	2,340	1,300	1,040	160	27	28	47
30	130	144	204	367	-----	2,270	1,060	1,050	158	27	29	48
31	159	-----	201	365	-----	2,230	-----	1,110	-----	27	29	-----
TOTAL	2,322	16,549	11,340	6,869	9,851	74,151	45,540	26,764	23,638	1,638	852	1,017
MEAN	74.9	552	366	222	352	2,392	1,518	863	788	52.8	27.5	33.9
MAX	159	1,280	635	389	367	4,590	2,230	1,110	1,250	159	29	48
MIN	34	96	185	161	317	391	1,060	553	158	27	27	28
AC-FT	4,610	32,820	22,490	13,620	19,540	147,100	90,330	53,090	46,890	3,250	1,690	2,020
CAL YR 1972	TOTAL 503,314		MEAN 1,375	MAX 8,390	MIN 34	AC-FT 998,300						
WTR YR 1973	TOTAL 220,531		MEAN 604	MAX 4,590	MIN 27	AC-FT 437,400						

## 05304500 Chippewa River near Milan, Minn.

LOCATION.--Lat 45°06'39", long 95°47'57", in SE¼SE¼ sec.16. T.119 N., R.41 W., Chippewa County, on right bank 800 ft (240 m) upstream from bridge on State Highway 40, 2.0 mi (3.2 km) upstream from small tributary, and 5.5 mi (8.8 km) east of Milan.

DRAINAGE AREA.--1,870 mi<sup>2</sup> (4,840 km<sup>2</sup>), approximately.

PERIOD OF RECORD.--March 1937 to current year.

GAGE.--Water-stage recorder. Datum of gage is 959.69 ft (292.51 m) above mean sea level, datum of 1929. Prior to June 15, 1942, nonrecording gage on bridge 800 ft (240 m) downstream at same datum.

AVERAGE DISCHARGE.--36 years, 267 ft<sup>3</sup>/s (7.56 m<sup>3</sup>/s), 1.94 in/yr (49 mm), 193,400 acre-ft/yr (238 hm<sup>3</sup>/yr).

EXTREMES.--Current year: Maximum discharge, 2,670 ft<sup>3</sup>/s (75.6 m) Mar. 14 (gage height, 6.79 ft or 2.070 m); maximum gage height, 7.41 ft (2.259 m) Mar. 12 (backwater from ice); minimum discharge, 58 ft<sup>3</sup>/s (1.64 m<sup>3</sup>/s) July 22 (gage height, 1.55 ft or 0.472 m).  
Period of Record: Maximum discharge, 11,400 ft<sup>3</sup>/s (323 m<sup>3</sup>/s) Apr. 9, 1969 (gage height, 15.45 ft or 4.709 m); 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	315	318	180	131	132	136	1,100	627	428	118	104	106
2	309	393	175	131	132	137	1,080	706	402	131	99	106
3	312	518	165	131	132	139	1,060	728	376	130	94	103
4	326	523	160	131	132	144	1,030	701	354	124	89	106
5	329	505	155	131	132	150	1,010	688	329	115	84	100
6	340	501	153	131	132	168	990	697	312	111	86	95
7	329	481	150	131	132	220	973	735	296	105	88	92
8	326	466	145	131	132	315	956	719	282	102	96	88
9	318	459	143	131	132	465	924	674	270	97	105	86
10	322	448	140	131	132	700	890	628	257	91	139	82
11	329	433	138	131	132	1,040	868	589	246	89	140	79
12	329	418	137	131	133	1,460	823	552	234	85	133	74
13	329	394	135	131	133	1,720	794	520	222	83	124	71
14	326	350	134	131	133	2,100	779	493	210	78	115	69
15	315	335	133	131	133	2,430	770	464	200	81	117	70
16	309	333	132	131	133	2,180	740	438	191	77	126	69
17	305	320	132	131	133	1,820	740	413	183	72	120	71
18	293	313	132	131	134	1,670	729	395	176	67	113	69
19	283	310	132	131	134	1,560	719	378	166	68	108	67
20	283	302	132	131	134	1,460	712	366	162	65	101	65
21	289	299	132	131	134	1,380	716	365	154	61	96	63
22	293	283	132	131	134	1,290	695	363	150	62	122	64
23	289	270	132	131	134	1,220	673	358	145	82	175	64
24	286	270	132	131	134	1,210	657	381	141	96	175	69
25	280	270	132	131	134	1,280	654	496	137	95	171	72
26	280	264	131	131	134	1,260	637	569	132	98	158	90
27	274	230	131	131	135	1,210	618	564	127	93	145	100
28	277	212	131	131	135	1,180	603	542	120	84	136	101
29	280	200	131	131	-----	1,160	590	523	118	82	126	101
30	280	190	131	131	-----	1,130	572	490	116	91	116	99
31	302	-----	131	131	-----	1,120	-----	459	-----	99	111	-----
TOTAL	9,457	10,608	4,349	4,061	3,726	33,454	24,102	16,621	6,636	2,832	3,712	2,491
MEAN	305	354	140	131	133	1,079	803	536	221	91.4	120	83.0
MAX	340	523	180	131	135	2,430	1,100	735	428	131	175	106
MIN	274	190	131	131	132	136	572	358	116	61	84	63
CFSM	.16	.19	.07	.07	.07	.58	.43	.29	.12	.05	.06	.04
IN <sub>1</sub>	.19	.21	.09	.08	.07	.67	.48	.33	.13	.06	.07	.05
AC-FT	18,760	21,040	8,630	8,050	7,390	66,360	47,810	32,970	13,160	5,620	7,360	4,940

CAL YR 1972 TOTAL 270,761 MEAN 740 MAX 3,040 MIN 78 CFSM .40 IN 5.39 AC-FT 537,100  
WTR YR 1973 TOTAL 122,049 MEAN 334 MAX 2,430 MIN 61 CFSM .18 IN 2.43 AC-FT 242,100

## PEAK DISCHARGE (BASE, 400 CFS)

DATE	TIME	G. H.	DISCHARGE	DATE	TIME	G. H.	DISCHARGE
11-3	1830	3.12	541	5-5	1900	3.66	847
3-14	0015	6.79	2,670	5-26	0630	3.18	572

## 05311000 Minnesota River at Montevideo, Minn.

LOCATION.--Lat 44°56'00", long 95°44'00", in NW¼NW¼ sec.19, T.117 N., R.40 W., Lac qui Parle County, on right bank 100 ft (30 m) upstream from bridge on U.S. Highway 212, at Montevideo, and 400 ft (122 m) downstream from Chippewa River.

DRAINAGE AREA.--6,180 mi<sup>2</sup> (16,000 km<sup>2</sup>), approximately.

PERIOD OF RECORD.--July 1909 to September 1917, October 1917 to September 1929 (no winter records), October 1929 to current year. Prior to October 1939, published as "near Montevideo." Monthly discharge only for some periods, published in WSP 1308.

GAGE.--Water-stage recorder. Datum of gage is 909.12 ft (277.10 m) above mean sea level, datum of 1929. July 22, 1909, to Feb. 4, 1932, nonrecording gage at bridge 600 ft (183 m) downstream at present datum. Feb. 5, 1932, to Nov. 26, 1934, nonrecording gage at bridge 100 ft (30 m) downstream at present datum.

AVERAGE DISCHARGE.--52 years (1909-17, 1929-73), 688 ft<sup>3</sup>/s (19.5 m<sup>3</sup>/s), 498,500 acre-ft/yr (615 hm<sup>3</sup>/yr).

EXTREMES.--Current year: Maximum discharge, 5,330 ft<sup>3</sup>/s (151 m<sup>3</sup>/s) Mar. 20 (gage height, 13.67 ft or 4.167 m); minimum 53 ft<sup>3</sup>/s (1.50 m<sup>3</sup>/s) Aug. 20, Sept. 4-8, 11-15, 19, 20.  
Period of record: Maximum discharge, 35,100 ft<sup>3</sup>/s (994 m<sup>3</sup>/s) Apr. 12, 1969 (gage height, 21.68 ft or 6.608 m, from high-water mark); no flow for several days in 1933-34, 1936.

REVISIONS (WATER YEARS).--WSP 1035: 1919(M). WSP 1085: 1935-36. WSP 1508: 1912, 1925(M), 1929(M).

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	480	551	325	390	564	583	3,100	1,440	1,630	291	59	58
2	472	729	355	390	564	600	3,060	1,520	1,670	302	59	56
3	465	890	380	385	564	680	3,010	1,530	1,690	293	59	55
4	466	1,040	415	375	564	760	2,990	1,490	1,710	262	59	54
5	470	1,040	450	370	564	874	2,730	1,440	1,530	266	60	53
6	476	1,010	480	370	564	965	2,020	1,720	1,500	207	60	53
7	472	662	520	365	564	1,150	2,090	1,580	1,490	165	59	53
8	446	604	550	360	564	1,410	2,200	1,500	1,480	152	71	54
9	442	783	540	355	564	1,610	2,170	1,430	1,480	147	65	54
10	442	1,020	570	355	564	1,750	2,140	1,320	1,470	142	57	54
11	455	1,160	572	350	564	1,950	2,080	1,100	1,440	112	56	54
12	421	1,230	560	350	564	2,070	2,070	1,130	1,330	102	57	53
13	406	1,230	560	345	564	2,280	1,960	1,300	1,240	97	62	53
14	404	1,230	540	345	564	3,010	1,880	1,420	938	96	57	53
15	400	1,190	550	340	564	3,510	1,880	1,500	865	97	56	54
16	389	933	540	340	564	3,780	1,920	1,530	878	98	56	54
17	393	886	530	340	560	4,080	2,040	1,470	881	81	56	54
18	379	875	520	340	560	4,450	2,030	1,380	849	70	57	54
19	370	812	510	338	555	5,110	1,890	1,380	829	63	55	54
20	370	774	500	338	550	5,330	1,840	1,350	685	61	54	53
21	376	653	490	338	540	5,170	1,990	1,330	685	60	55	54
22	374	491	480	338	535	4,960	2,180	1,220	651	60	62	55
23	371	426	470	338	530	4,760	2,240	972	541	67	64	54
24	371	412	460	338	520	4,640	2,030	1,010	515	71	58	57
25	363	302	450	338	515	4,510	2,020	1,090	498	64	57	56
26	363	285	440	338	505	4,380	1,960	1,190	296	64	57	64
27	356	279	430	350	500	4,250	1,910	1,340	264	62	57	59
28	433	292	420	430	530	4,130	1,880	1,470	270	61	56	55
29	462	320	415	540	-----	3,750	1,850	1,570	274	60	61	56
30	467	306	405	564	-----	3,370	1,790	1,570	279	59	72	56
31	496	-----	400	564	-----	3,180	-----	1,580	-----	59	62	-----
TOTAL	13,056	22,417	14,867	11,617	15,424	93,052	64,950	42,872	29,838	3,791	1,835	1,646
MEAN	421	747	480	375	551	3,002	2,165	1,383	995	122	59.2	54.9
MAX	498	1,230	572	564	564	5,330	3,100	1,720	1,710	302	72	64
MIN	358	279	325	338	500	583	1,790	972	264	59	54	53
AC-FT	25,900	44,460	29,490	23,040	30,590	184,600	126,800	85,040	59,180	7,520	3,640	3,260

CAL YR 1972 TOTAL 678,879 MEAN 1,855 MAX 8,990 MIN 212 AC-FT 1,347,000  
WTR YR 1973 TOTAL 315,365 MEAN 864 MAX 5,330 MIN 53 AC-FT 625,500

NOTE.--Period of lagging intakes Mar. 6-10, 14-16, 18-22, Apr. 4 to July 6.



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 mi (0.8 km) northwest of Minneota and 6 mi (9.7 km) upstream from mouth.

DRAINAGE AREA.--111 mi<sup>2</sup> (287 km<sup>2</sup>), 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 (350.52 m) above mean sea level, datum of 1929.

AVERAGE DISCHARGE.--13 years, 23.5 ft<sup>3</sup>/s (0.666 m<sup>3</sup>/s), 2.88 in/yr (73 mm/yr), 17,030 acre-ft/yr (21.0 hm<sup>3</sup>/yr).

EXTREMES.--Current year: Maximum discharge, 558 ft<sup>3</sup>/s (15.8 m<sup>3</sup>/s) Mar. 12 (gage height, 8.10 ft or 2.469 m); no flow July 10-23, July 27 to Aug. 1, Aug. 5-7, Aug. 9 to Sept. 30.  
Period of record: Maximum discharge, 4,430 ft<sup>3</sup>/s (125 m<sup>3</sup>/s) Apr. 8, 1969 (gage height, 13.41 ft or 4.087 m); no flow at times.

REMARKS.--Records fair.

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.8	14	6.0	2.4	7.0	42	49	30	21	.27	0	
2	2.6	34	5.6	2.3	6.2	94	48	51	17	.30	.14	
3	2.6	42	5.1	2.3	5.6	109	47	57	16	.24	.10	
4	2.5	36	5.1	2.2	5.3	123	43	44	15	.18	.04	
5	2.5	26	4.8	2.0	4.8	134	39	34	14	.14	0	
6	3.6	22	4.5	1.8	4.5	152	36	31	14	.12	0	
7	3.4	18	4.2	1.8	4.2	160	35	32	11	.09	0	
8	3.3	15	3.8	1.8	4.0	170	34	27	10	.06	.02	
9	3.2	14	3.5	1.8	3.6	178	32	23	9.0	.03	0	
10	3.0	13	3.4	1.8	3.2	194	28	22	8.2	0	0	
11	2.9	12	3.1	1.8	2.8	349	30	21	7.6	0	0	
12	2.8	12	2.9	1.8	2.2	488	27	19	7.8	0	0	
13	2.8	11	2.7	1.8	1.8	296	26	17	6.0	0	0	
14	2.8	10	2.5	1.9	1.2	255	25	15	5.1	0	0	
15	2.7	9.8	2.3	2.0	.80	282	33	13	3.8	0	0	
16	2.8	9.6	2.2	2.5	.03	199	30	12	4.1	0	0	
17	2.7	9.4	2.1	3.1	.03	123	35	11	3.0	0	0	
18	2.7	9.2	1.9	4.0	.03	106	33	11	3.3	0	0	
19	2.7	9.0	1.8	5.0	.03	90	29	10	2.6	0	0	
20	2.6	8.7	1.8	6.7	.03	72	32	9.3	3.5	0	0	
21	3.3	8.6	3.4	8.4	.03	65	30	10	2.3	0	0	
22	3.0	8.4	3.4	11	.04	57	28	9.5	1.7	0	0	
23	3.4	8.6	3.4	11	.06	52	26	9.5	1.1	0	0	
24	3.4	8.4	3.4	11	.29	52	24	9.8	.90	.14	0	
25	3.3	8.4	3.4	11	.80	78	22	12	.58	.09	0	
26	3.3	8.2	3.4	11	3.1	70	21	11	.33	.06	0	
27	3.4	8.0	3.2	11	7.2	64	20	17	.30	0	0	
28	3.5	7.6	3.0	11	11	58	19	36	.30	0	0	
29	3.5	7.2	2.9	10	-----	54	18	69	.33	0	0	
30	5.0	6.4	2.7	9.7	-----	50	19	36	.30	0	0	
31	9.0	-----	2.5	8.5	-----	47	-----	26	-----	0	0	-----
TOTAL	101.1	416.5	104.0	164.4	79.87	4,263	918	735.1	190.14	1.72	.30	0
MEAN	3.26	13.9	3.35	5.30	2.85	138	30.6	23.7	6.34	.056	.010	0
MAX	9.0	42	6.0	11	11	488	49	69	21	.30	.14	0
MIN	2.5	6.4	1.8	1.8	.03	42	18	9.3	.30	0	0	0
CFSM	.03	.13	.03	.05	.03	1.24	.28	.21	.06	.0005	.0001	0
IN.	.03	.14	.03	.06	.03	1.43	.31	.25	.06	0	0	0
AC-FT	201	826	206	326	158	8,460	1,820	1,460	377	3.4	.6	0

CAL YR 1972 TOTAL 11,204.56 MEAN 30.6 MAX 708 MIN .67 CFSM .28 IN 3.76 AC-FT 22,220  
WTR YR 1973 TOTAL 6,974.13 MEAN 19.1 MAX 488 MIN 0 CFSM .17 IN 2.34 AC-FT 13,830

PEAK DISCHARGE (BASE, 82 CFS).--Mar. 12 (0730) 558 cfs (8.10 ft).

## 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 (15 m) downstream from highway bridge, 6 mi (9.7 km) upstream from mouth, and 8 mi (13 km) south of town of Granite Falls.

DRAINAGE AREA.--653 mi<sup>2</sup> (1,691 km<sup>2</sup>).

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 (296.14 m) above mean sea level, datum of 1929. Mar. 16, 1931, to June 13, 1938, nonrecording gage, on bridge 50 ft (15 m) upstream at same datum. Oct. 12, 1939, to Nov. 30, 1952, nonrecording gage 500 ft (152 m) downstream at same datum.

AVERAGE DISCHARGE.--37 years (1935-38, 1939-73), 108 ft<sup>3</sup>/s (3.06 m<sup>3</sup>/s), 2.25 in/yr (57 mm/yr), 78,250 acre-ft/yr (96.5 hm<sup>3</sup>/yr).

EXTREMES.--Current year: Maximum discharge, 1,980 ft<sup>3</sup>/s (56.1 m<sup>3</sup>/s) Mar. 14 (gage height, 6.13 ft or 1.868 m); minimum, 2.4 ft<sup>3</sup>/s (0.068 m<sup>3</sup>/s) Sept. 8 (gage height, 2.08 ft or 0.634 m).

Period of record: Maximum discharge, 17,200 ft<sup>3</sup>/s (487 m<sup>3</sup>/s) Apr. 10, 1969 (gage height, 14.90 ft or 4.542 m); no flow at times in 1931, 1933, 1948, 1959.

Flood in June 1919 reached a stage of 17.5 ft (5.3 m), 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7.9	32	31	15	62	270	318	113	225	16	7.0	2.9
2	7.9	52	29	15	60	280	306	140	184	20	6.4	2.8
3	14	70	27	15	59	300	297	219	155	18	7.7	2.8
4	8.7	137	26	15	59	320	285	276	124	17	6.8	2.7
5	7.2	165	24	15	57	340	270	267	110	16	5.7	2.6
6	16	151	23	14	54	411	251	282	103	14	5.3	2.9
7	23	127	22	14	50	440	236	337	89	12	5.6	2.5
8	12	110	20	14	44	480	222	399	80	10	5.9	2.7
9	21	97	19	14	42	520	209	428	72	9.9	5.8	2.7
10	18	90	16	13	38	560	195	371	63	9.7	4.7	2.9
11	14	84	17	13	36	600	185	305	55	9.3	4.2	2.8
12	14	79	16	13	35	650	168	259	52	8.0	4.1	2.5
13	13	72	16	13	34	900	165	222	47	7.5	5.4	2.7
14	12	56	15	13	33	1,630	153	192	40	6.9	4.3	2.7
15	9.4	51	15	13	32	1,480	162	165	40	6.6	3.9	2.9
16	11	72	14	14	31	1,340	148	144	40	6.1	3.7	2.8
17	9.1	67	14	17	30	1,220	152	123	36	5.6	3.4	3.0
18	12	62	14	24	30	980	165	113	35	5.9	3.1	2.9
19	12	60	14	45	30	802	168	105	33	5.4	3.2	2.9
20	13	58	14	52	29	676	168	98	31	5.0	3.3	2.7
21	15	55	13	56	29	570	153	97	29	5.1	3.2	2.7
22	16	50	13	57	32	495	153	95	27	5.8	3.7	2.8
23	18	49	13	59	40	447	152	91	25	9.6	4.2	2.8
24	19	47	13	61	51	414	142	101	24	12	4.1	2.8
25	20	56	13	63	48	396	133	102	23	9.2	3.6	2.7
26	24	47	13	66	46	414	122	106	21	14	3.6	3.2
27	23	46	13	66	90	433	114	120	18	12	3.2	3.3
28	22	36	14	66	200	410	107	133	18	8.9	3.0	3.2
29	26	34	14	66	-----	378	103	181	16	7.6	3.0	3.6
30	24	52	14	65	-----	356	99	287	15	7.7	2.9	3.5
31	31	-----	15	64	-----	335	-----	274	-----	7.7	3.0	-----
TOTAL	493.2	2,144	536	1,050	1,381	18,827	5,501	6,145	1,830	308.5	137.0	86.0
MEAN	15.9	71.5	17.3	33.9	49.3	607	183	198	61.0	9.95	4.42	2.87
MAX	31	165	31	66	200	1,630	318	428	225	20	7.7	3.6
MIN	7.2	32	13	13	29	270	99	91	15	5.0	2.9	2.5
CFSM	.02	.11	.03	.05	.08	.93	.28	.30	.09	.02	.007	.004
IN.	.03	.12	.03	.06	.08	1.07	.31	.35	.10	.02	.007	.004

CAL YR 1972 TOTAL 65,571.1 MEAN 179 MAX 1,850 MIN 7.2 CFSM .27 IN 3.74  
WTR YR 1973 TOTAL 38,438.7 MEAN 105 MAX 1,630 MIN 2.5 CFSM .16 IN 2.19

PEAK DISCHARGE (BASE, 300 CFS).--Mar. 14 (0800) 1980 cfs (6.13 ft); May 9 (0530) 438 cfs (3.83 ft).

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

LOCATION.--Lat 45°10'18", long 95°00'42", SW¼SE¼ sec. 25, T.120 N., R.35 W., Kandiyohi County, at dam at Outlet of Eagle Lake, 1 mi (1.6 km) upstream from Swan Lake and 4.1 mi (6.6 km) northeast of Willmar.

PERIOD OF RECORD.--March 1972 to September 1973 (discontinued).

GAGE.--Nonrecording gage and concrete dam. Datum of gage is 1,123.19 ft (342.35 m) above mean sea level, datum of 1912.

EXTREMES.--Current year: Maximum discharge, 52 ft<sup>3</sup>/s (1.47 m<sup>3</sup>/s) Mar. 17 (gage height, 2.06 ft or 0.628 m); no flow many days.

Period of record: Maximum discharge, 54 ft<sup>3</sup>/s (1.53 m<sup>3</sup>/s) Mar. 22, 23, 1972 (gage height, 2.07 ft or 0.631 m); no flow many days.

REMARKS.--Records good except those below 2 ft<sup>3</sup>/s (0.057 m<sup>3</sup>/s), which are fair.

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.60	4.0	6.4	1.9	3.4	2.3	20	14	18	0		2.3
2	.40	4.6	6.0	1.9	3.5	2.3	16	9.7	21	0		2.3
3	.20	5.8	5.8	1.9	3.5	3.8	18	16	16	0		2.3
4	.10	7.9	5.4	1.9	3.4	5.8	16	18	17	0		.80
5	.80	7.9	5.2	1.9	3.4	7.2	12	18	17	0		1.1
6	1.4	7.9	5.0	1.9	3.4	9.7	9.7	18	16	0		.60
7	.80	7.9	4.8	1.9	3.3	14	8.8	12	12	0		.20
8	.60	7.9	4.6	1.9	3.2	16	18	11	12	0		0
9	.60	9.7	4.3	1.9	3.2	18	12	12	5.2	0		0
10	.40	9.7	4.1	2.0	3.1	17	12	11	5.2	0		0
11	1.1	9.7	3.9	2.0	3.1	27	7.9	9.7	2.3	0		0
12	.60	14	3.7	2.0	3.0	29	5.8	11	4.0	0		0
13	.60	12	3.6	2.1	2.9	37	5.8	7.9	4.0	0		0
14	.60	9.7	3.5	2.1	2.9	45	7.2	4.6	2.3	0		0
15	.40	7.9	3.3	2.2	2.8	46	7.9	4.6	7.9	0		0
16	.10	7.2	3.2	2.2	2.7	50	12	3.1	4.0	0		0
17	0	6.5	3.1	2.3	2.6	52	12	2.3	2.0	0		0
18	0	6.5	3.0	2.3	2.6	45	15	2.3	.60	0		0
19	0	6.5	2.9	2.4	2.5	39	18	2.3	.60	0		0
20	0	5.8	2.7	2.4	2.4	39	22	2.3	.20	0		0
21	0	5.2	2.6	2.5	2.4	33	18	2.3	0	0		0
22	0	4.6	2.5	2.6	2.4	27	16	2.3	0	1.1		0
23	0	5.2	2.4	2.6	2.3	29	16	2.3	0	1.4		0
24	0	5.2	2.3	2.7	2.3	29	14	3.1	0	1.7		0
25	0	5.2	2.2	2.8	2.3	29	18	20	0	1.1		0
26	0	4.6	2.1	2.9	2.3	27	7.9	18	0	.60		0
27	0	5.2	2.1	3.0	2.7	25	7.9	25	0	1.1		0
28	0	7.2	2.0	3.1	2.5	27	6.5	23	0	1.4		0
29	0	6.5	2.0	3.2	-----	25	7.9	20	0	2.3		0
30	.40	6.5	2.0	3.3	-----	25	12	18	0	4.6		0
31	3.5	-----	1.9	3.4	-----	25	-----	17	-----	2.3	-----	-----
TOTAL	13.20	214.5	108.6	73.2	80.1	806.1	380.3	340.8	167.30	0	17.60	9.60
MEAN	.43	7.15	3.50	2.36	2.86	26.0	12.7	11.0	5.58	0	.57	.32
MAX	3.5	14	6.4	3.4	3.5	52	22	25	21	0	4.6	2.3
MIN	0	4.0	1.9	1.9	2.3	2.3	5.8	2.3	0	0	0	0
AC-FT	26	425	215	145	159	1,600	754	676	332	0	35	19

WTR YR 1973 TOTAL 2,211.30 MEAN 6.06 MAX 52 MIN 0 AC-FT 4,390

## 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., Kandiyohi County, at culvert on County Highway 5.7 mi (9.2 km) northeast of Willmar.

PERIOD OF RECORD.--March 1972 to September 1973 (discontinued).

GAGE.--Nonrecording gage and crest-stage gage. Datum of gage is 1,123.18 ft (342.35 m) above sea level, datum of 1929.

EXTREMES.--Current year: Maximum discharge, 66 ft<sup>3</sup>/s (1.87 m<sup>3</sup>/s) Mar. 14 (gage height, 3.49 ft or 1.064 m, from crest-stage gage); minimum daily 0.1 cfs (0.003 m<sup>3</sup>/s) July 9-22, 27, 28; minimum gage height, 1.67 ft (0.509 m) July 11-13.Period of record: Maximum discharge, 66 cfs (1.87 m<sup>3</sup>/s) Mar. 14, 1973 (gage height, 3.49 ft or 1.064 m, from crest-stage gage); minimum daily, 0.1 cfs (0.003 m<sup>3</sup>/s) July 9-22, 27, 28.

REMARKS.--Records fair.

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.4	3.9	1.4	1.0	.70	1.2	6.8	6.3	4.2	.30	.50	1.4
2	1.4	6.9	1.4	1.0	.70	1.4	6.2	6.5	3.6	1.0	.40	1.5
3	2.3	6.6	1.4	1.0	.70	2.0	5.8	6.1	3.3	1.0	.40	1.1
4	2.0	5.2	1.4	1.0	.70	5.8	5.6	5.2	3.0	1.0	.60	1.0
5	2.2	4.3	1.3	1.0	.80	7.6	5.8	5.3	2.8	.80	.30	.60
6	2.9	3.9	1.3	1.0	.80	9.6	5.4	17	2.3	.60	1.1	.50
7	2.2	2.1	1.3	1.0	.70	10	5.0	36	1.9	.40	.80	.60
8	2.0	1.8	1.2	1.0	.70	7.4	5.6	6.9	2.3	.20	.60	.60
9	1.8	1.9	1.2	1.0	.60	6.2	5.6	5.1	1.5	.10	1.0	1.1
10	1.7	3.5	1.2	1.0	.60	7.4	5.4	4.2	1.5	.10	.80	.90
11	2.7	3.3	1.2	1.0	.60	18	5.4	3.8	1.5	.10	.60	.80
12	2.4	2.9	1.2	1.0	.60	18	4.8	3.6	1.4	.10	.80	.80
13	2.0	3.0	1.1	1.0	.50	23	4.0	3.2	1.2	.10	.60	.80
14	2.0	3.0	1.1	1.1	.50	58	3.6	2.9	1.0	.10	.60	.80
15	1.9	3.1	1.1	1.2	.50	27	6.8	2.4	.80	.10	.60	.80
16	1.8	3.2	1.1	1.1	.50	20	6.2	2.1	1.2	.10	.40	.80
17	1.6	3.1	1.1	1.1	.50	16	5.6	1.8	1.2	.10	.40	.80
18	1.1	3.0	1.1	1.1	.60	13	5.1	1.5	1.2	.10	.40	.80
19	1.1	2.9	1.1	1.0	.60	12	5.7	1.5	1.1	.10	.50	.80
20	1.2	2.8	1.1	1.0	.70	10	12	1.3	1.0	.10	.40	.80
21	2.4	2.4	1.1	1.0	.80	8.0	8.4	1.2	.90	.10	.70	.80
22	2.4	1.9	1.1	1.0	.80	7.1	7.4	2.3	.50	.10	3.1	.80
23	1.9	1.8	1.1	1.0	.80	6.5	6.1	3.3	.50	.50	3.9	.80
24	1.6	1.5	1.1	.90	.80	7.6	5.7	8.7	.50	.40	2.2	1.0
25	1.5	1.5	1.0	.80	.80	7.2	5.3	9.6	.60	.40	1.6	1.1
26	1.5	1.5	1.0	.80	.80	7.2	4.9	11	.60	.20	1.5	1.1
27	1.5	1.5	1.0	.80	.80	7.2	4.2	12	.60	.10	1.2	1.1
28	1.5	1.4	1.0	.80	1.0	7.2	3.9	8.7	.50	.10	1.0	1.1
29	1.5	1.4	1.0	.80	-----	6.8	3.7	6.9	.40	.60	.80	1.0
30	2.4	1.4	1.0	.80	-----	6.2	3.5	5.1	.40	1.1	1.0	.80
31	4.4	-----	1.0	.80	-----	5.8	-----	4.4	-----	1.0	1.1	-----
TOTAL	60.3	46.7	55.7	30.10	19.20	350.4	169.5	195.9	43.50	11.10	29.70	26.90
MEAN	1.95	2.89	1.15	.97	.69	11.3	5.65	6.32	1.45	.36	.96	.90
MAX	4.4	6.9	1.4	1.2	1.0	58	12	36	4.2	1.1	3.9	1.5
MIN	1.1	1.4	1.0	.80	.50	1.2	3.5	1.2	.40	.10	.30	.50
AC-FT	120	172	71	60	38	695	336	389	86	22	59	53

WTR YR 1973 TOTAL 1,059.00 MEAN 2.90 MAX 58 MIN .10 AC-FT 2,100

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 mi (7.9 m) northeast of Willmar.

PERIOD OF RECORD.--March 1972 to September 1973 (discontinued).

GAGE.--Nonrecording gage. Altitude of gage is 1,125 ft (343 m) (from topographic map).

EXTREMES.--Current year: Maximum discharge, 7.9 ft<sup>3</sup>/s (0.22 m<sup>3</sup>/s) Mar. 14 (gage height, 8.95 ft or 2.728 m); maximum gage height, 9.09 ft (2.771 m) Mar. 6 (backwater from ice); no flow many days.

Period of record: Maximum discharge, 14 ft<sup>3</sup>/s (0.40 m<sup>3</sup>/s) Mar. 21, 22, 1972 (gage height, 9.04 ft or 2.755 m); maximum gage height, 9.44 ft (2.877 m) Sept. 6 (backwater from sewer construction); no flow many days.

REMARKS.--Records fair.

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.10	.40				0	2.3	1.5	1.6		0	
2	.10	1.3				0	2.0	1.6	2.0		0	
3	.20	1.3				.10	1.8	1.5	1.8		0	
4	.10	1.3				.20	1.8	1.3	1.7		0	
5	.10	1.2				.20	1.5	1.3	1.6		0	
6	.10	1.2				.30	1.5	1.3	1.4		0	
7	.10	1.0				.50	1.5	1.3	1.3		0	
8	.10	1.0				.80	1.9	1.2	1.1		.10	
9	.10	.90				.90	1.8	1.2	.90		.10	
10	.10	.60				1.0	1.5	1.2	.70		.10	
11	.20	.50				1.5	1.3	1.2	.60		.10	
12	.10	.40				2.0	1.1	1.0	.50		0	
13	.10	.30				2.0	.90	1.0	.40		0	
14	.10	.40				5.5	.90	1.0	.20		0	
15	.10	.50				6.2	1.6	1.0	.20		0	
16	.10	.70				7.9	1.4	1.0	.40		0	
17	.10	.70				3.1	1.2	.60	.20		0	
18	.10	.60				4.5	1.2	.60	.20		0	
19	.10	.60				3.8	1.2	.60	0		0	
20	.10	.60				3.6	1.6	.60	0		0	
21	.20	.50				3.2	1.7	.70	0		.10	
22	.10	.40				3.1	1.9	.80	0		.10	
23	.10	.40				3.0	1.6	.80	0		.10	
24	.10	.40				3.1	1.5	4.9	0		.10	
25	.10	.40				2.7	1.4	4.8	0		.10	
26	.10	.40				2.5	1.4	4.9	0		0	
27	.10	.20				2.3	1.3	4.9	0		0	
28	.10	.10				2.3	1.1	3.0	0		0	
29	.10	.10				2.1	1.1	3.0	0		0	
30	.20	0			-----	2.0	1.2	2.2	0		0	
31	.50	-----			-----	2.0	-----	1.9	-----		0	-----
TOTAL	3.90	18.40	0	0	0	72.40	44.20	53.90	16.80	0	.90	0
MEAN	.13	.61	0	0	0	2.34	1.47	1.74	.56	0	.029	0
MAX	.50	1.3	0	0	0	7.9	2.3	4.9	2.0	0	.10	0
MIN	.10	0	0	0	0	0	.90	.60	0	0	0	0
AC-FT	7.7	36	0	0	0	144	88	107	33	0	1.8	0

WTR YR 1973 TOTAL 210.50 MEAN .58 MAX 7.9 MIN 0 AC-FT 418

## MINNESOTA RIVER BASIN

05315000 Redwood River at Marshall, Minn.

LOCATION.--Lat 44°27'05", long 95°47'13", in SE¼NW¼ sec.4, T.111 N., R.41 W., Lyon County, on downstream side of highway bridge on Fourth Street in Marshall, and 10 mi (16 km) upstream from Threemile Creek.

DRAINAGE AREA.--307 mi<sup>2</sup> (795 km<sup>2</sup>).

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 (348.96 m) above mean sea level, datum of 1929. Nonrecording gage and crest-stage gage on diversion channel. Datum of gage is 1,100.00 ft (335.28 m) above mean sea level, datum of 1929 (levels by Corps of Engineers).

AVERAGE DISCHARGE.--33 years, 48.1 ft<sup>3</sup>/s (1.362 m<sup>3</sup>/s), 2.13 in/yr (54 mm/yr), 34,850 acre-ft/yr (43.0 hm<sup>3</sup>/yr).

EXTREMES (Combined flow).--Current year: Maximum discharge, 1,038 ft<sup>3</sup>/s (29.4 m<sup>3</sup>/s) Mar. 12; minimum daily, 0.15 ft<sup>3</sup>/s (0.004 m<sup>3</sup>/s) Sept. 7.

Period of record: Maximum discharge, 5,590 ft<sup>3</sup>/s (158 m<sup>3</sup>/s) Apr. 10, 1969; no flow at times.

(River only).--Current year: Maximum discharge, 840 ft<sup>3</sup>/s (23.8 m<sup>3</sup>/s) Mar. 12 (gage height, 4.81 ft or 1.466 m); minimum, 0.15 ft<sup>3</sup>/s (0.004 m<sup>3</sup>/s) Sept. 7 (gage height, 0.62 ft or 0.189 m).

Period of record: Maximum discharge, 5,370 ft<sup>3</sup>/s (152 m<sup>3</sup>/s) June 17, 1957 (gage height, 10.14 ft or 3.091 m); maximum gage height, 11.05 ft (3.368 m) Apr. 6, 1951 (from floodmark); no flow at times.

(Diversion only).--Current year: Maximum discharge, 198 ft<sup>3</sup>/s (5.61 m<sup>3</sup>/s) Mar. 12; no flow most of year.

Period of record: Maximum discharge, 4,440 ft<sup>3</sup>/s (126 m<sup>3</sup>/s) Apr. 10, 1969 (gage height, 78.45 ft or 23.912 m); no flow on many days.

REMARKS.--Records fair. Water diverted at medium and high stages into diversion channel 3 mi (4.8 km) above station, bypasses station and returns to river 1 mi (1.6 km) 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.9	25	12	7.1	11	66	125	81	59	4.0	2.2	.42
2	5.1	45	12	7.3	11	92	123	113	52	3.8	2.2	6.8
3	6.2	78	12	7.4	10	110	122	127	51	3.6	2.2	.87
4	6.2	70	11	7.6	10	145	111	116	52	3.4	2.2	1.9
5	6.2	62	11	7.8	9.7	185	106	99	51	3.2	.64	1.1
6	11	55	10	8.0	9.5	256	101	91	49	3.2	.84	.28
7	16	50	9.9	8.3	9.2	320	96	94	47	2.5	1.9	.18
8	13	44	9.3	8.6	8.9	450	98	86	46	2.5	2.8	2.5
9	13	39	9.0	8.9	8.6	619	91	76	41	5.6	1.6	1.3
10	12	36	8.7	9.1	8.5	697	69	76	36	4.0	1.3	2.5
11	11	32	8.3	9.3	8.4	641	86	71	35	3.6	1.1	1.3
12	11	28	8.0	9.6	8.4	762	81	62	33	2.8	1.9	1.6
13	10	25	7.6	9.9	8.4	395	75	55	24	2.8	1.3	1.6
14	10	23	7.4	10	8.4	440	78	48	15	2.8	1.1	2.2
15	10	20	7.1	10	8.4	444	99	46	16	2.5	.84	2.5
16	10	19	6.9	11	8.5	463	113	44	16	1.3	.84	2.5
17	11	19	6.8	11	8.8	399	120	39	14	1.3	1.1	3.6
18	11	19	6.2	12	9.2	330	103	36	16	1.3	.84	2.8
19	8.4	19	6.0	12	9.8	252	88	33	15	1.6	.84	2.8
20	7.6	19	6.0	12	10	229	96	31	15	1.1	1.1	2.8
21	6.2	17	5.9	12	12	204	101	30	13	.84	.64	3.6
22	5.6	20	6.0	12	13	180	101	26	10	1.6	2.6	3.2
23	4.5	29	6.0	12	16	161	93	26	9.2	22	1.1	2.5
24	4.5	35	6.0	12	19	159	82	34	7.6	7.8	1.1	2.5
25	4.5	17	6.2	12	25	161	78	26	6.9	4.5	1.6	3.2
26	6.2	15	6.3	12	32	161	73	47	5.6	4.5	1.9	7.6
27	7.6	14	6.4	12	44	152	68	47	4.5	3.2	2.2	4.0
28	7.6	14	6.6	12	53	143	62	69	4.5	3.2	1.9	4.5
29	7.6	13	6.7	12	-----	137	56	81	4.5	2.5	1.3	3.6
30	7.8	13	6.8	11	-----	130	59	81	4.0	2.8	1.3	4.5
31	14	-----	7.0	11	-----	123	-----	71	-----	1.9	.28	-----
TOTAL	271.7	914	245.1	316.9	398.7	9,006	2,754	1,962	752.8	111.74	44.76	80.75
MEAN	8.76	30.5	7.91	10.2	14.2	291	91.8	63.3	25.1	3.60	1.44	2.69
MAX	16	78	12	12	53	762	125	127	59	22	2.8	7.6
MIN	4.5	13	5.9	7.1	8.4	66	56	26	4.0	.84	.28	.18
CFSM	.03	.10	.03	.03	.05	.95	.30	.21	.08	.01	.005	.009
IN.	.03	.11	.03	.04	.05	1.09	.33	.24	.09	.01	.005	.009
CAL YR 1972	TOTAL 17,482.40		MEAN 47.8	MAX 668	MIN 3.9	CFSM .16	IN 2.12					
WTR YR 1973	TOTAL 16,858.45		MEAN 46.2	MAX 762	MIN .18	CFSM .15	IN 2.04					

## 05316500 Redwood River near Redwood Falls, Minn.

LOCATION.--Lat 44°31'25", long 95°10'20", in SE¼NE¼ sec.9, T.112 N., R.36 W., Redwood County, on right bank 20 ft (6 m) upstream from highway bridge, 3 mi (4.8 km) west of town of Redwood Falls, and 8.5 mi (13.7 km) upstream from mouth.

DRAINAGE AREA.--697 mi<sup>2</sup> (1805 km<sup>2</sup>).

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 (296.37 m) above mean sea level, datum of 1929. July 1909 to September 1914, nonrecording gage at bridge 20 ft (6 m) downstream at datum 0.22 ft (0.07 m) lower. August 1930 to Oct. 25, 1949, nonrecording gage, at bridge 20 ft (6 m) downstream at present datum.

AVERAGE DISCHARGE.--39 years (1911-12, 1935-73), 104 ft<sup>3</sup>/s (2.95 m<sup>3</sup>/s), 2.03 in/yr (52 mm/yr), 75,350 acre-ft/yr (92.9 hm<sup>3</sup>/yr).

EXTREMES.--Current year: Maximum discharge, 1,070 ft<sup>3</sup>/s (30.3 m<sup>3</sup>/s) Mar. 15 (gage height, 4.15 ft or 1.265 m); maximum gage height, 8.08 ft (2.463 m) Mar. 13 (backwater from ice); minimum discharge, 1.8 ft<sup>3</sup>/s (0.051 m<sup>3</sup>/s) Sept. 7, 8 (gage height, 1.37 ft or 0.418 m).

Period of record: Maximum discharge, 19,700 ft<sup>3</sup>/s (558 m<sup>3</sup>/s) June 18, 1957 (gage height, 15.92 ft or 4.852 m, from floodmark); no flow for several days in January 1940 and for part of each day Aug. 19, 20, 1959.

REMARKS.--Records good except those for winter periods, which are fair. Natural discharge affected by unknown amount of interbasin flow between Yellow Medicine, Redwood, and Cottonwood River basins during extreme floods.

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	19	55	48	16	80	40	287	145	193	21	11	2.8
2	19	100	46	15	80	45	295	192	166	24	9.4	3.2
3	17	179	45	14	80	54	295	238	145	22	8.2	2.9
4	17	203	43	13	80	78	292	260	127	25	7.3	2.6
5	17	191	41	13	80	110	294	254	116	20	6.6	2.7
6	20	179	40	12	80	157	279	237	110	18	6.0	2.3
7	33	164	38	12	78	250	265	220	103	16	6.7	1.8
8	39	148	37	11	74	390	248	216	96	15	6.6	2.4
9	33	137	35	10	69	500	233	213	87	14	6.0	3.0
10	33	125	34	9.7	66	560	215	195	79	14	5.8	2.8
11	31	113	33	10	63	610	197	180	74	13	6.3	3.0
12	28	106	31	10	62	660	186	161	70	13	6.2	3.2
13	26	98	30	11	60	730	182	143	67	13	6.3	3.2
14	24	90	29	12	59	826	171	129	64	12	5.3	2.9
15	23	84	28	15	54	1,030	180	118	61	12	4.7	3.1
16	23	84	26	17	49	971	198	111	59	11	4.3	3.2
17	29	84	25	20	45	909	221	105	55	9.6	4.0	3.5
18	26	84	24	23	44	852	240	101	56	8.6	3.5	3.3
19	23	84	23	26	44	697	236	97	53	8.0	2.9	3.4
20	24	85	22	27	43	535	227	91	52	7.7	2.7	3.3
21	29	82	21	27	42	447	225	95	46	7.4	2.8	3.8
22	31	77	21	28	41	393	213	97	43	8.1	2.8	3.5
23	32	74	20	33	39	356	205	93	39	9.8	3.1	3.2
24	31	72	19	46	38	335	183	96	35	10	3.0	3.5
25	32	70	18	70	36	337	160	108	31	19	3.3	4.6
26	31	66	18	98	36	345	147	107	29	25	3.4	5.4
27	32	63	17	98	36	341	139	126	26	19	3.3	6.0
28	33	57	16	95	36	332	132	172	23	16	3.0	6.3
29	31	52	16	90	-----	316	126	206	22	14	3.0	7.6
30	32	50	16	85	-----	301	124	224	21	13	2.9	7.8
31	41	-----	16	80	-----	289	-----	214	-----	12	2.7	-----
TOTAL	859	3,056	876	1,046.7	1,594	13,796	6,393	4,944	2,148	450.2	153.1	110.3
MEAN	27.7	102	28.3	33.8	56.9	445	213	159	71.6	14.5	4.94	3.68
MAX	41	203	48	98	80	1,030	295	260	193	25	11	7.8
MIN	17	50	16	9.7	36	40	124	91	21	7.4	2.7	1.8
CFSM	.04	.15	.04	.05	.08	.64	.31	.23	.10	.02	.007	.005
IN.	.05	.16	.05	.06	.09	.74	.34	.26	.11	.02	.008	.005
AC-FT	1,700	6,060	1,740	2,080	3,160	27,360	12,680	9,810	4,260	893	304	219

CAL YR 1972 TOTAL 44,159.0 MEAN 121 MAX 1,640 MIN 4.1 CFSM .17 IN 2.36 AC-FT 87,590  
 WTR YR 1973 TOTAL 35,426.3 MEAN 97.1 MAX 1,030 MIN 1.8 CFSM .14 IN 1.89 AC-FT 70,270

## PEAK DISCHARGE (BASE, 150 CFS)

DATE	TIME	G. H.	DISCHARGE	DATE	TIME	G. H.	DISCHARGE
11-4	0500	2.54	205	5-4	1600	2.68	265
3-15	1315	4.15	1,070	5-30	0200	2.60	225
4-18	0445	2.62	241				

LOCATION.--Lat 44°19'20", long 94°27'09", in NE¼NE¼ sec.20, T.110 N., R.30 W., Nicollet County, on left bank 30 ft (9 m) downstream from U.S. Highway 14, at New Ulm and 6.1 mi (9.8 km) upstream from Cottonwood River.

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

	UCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	662	677	535	700	661	820	6,080	2,760	3,260	438	111	155
2	662	941	538	680	661	915	5,870	2,830	3,140	446	104	148
3	666	1,120	538	670	661	1,040	5,620	2,900	3,000	518	101	147
4	668	1,430	540	660	661	1,170	5,360	2,920	2,870	557	101	144
5	650	1,660	550	640	661	1,330	5,100	2,930	2,770	539	99	144
6	654	1,850	560	635	661	1,500	4,900	2,930	2,680	493	100	142
7	668	1,940	570	635	661	1,680	4,680	2,890	2,580	544	101	141
8	704	1,930	580	630	661	1,890	4,430	2,880	2,470	455	104	130
9	740	1,820	590	630	661	2,130	4,090	2,940	2,390	388	106	130
10	736	1,620	600	630	661	2,400	3,740	2,960	2,300	339	106	128
11	682	1,500	610	630	661	2,700	3,560	2,890	2,200	304	107	122
12	636	1,530	620	630	661	3,060	3,380	2,750	2,150	291	106	122
13	618	1,630	630	630	661	3,490	3,260	2,570	2,080	269	108	122
14	610	1,700	640	630	661	3,900	3,150	2,420	1,990	242	115	122
15	567	1,720	650	640	661	4,600	3,090	2,400	1,880	221	120	122
16	564	1,730	660	660	661	5,300	3,040	2,400	1,790	204	124	122
17	538	1,720	670	660	661	6,100	2,990	2,380	1,610	190	125	122
18	526	1,690	680	700	661	7,260	3,010	2,340	1,540	171	125	121
19	526	1,590	700	680	661	7,580	3,010	2,280	1,530	161	120	120
20	524	1,480	704	670	661	7,620	3,050	2,220	1,510	154	119	120
21	528	1,440	708	661	661	7,440	3,060	2,200	1,450	148	125	119
22	533	1,400	704	661	661	7,230	3,000	2,180	1,360	144	131	120
23	528	1,340	700	661	661	7,100	2,980	2,170	1,230	137	135	120
24	528	1,220	690	661	665	7,010	3,020	2,160	1,120	139	134	121
25	528	1,130	680	661	670	6,950	3,060	2,150	1,040	140	131	126
26	533	1,110	685	661	680	6,880	3,050	2,660	930	136	135	129
27	538	920	690	661	720	6,870	2,960	3,090	837	129	170	129
28	526	803	700	661	770	6,710	2,870	3,200	766	129	190	126
29	502	623	720	661	-----	6,580	2,800	3,290	652	134	178	125
30	510	551	730	661	-----	6,440	2,740	3,360	527	131	166	132
31	556	-----	720	661	-----	6,260	-----	3,360	-----	119	163	-----
TOTAL	18,501	41,815	19,895	20,351	16,708	141,955	111,000	83,410	55,652	8,410	3,860	3,871
MEAN	597	1,394	642	656	668	4,579	3,700	2,691	1,855	271	125	129
MAX	740	1,940	730	700	770	7,620	6,080	3,360	3,260	557	190	155
MIN	502											



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 (183 m) upstream from highway bridge, 1.8 mi (2.9 km) south of New Ulm, and 2 mi (3.2 km) upstream from mouth.

DRAINAGE AREA.--1,280 mi<sup>2</sup> (3,320 km<sup>2</sup>), 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 (242.87 m) above mean sea level, datum of 1929 July 1, 1909, to Dec. 13, 1913, nonrecording gage at site 2.7 mi (4.3 km) upstream at different datum. Mar. 15, 1931, to Mar. 31, 1938, nonrecording gage 2.2 mi (3.5 km) upstream at datum 11.41 ft (3.48 m) higher. Aug. 23, 1938, to June 25, 1948, nonrecording gage at present site and datum.

AVERAGE DISCHARGE.--39 years (1911-13, 1935-37, 1938-73), 279 ft<sup>3</sup>/s (7.90 m<sup>3</sup>/s), 2.96 in/yr (75 mm/yr), 202,100 acre-ft/yr (249 hm<sup>3</sup>/yr).

EXTREMES.--Current year: Maximum discharge during year, 2,680 ft<sup>3</sup>/s (75.9 m<sup>3</sup>/s) Mar. 14 (gage height, 8.67 ft or 2.643 m); minimum, 16 ft<sup>3</sup>/s (0.45 m<sup>3</sup>/s) Sept. 7, 8 (gage height, 1.11 ft or 0.338 m).

Period of record: Maximum discharge, 28,700 ft<sup>3</sup>/s (813 m<sup>3</sup>/s) Apr. 10, 1969 (gage height, 19.15 ft or 5.836 m); maximum gage height, 20.86 ft (6.358 m) Apr. 8, 1965 (from floodmark, backwater from ice); minimum discharge observed, 0.5 ft<sup>3</sup>/s (0.014 m<sup>3</sup>/s) Nov. 27, 1952; minimum gage height, 0.72 ft (0.219 m) 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	89	124	110	67	69	78	607	379	523	102	34	20
2	85	193	138	65	68	90	613	424	468	111	32	22
3	83	238	175	63	67	110	650	585	433	101	30	22
4	79	291	210	62	66	140	693	710	390	100	29	21
5	75	362	225	60	66	190	696	704	365	95	28	19
6	81	398	230	59	66	240	661	657	337	109	31	18
7	74	389	210	57	66	320	613	605	311	100	30	16
8	73	362	190	55	66	385	571	556	287	80	33	20
9	75	333	170	54	65	460	536	509	261	73	29	22
10	88	307	156	53	65	550	502	469	238	71	27	22
11	110	281	140	53	64	650	462	435	219	73	27	20
12	111	259	130	53	64	787	446	400	222	66	25	20
13	108	245	118	54	64	1,140	437	364	204	62	26	20
14	99	231	110	54	64	2,260	414	340	194	59	24	19
15	94	199	107	55	64	2,030	429	318	186	57	23	20
16	89	196	105	57	64	2,060	432	299	201	53	26	21
17	86	193	101	59	64	1,910	462	283	199	49	29	22
18	82	190	98	62	64	1,650	533	274	221	46	27	22
19	79	190	95	62	64	1,420	564	258	231	43	26	20
20	82	190	93	62	65	1,170	564	247	229	40	21	19
21	86	186	90	63	65	970	532	254	217	36	40	21
22	85	180	88	65	65	822	521	242	204	36	36	20
23	91	173	86	68	66	726	507	234	188	43	31	18
24	90	166	83	73	66	689	479	234	173	66	29	25
25	89	160	81	77	67	668	450	248	158	52	29	30
26	92	155	79	78	68	677	418	247	146	49	31	35
27	94	145	77	76	68	709	389	272	133	46	27	34
28	98	130	75	74	70	715	370	317	121	43	24	27
29	97	110	73	74	-----	689	353	407	111	41	22	26
30	103	90	71	72	-----	657	348	524	107	38	22	25
31	116	-----	69	70	-----	625	-----	566	-----	36	24	-----
TOTAL	2,783	6,666	3,783	1,956	1,840	25,587	15,252	12,361	7,277	1,976	872	666
MEAN	89.8	222	122	63.1	65.7	825	508	399	243	63.7	28.1	22.2
MAX	116	398	230	78	70	2,260	696	710	523	111	40	35
MIN	73	90	69	53	64	78	348	234	107	36	21	16
CFSM	.07	.17	.10	.05	.05	.64	.40	.31	.19	.05	.02	.02
IN.	.08	.19	.11	.06	.05	.74	.44	.36	.21	.06	.03	.02
AC=FT	5,520	13,220	7,500	3,880	3,650	50,750	30,250	24,520	14,430	3,920	1,730	1,320
CAL YR 1972	TOTAL 103,070	MEAN 282	MAX 2,990	MIN 11	CFSM .22	IN 3.00	AC=FT 204,400					
WTR YR 1973	TOTAL 81,019	MEAN 222	MAX 2,260	MIN 16	CFSM .17	IN 2.35	AC=FT 160,700					

## 05320000 Blue Earth River near Rapidan, Minn.

LOCATION.--Lat 44°05'44", long 94°06'33", in SE¼SE¼ sec.6, T.107 N., R.27 W., Blue Earth County, on left bank 0.2 mi (0.3 km) downstream from abandoned powerplant of Northern States Power Co., 2 mi (3.2 km) west of Rapidan, 3.5 mi (5.6 km) downstream from Watonwan River, and 7.8 mi (12.6 km) upstream from Le Sueur River.

DRAINAGE AREA.--2,430 mi<sup>2</sup> (6,290 km<sup>2</sup>), 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 (246.52 m) above mean sea level, adjustment of 1912. July 20, 1909, to Apr. 28, 1910, nonrecording gage at site 0.2 mi (0.3 km) upstream at different datum. Apr. 29 to Nov. 12, 1910, nonrecording gage at site 800 ft (244 m) upstream at different datum. Oct. 4 to Nov. 14, 1939, nonrecording gage at present site and datum.

AVERAGE DISCHARGE.--30 years (1939-45, 1949-73, 843 ft<sup>3</sup>/s (23.9 m<sup>3</sup>/s) 4.71 in/yr (120 mm/yr), 610,800 acre-ft/yr (753 hm<sup>3</sup>/yr).

EXTREMES.--Current year: Maximum discharge, 8,380 ft<sup>3</sup>/s (237 m<sup>3</sup>/s) Mar. 13 (gage height, 9.69 ft or 2.954 m, backwater from ice); minimum, 60 ft<sup>3</sup>/s (1.70 m<sup>3</sup>/s) Sept. 21, 22, 23, 24 (gage height, 1.43 ft or 0.436 m). Period of record: Maximum discharge, 43,100 ft<sup>3</sup>/s (1,220 m<sup>3</sup>/s) Apr. 9, 1965 (gage height, 21.36 ft or 6.511 m, from floodmark); minimum, 6.9 ft<sup>3</sup>/s (0.195 m<sup>3</sup>/s) Oct. 12, 1955 (gage height, 1.04 ft or 0.317 m).

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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	320	530	493	220	238	665	2,830	2,320	4,020	683	200	77
2	293	703	505	219	238	800	2,820	3,220	3,600	680	184	74
3	275	1,100	525	218	238	990	2,960	4,090	3,200	704	176	74
4	265	1,620	545	216	234	1,320	3,030	4,520	2,930	757	165	69
5	249	1,770	550	216	231	1,950	2,940	4,860	2,710	781	154	69
6	250	1,570	540	216	230	2,700	2,700	4,940	2,500	725	147	69
7	247	1,390	520	216	229	2,980	2,470	4,550	2,330	648	144	66
8	289	1,270	500	218	228	3,100	2,270	4,110	2,150	582	140	69
9	448	1,190	470	220	228	3,280	2,090	3,930	1,980	527	137	71
10	492	1,110	445	222	228	3,400	1,870	3,930	1,620	471	130	71
11	446	1,080	425	228	228	3,500	1,580	4,000	1,670	433	127	69
12	397	1,090	405	231	228	4,100	1,770	3,810	1,560	410	117	72
13	371	1,110	390	233	230	6,480	2,130	3,360	1,460	376	117	70
14	347	1,080	370	236	231	6,390	2,400	2,920	1,360	347	111	70
15	321	1,010	360	236	232	6,760	2,610	2,600	1,290	316	111	71
16	310	955	345	236	232	6,940	2,940	2,360	1,230	294	111	69
17	292	916	330	239	239	6,790	3,510	2,180	1,170	272	108	70
18	272	893	320	239	241	6,360	4,020	2,010	1,170	252	108	68
19	270	852	305	239	249	5,580	4,460	1,670	1,180	234	102	64
20	267	814	295	239	259	4,740	4,420	1,770	1,290	221	96	63
21	263	785	285	239	272	4,100	3,890	1,680	1,370	204	120	62
22	260	755	275	238	290	3,610	3,350	1,590	1,330	200	117	61
23	271	733	265	238	324	3,190	2,960	1,610	1,250	247	111	60
24	291	722	255	238	368	2,950	2,660	2,030	1,170	318	99	67
25	342	709	250	238	414	2,990	2,440	2,200	1,090	256	108	80
26	642	708	240	238	450	3,300	2,240	2,030	996	293	99	123
27	674	676	235	238	510	3,610	2,090	1,980	916	333	90	120
28	623	602	230	238	580	3,650	1,950	2,230	843	293	87	162
29	583	500	226	238	-----	3,440	1,830	3,070	792	260	96	343
30	542	492	222	238	-----	3,180	1,780	3,740	755	242	90	528
31	526	-----	220	238	-----	2,970	-----	4,060	-----	221	79	-----
TOTAL	11,438	28,735	11,341	7,156	7,899	115,795	81,010	93,570	51,132	12,582	3,781	3,001
MEAN	369	958	366	231	282	3,735	2,700	3,018	1,704	406	122	100
MAX	674	1,770	550	239	580	6,940	4,460	4,940	4,020	781	200	528
MIN	247	492	220	216	228	665	1,580	1,590	755	200	79	60
CFSM	.15	.39	.15	.10	.12	1.54	1.11	1.24	.70	.17	.05	.04
IN.	.16	.44	.17	.11	.12	1.77	1.24	1.43	.78	.19	.06	.05
AC-FT	22,690	57,000	22,490	14,200	15,670	229,700	160,700	185,600	101,400	24,960	7,500	5,950

CAL YR 1972 TOTAL 264,184 MEAN 722 MAX 6,240 MIN 87 CFSM .30 IN 4.04 AC-FT 524,000  
WTR YR 1973 TOTAL 427,442 MEAN 1,171 MAX 6,940 MIN 60 CFSM .48 IN 6.54 AC-FT 847,800

05320500 Le Sueur River near Rapidan, Minn.

LOCATION.--Lat 44°06'40", long 94°02'28", in SW¼ sec.35, T.108 N., R.27 W., Blue Earth County, on right bank 600 ft (183 m) downstream from highway bridge, 1.8 mi (2.9 km) northeast of Rapidan, and 2.3 mi (3.7 km) upstream from mouth.

DRAINAGE AREA.--1,100 mi<sup>2</sup> (2,850 km<sup>2</sup>), 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 (236.45 m) above mean sea level, datum of 1929. Prior to Nov. 15, 1939, nonrecording gage at same site and datum.

AVERAGE DISCHARGE.--30 years, 427 ft<sup>3</sup>/s (12.1 m<sup>3</sup>/s), 5.27 in/yr (134 mm/yr), 309,400 acre-ft/yr (381 hm<sup>3</sup>/yr).

EXTREMES.--Current year: Maximum discharge, 6,560 ft<sup>3</sup>/s (186 m<sup>3</sup>/s) May 4 (gage height, 9.33 ft or 2.844 m); minimum, 24 ft<sup>3</sup>/s (0.68 m<sup>3</sup>/s) Sept. 24 (gage height, 0.97 ft or 0.296 m).  
Period of record: Maximum discharge, 24,700 ft<sup>3</sup>/s (700 m<sup>3</sup>/s) Aug. 8, 1965 (gage height, 22.10 ft or 6.736 m, from floodmark); maximum gage height, 22.72 ft (6.925 m) May 22, 1960 (from floodmark); minimum daily discharge, 1.6 ft<sup>3</sup>/s (0.045 m<sup>3</sup>/s) Feb. 9-25, 1959; minimum gage height, 1.22 ft (0.372 m) Aug. 31, 1970.

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

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	364	341	330	147	182	280	1,680	2,650	1,210	255	140	140
2	332	716	310	145	183	480	1,600	3,730	1,110	252	126	117
3	304	1,190	350	143	184	720	1,560	4,710	1,010	255	110	122
4	272	1,350	408	142	186	990	1,530	6,150	924	263	97	106
5	252	1,300	425	141	188	1,570	1,460	6,220	884	274	82	88
6	244	1,190	405	140	192	2,310	1,350	5,060	853	289	72	74
7	227	1,070	369	140	191	3,060	1,240	4,050	816	289	63	65
8	222	957	341	139	190	3,390	1,130	3,710	768	269	58	61
9	214	865	318	138	190	3,810	1,030	3,620	694	249	61	60
10	209	792	300	138	189	4,020	871	3,600	631	222	58	56
11	196	751	292	138	186	4,350	792	3,410	569	206	53	49
12	186	722	270	138	185	4,670	884	2,940	528	193	93	48
13	176	694	254	139	185	5,310	985	2,560	493	179	113	45
14	166	660	241	140	184	5,900	1,100	2,240	458	166	95	42
15	159	626	230	141	183	5,980	1,300	1,950	420	152	95	39
16	147	587	220	142	182	5,780	1,910	1,690	394	138	113	36
17	138	550	211	144	182	5,330	2,470	1,470	374	126	97	38
18	133	514	203	147	182	4,520	2,850	1,300	367	113	106	33
19	126	481	199	150	182	3,810	2,820	1,140	383	99	133	31
20	126	462	191	152	181	3,290	2,560	1,020	401	88	97	31
21	136	438	197	157	181	2,900	2,290	942	442	78	99	28
22	136	416	182	160	180	2,590	2,120	884	473	72	117	27
23	145	387	177	163	181	2,320	1,920	815	465	72	115	25
24	164	390	172	166	183	2,190	1,650	757	427	117	193	27
25	241	380	167	169	188	2,210	1,460	745	380	222	377	46
26	329	377	164	171	192	2,270	1,310	716	348	319	390	113
27	357	354	161	173	200	2,250	1,180	762	329	357	329	304
28	351	263	157	176	212	2,150	1,050	924	307	319	269	587
29	335	269	153	178	-----	2,010	975	1,080	289	257	238	910
30	319	338	150	179	-----	1,890	897	1,220	269	198	193	1,550
31	319	-----	148	181	-----	1,770	-----	1,260	-----	152	159	-----
TOTAL	7,025	19,430	7,683	4,717	5,224	94,120	45,974	73,325	17,016	6,240	4,341	4,898
MEAN	227	648	248	152	187	3,036	1,532	2,365	567	201	140	163
MAX	364	1,350	425	181	212	5,980	2,850	6,220	1,210	357	390	1,550
MIN	126	263	148	138	180	280	792	716	269	72	53	25
CF8M	.21	.59	.23	.14	.17	2.76	1.39	2.15	.52	.18	.13	.15
IN.	.24	.66	.26	.16	.18	3.18	1.55	2.48	.58	.21	.15	.17
AC-FT	13,930	38,540	15,240	9,360	10,360	186,700	91,190	145,400	33,750	12,380	8,610	9,720
CAL YR 1972	TOTAL 113,377	MEAN 310	MAX 2,200	MIN 16	CF8M .28	IN 3.83	AC-FT 224,900					
WTR YR 1973	TOTAL 289,993	MEAN 795	MAX 6,220	MIN 25	CF8M .72	IN 9.81	AC-FT 575,200					

## PEAK DISCHARGE (BASE, 1,300 CFS)

DATE	TIME	G. H.	DISCHARGE	DATE	TIME	G. H.	DISCHARGE
11-4	1045	4.24	1,380	4-18	2145	5.97	2,910
3-14	2300	8.88	6,090	5-4	2400	9.33	6,560

## MINNESOTA RIVER BASIN

05325000 Minnesota River at Mankato, Minn.

LOCATION.--Lat 44°09'54", long 94°00'45", in NE¼NE¼ Sec.13, T.108 N., R.27 W., Blue Earth County, on right bank 0.2 mi (0.3 km) downstream from bridge on U.S. Highway 169 in Mankato, 1.3 mi (2.1 km) downstream from Blue Earth River and at mile 106.9 (172 km) upstream from Mississippi River.

DRAINAGE AREA.--14,900 mi<sup>2</sup> (38,600 km<sup>2</sup>), 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 (227.97 m) above mean sea level, datum of 1929. Prior to Oct. 19, 1921, nonrecording gage, at site 1.3 mi (2.1 km) upstream at datum 6.4 ft (2.0 m) higher. Mar. 15, 1922, to Nov. 30, 1924, nonrecording gage at present site and datum, Dec. 1, 1924, to May 24, 1971, recorder at site 0.5 mi (0.8 km) downstream at present datum.

AVERAGE DISCHARGE.--52 years (1905, 1910-17, 1929-73), 2,690 ft<sup>3</sup>/s (76.2 m<sup>3</sup>/s), 2.45 in/yr (62 mm/yr), 1,949,000 acre-ft/yr (2.40 km<sup>3</sup>/yr).

EXTREMES.--Current year: Maximum discharge, 19,700 ft<sup>3</sup>/s (558 m<sup>3</sup>/s) Mar. 17 (gage height, 16.52 ft or 5.035 m); minimum, 219 ft<sup>3</sup>/s (6.20 m<sup>3</sup>/s) Sept. 24 (gage height, 1.87 ft or 0.570 m).

Period of record: Maximum discharge, 94,100 ft<sup>3</sup>/s (2,660 m<sup>3</sup>/s) Apr. 10, 1965 (gage height, 29.09 ft or 8.867 m); minimum observed, 26 ft<sup>3</sup>/s (0.74 m<sup>3</sup>/s) Aug. 4, 1934.

Maximum stage known, 29.9 ft (9.11 m) Apr. 26, 1881, from floodmark, present site and datum (discharge, 90,000 ft<sup>3</sup>/s or 2,550 m<sup>3</sup>/s).

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 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1,590	1,640	1,980	1,300	1,650	1,540	11,600	8,330	9,000	1,910	579	496
2	1,500	2,400	1,850	1,350	1,600	1,670	11,300	10,200	8,490	1,890	514	440
3	1,400	3,330	1,800	1,400	1,560	1,840	11,200	12,000	7,920	1,860	455	432
4	1,310	4,180	1,770	1,430	1,560	2,050	11,100	13,900	7,460	2,000	410	403
5	1,250	4,690	1,730	1,460	1,550	2,300	10,800	14,400	7,090	2,070	369	363
6	1,230	4,810	1,700	1,400	1,530	2,700	10,300	13,400	6,780	2,040	338	332
7	1,140	4,790	1,650	1,300	1,520	3,100	9,840	12,100	6,500	1,960	315	326
8	1,150	4,630	1,600	1,300	1,500	3,800	9,360	11,100	6,150	1,880	310	310
9	1,340	4,450	1,570	1,250	1,480	4,700	8,940	10,700	5,830	1,690	315	305
10	1,430	4,120	1,530	1,270	1,460	6,300	6,220	10,700	5,530	1,530	315	310
11	1,410	3,880	1,480	1,230	1,440	7,800	7,550	10,500	5,200	1,500	299	294
12	1,350	3,740	1,440	1,230	1,420	9,200	7,390	9,890	5,000	1,410	305	278
13	1,280	3,750	1,400	1,230	1,400	13,500	7,540	8,970	4,750	1,240	357	273
14	1,210	3,840	1,370	1,230	1,380	17,700	7,700	8,040	4,520	1,140	344	269
15	1,120	3,820	1,340	1,230	1,360	19,100	8,060	7,340	4,260	1,030	344	259
16	1,080	3,780	1,320	1,230	1,350	19,600	8,970	6,940	4,090	926	375	259
17	1,030	3,700	1,300	1,230	1,340	19,500	9,660	6,530	3,870	816	363	259
18	982	3,560	1,250	1,300	1,320	18,600	10,500	6,200	3,780	705	363	259
19	937	3,510	1,240	1,380	1,310	17,800	10,900	5,840	3,740	672	395	254
20	903	3,340	1,200	1,500	1,300	16,700	10,700	5,540	3,770	598	351	245
21	937	3,230	1,200	1,600	1,290	15,700	10,100	5,370	3,920	541	337	236
22	937	3,130	1,200	1,720	1,280	14,500	9,340	5,190	3,860	532	505	236
23	982	2,990	1,200	1,860	1,280	13,500	8,680	4,610	3,640	640	551	240
24	992	2,910	1,200	1,850	1,290	12,900	8,210	5,230	3,370	1,020	496	250
25	1,080	2,840	1,200	1,800	1,300	12,800	7,880	5,540	3,120	971	805	278
26	1,480	2,720	1,200	1,790	1,340	13,000	7,560	5,560	2,910	1,140	903	496
27	1,700	2,570	1,200	1,780	1,370	13,300	7,240	6,150	2,670	1,180	794	661
28	1,690	2,330	1,200	1,760	1,440	13,300	6,880	6,790	2,490	992	750	1,070
29	1,630	2,080	1,200	1,740	-----	12,800	6,610	7,630	2,310	848	794	1,590
30	1,560	2,030	1,220	1,700	-----	12,400	6,460	8,520	2,160	784	716	2,320
31	1,600	-----	1,260	1,670	-----	11,900	-----	9,000	-----	694	560	-----
TOTAL	39,300	102,860	43,600	45,610	39,640	335,600	270,630	262,210	144,180	38,209	14,627	13,743
MEAN	1,266	3,429	1,413	1,471	1,416	10,830	9,021	8,458	4,806	1,233	472	458
MAX	1,700	4,810	1,980	1,860	1,650	19,600	11,600	14,400	9,000	2,070	903	2,320
MIN	903	1,840	1,200	1,230	1,280	1,540	6,460	4,610	2,160	532	299	236
CFSM	.09	.23	.09	.10	.10	.73	.61	.57	.32	.08	.03	.03
IN	.10	.20	.11	.11	.10	.84	.68	.65	.36	.10	.04	.03
AC-FT	77,950	204,000	86,480	90,470	78,630	665,700	536,600	520,100	286,000	75,790	29,010	27,260
CAL YR 1972	TOTAL 1,557,036	MEAN 4,254	MAX 14,300	MIN 500	CFSM .29	IN 3.89	AC-FT 3,088,000					
WTR YR 1973	TOTAL 1,350,409	MEAN 3,700	MAX 19,600	MIN 236	CFSM .25	IN 3.37	AC-FT 2,679,000					

05330000 Minnesota River near Jordan, Minn.

LOCATION.--Lat 44°41'35", long 93°38'30", in NW¼SW¼ sec.7, T.114 N., R.23 W., Carver County, on left bank 1.5 mi (2.4 km) northwest of Jordan and at mile 39.4 (63.4 km) upstream from Mississippi River.

DRAINAGE AREA.--16,200 mi<sup>2</sup> (42,000 km<sup>2</sup>), 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 (210.31 m) above mean sea level, datum of 1929. Prior to Oct. 1, 1966, water-stage recorder 2.8 mi (4.5 km) downstream with auxiliary chain gage at present site and same datum.

AVERAGE DISCHARGE.--39 years, 3,425 ft<sup>3</sup>/s (97.0 m<sup>3</sup>/s), 2.87 in/yr (73 mm/yr), 2,481,000 acre-ft (3.06 km<sup>3</sup>/yr).

EXTREMES.--Current year: Maximum daily discharge, 21,900 ft<sup>3</sup>/s (620 m<sup>3</sup>/s) Mar. 18 (gage height, 23.09 ft or 7.038 m); maximum gage height, 23.14 ft (7.053 m) Mar. 19; minimum discharge, 384 ft<sup>3</sup>/s (10.9 m<sup>3</sup>/s) Sept. 24 (gage height, 4.00 ft or 1.219 m).

Period of record: Maximum discharge, 117,000 ft<sup>3</sup>/s (3,310 m<sup>3</sup>/s) Apr. 11, 1965; maximum gage height, 34.37 ft (10.476 m) Apr. 12, 1965 (backwater from Mississippi River); minimum discharge, 79 ft<sup>3</sup>/s (2.24 m<sup>3</sup>/s) Nov. 17, 1955; minimum gage height, 2.66 ft (0.811 m) 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1,990	2,140	2,280	1,510	2,900	2,000	13,500	7,630	9,500	2,770	1,100	806
2	2,030	2,380	2,180	1,520	2,800	2,200	13,100	9,510	9,760	2,640	1,030	735
3	2,010	3,150	2,100	1,550	2,750	2,400	12,700	11,000	9,620	2,570	964	702
4	1,900	3,990	2,000	1,590	2,700	2,700	12,300	11,800	9,220	2,490	922	674
5	1,820	4,650	1,940	1,620	2,650	3,100	12,000	12,400	8,740	2,470	866	652
6	1,760	5,220	1,690	1,630	2,600	3,800	11,700	13,000	8,240	2,500	822	610
7	1,720	5,380	1,840	1,700	2,570	5,000	11,200	13,000	7,780	2,460	777	584
8	1,700	5,350	1,790	1,730	2,530	6,600	10,700	14,100	7,380	2,360	746	574
9	1,660	5,230	1,740	1,700	2,500	8,870	10,200	14,000	6,970	2,270	766	569
10	1,670	5,040	1,690	1,630	2,450	10,500	9,620	13,600	6,580	2,120	714	576
11	1,880	4,820	1,670	1,500	2,400	12,000	9,020	12,900	6,190	1,950	678	558
12	1,900	4,520	1,650	1,480	2,350	13,000	8,390	12,400	5,920	1,820	656	529
13	1,840	4,310	1,610	1,460	2,300	14,500	7,980	11,900	5,670	1,710	603	488
14	1,790	4,240	1,600	1,470	2,250	15,900	7,930	11,200	5,380	1,610	725	478
15	1,740	4,230	1,590	1,460	2,200	16,900	8,060	10,100	5,090	1,510	701	476
16	1,670	4,220	1,580	1,500	2,170	18,300	8,410	8,930	4,900	1,420	676	450
17	1,600	4,170	1,570	1,530	2,130	20,100	8,960	8,130	4,690	1,330	700	439
18	1,560	4,080	1,560	1,570	2,100	21,400	9,520	7,580	4,530	1,270	692	407
19	1,490	4,060	1,560	1,640	2,070	21,500	10,000	7,090	4,410	1,200	656	435
20	1,480	3,960	1,550	1,760	2,030	20,900	10,500	6,670	4,360	1,130	635	425
21	1,500	3,730	1,540	2,000	2,010	19,800	10,800	6,340	4,380	1,070	642	440
22	1,520	3,520	1,530	2,250	1,990	19,100	10,800	6,100	4,460	1,020	680	435
23	1,530	3,310	1,520	2,550	1,960	18,200	10,500	5,830	4,460	999	828	406
24	1,520	3,200	1,510	2,800	1,930	17,400	9,790	5,680	4,310	994	851	398
25	1,540	3,100	1,500	3,050	1,900	16,600	9,110	5,680	4,020	1,220	779	440
26	1,570	3,000	1,500	3,200	1,900	15,800	8,600	6,220	3,740	1,260	774	552
27	1,720	2,850	1,490	3,150	1,910	15,100	8,180	6,420	3,550	1,270	912	638
28	2,030	2,720	1,490	3,100	1,920	14,600	7,810	6,920	3,320	1,340	951	742
29	2,110	2,580	1,480	3,100	-----	14,300	7,500	7,550	3,100	1,350	890	829
30	2,090	2,450	1,480	3,100	-----	14,100	7,330	8,200	2,910	1,280	856	1,100
31	2,110	-----	1,470	3,000	-----	13,800	-----	8,950	-----	1,170	856	-----
TOTAL	54,450	115,600	51,900	62,870	63,970	400,470	296,210	291,630	173,180	52,573	24,528	17,147
MEAN	1,756	3,853	1,674	2,028	2,285	12,920	9,874	9,407	5,773	1,696	791	572
MAX	2,110	5,380	2,280	3,200	2,900	21,500	13,500	14,100	9,760	2,770	1,100	1,100
MIN	1,480	2,140	1,470	1,460	1,900	2,000	7,330	5,680	2,910	994	635	398
CFSM	.11	.24	.10	.13	.14	.80	.61	.58	.36	.10	.05	.04
IN	.13	.27	.12	.14	.15	.92	.68	.67	.40	.12	.06	.04
AC=FT	108,000	229,300	102,900	124,700	126,900	794,300	587,500	578,400	343,500	104,300	48,650	34,010
CAL YR 1972	TOTAL 1,822,435	MEAN 4,979	MAX 16,800	MIN 610	CFSM .31	IN 4.18	AC=FT 3,615,000					
WTR YR 1973	TOTAL 1,604,528	MEAN 4,396	MAX 21,500	MIN 398	CFSM .27	IN 3.68	AC=FT 3,183,000					

## MINNESOTA RIVER BASIN

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 mi (1.9 km) downstream from bridge on Old Shakopee Road and 2.1 mi (3.4 km) upstream from mouth.

PERIOD OF RECORD.--January 1963 to July 1973 (discontinued). *OK 10, 38 57 m*

GAGE.--Water-stage recorder. Altitude of gage is 731 ft (223 m) (from topographic map). Prior to May 16, 1963, nonrecording gage 30 ft (9 m) upstream at datum 0.81 ft (0.247 m) higher.

AVERAGE DISCHARGE.--9 years (1963-72), 18.4 ft<sup>3</sup>/s (0.52 m<sup>3</sup>/s), 13.300 acre-ft/yr (16.4 hm<sup>3</sup>/yr).

EXTREMES.--Current year: Maximum discharge during period October 1972 to July 1973, 204 ft<sup>3</sup>/s (5.78 m<sup>3</sup>/s) July 1 gage height, 3.20 ft or 0.975 m; minimum, 3.2 ft<sup>3</sup>/s (0.091 m<sup>3</sup>/s) Jan. 14, 15, 16, Feb. 10, 12, 15, 16, 17, 19, 21, 22.

Period of record: Maximum discharge, 535 ft<sup>3</sup>/s (15.2 m<sup>3</sup>/s) Apr. 8, 1965 (gage height, 4.32 ft or 1.317 m); minimum, 1.2 ft<sup>3</sup>/s (0.034 m<sup>3</sup>/s) Feb. 24, 1965; minimum gage height, 1.28 ft (0.390 m) Oct. 4, 1966.

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

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9.5	16	7.8	7.4	8.3	11	13	58	10	11		
2	7.7	38	8.0	7.4	8.3	11	13	60	11	29		
3	9.2	30	7.8	7.4	8.7	11	13	61	13	16		
4	7.6	32	7.3	7.2	9.0	12	13	56	13	16		
5	9.6	31	7.4	7.0	8.5	12	13	46	12	10		
6	10	27	7.2	6.8	8.1	12	14	37	10	7.9		
7	9.4	21	7.0	6.0	7.9	13	15	32	7.9	5.8		
8	8.9	17	7.6	5.6	7.5	14	15	27	6.8	5.5		
9	11	15	7.0	5.2	7.3	22	16	25	6.4	5.3		
10	13	14	7.0	5.0	7.2	51	17	22	6.4	5.1		
11	8.5	12	6.1	4.8	6.8	80	16	19	6.4	5.1		
12	7.3	10	6.1	4.9	6.8	71	15	17	6.4	5.1		
13	7.8	9.9	6.4	5.9	6.4	58	14	14	6.1			
14	7.3	8.7	6.4	6.4	6.4	43	14	12	5.8			
15	7.3	8.2	7.0	6.4	6.8	33	62	10	5.8			
16	8.3	8.8	6.4	9.0	7.0	27	34	10	7.3			
17	7.8	8.8	6.1	11	7.1	23	22	10	7.3			
18	6.8	8.0	6.1	21	7.0	21	21	10	13			
19	7.1	7.9	6.4	11	7.0	18	19	8.8	11			
20	12	8.6	6.4	11	7.6	17	21	8.8	11			
21	8.7	9.6	6.1	12	6.1	16	17	12	10			
22	12	8.6	6.4	11	7.6	15	15	15	8.8			
23	14	9.5	6.4	11	9.0	15	14	15	7.9			
24	12	9.3	6.4	11	9.0	14	12	22	6.8			
25	11	10	7.0	11	9.0	14	12	21	7.9			
26	10	9.3	6.4	11	9.0	14	13	22	6.4			
27	9.9	8.0	7.0	9.7	9.7	14	12	22	6.4			
28	8.4	8.1	6.4	9.0	9.7	13	12	19	6.8			
29	7.7	8.1	7.1	8.3	-----	13	11	17	6.8			
30	12	8.2	7.2	8.3	-----	13	22	13	6.4			
31	15	-----	7.3	8.3	-----	13	-----	10	-----			-----
TOTAL	296.8	420.6	211.2	267.0	218.8	714	520	731.6	250.8			
MEAN	9.57	14.0	6.81	8.61	7.81	23.0	17.3	23.6	8.36			
MAX	15	38	8.0	21	9.7	80	62	61	13			
MIN	6.8	7.9	6.1	4.8	6.1	11	11	8.8	5.8			
AC-FT	589	834	419	530	434	1,420	1,030	1,450	497			

CAL YR 1972 TOTAL 6,657.2 MEAN 18.2 MAX 117 MIN 2.8 AC-FT 13,200

NOTE.--No gage-height record Mar. 2 to Apr. 16.

## 05331000 Mississippi River at St. Paul, Minn.

LOCATION.--Lat 44°56'40", long 93°05'20", in SE¼NE¼ sec.6, T.28 N., R.22 W., Ramsey County, on left bank in St. Paul, 300 ft (91 m) upstream from Robert Street Bridge, 6 mi (10 km) downstream from Minnesota River, and at mile 839.3 (1,350 km) upstream from Ohio River.

DRAINAGE AREA.--36,800 mi<sup>2</sup> (95,300 km<sup>2</sup>), approximately.

PERIOD OF RECORD.--Water year 1867-69, 1872-92 (annual maximum), March 1892 to current year (prior to 1901, fragmentary during some winters). Records prior to March 1892, published in the 19th Annual Report, Part 4, have been found to be unreliable and should not be used. Monthly discharge only for some periods, published in WSP 1308. Gage-height records (winter records incomplete) collected at same site since 1866 are contained in reports of U.S. Weather Bureau, War Department and Mississippi River Commission.

GAGE.--Water-stage recorder. Datum of gage is 683.62 ft (208.37 m) above mean sea level, datum of 1929. Prior to Mar. 18, 1925, nonrecording gage at several sites within 300 ft (91 m) 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 mi (9.0 km) downstream.

AVERAGE DISCHARGE (ADJUSTED FOR DIVERSION).--75 years (1894-95, 1896-97, 1900-73), 10,470 ft<sup>3</sup>/s (296.5 m<sup>3</sup>/s), 3.86 in/yr (98 mm/yr).

EXTREMES.--Current year: Maximum discharge, 51,800 ft<sup>3</sup>/s (1,470 m<sup>3</sup>/s) Mar. 20 (gage height, 11.19 ft or 3.411 m); minimum daily, 3,560 ft<sup>3</sup>/s (101 m<sup>3</sup>/s) Sept. 27.

Period of record (1867-70, 1872-1973): Maximum discharge, 171,000 ft<sup>3</sup>/s (4,840 m<sup>3</sup>/s) Apr. 16, 1965 (gage height, 26.01 ft or 7.928 m, from floodmark).

Period of record (1897, 1917-73): Minimum daily discharge, 632 ft<sup>3</sup>/s (17.9 m<sup>3</sup>/s) Aug. 26, 1934.

Maximum flood known since at least 1851, 171,000 ft<sup>3</sup>/s (4,840 m<sup>3</sup>/s) Apr. 16, 1965 (gage height, 26.01 ft or 7.928 m, from floodmark).

Flood of Apr. 11, 1870 reached a stage of 19.4 ft (5.9 m), discharge, 100,000 ft<sup>3</sup>/s (2,830 m<sup>3</sup>/s).

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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	12,000	11,700	10,200	8,240	9,790	7,090	33,500	16,700	23,700	6,760	4,920	7,900
2	11,700	13,300	9,680	8,030	9,780	7,260	32,600	20,700	23,800	7,420	4,800	7,400
3	12,300	13,800	7,280	8,860	8,660	7,810	31,900	21,800	23,600	7,940	5,970	7,580
4	12,000	15,000	6,200	8,510	8,700	7,530	30,800	23,100	23,500	6,860	6,860	7,620
5	12,000	18,100	6,570	7,210	8,540	8,920	29,600	23,400	22,900	7,540	5,280	6,370
6	11,700	21,600	6,400	7,740	8,640	10,900	28,700	24,600	21,500	7,120	5,300	6,400
7	11,300	20,400	5,850	7,400	8,400	11,600	27,500	24,400	21,000	7,780	6,060	6,830
8	11,000	19,900	6,360	7,400	7,950	13,700	26,200	25,000	19,500	6,620	6,460	6,960
9	11,000	20,000	7,270	7,640	7,980	15,000	24,200	25,800	18,700	6,660	6,860	6,370
10	11,000	21,100	8,250	7,700	8,130	17,100	23,600	26,100	17,400	6,460	7,060	6,300
11	10,800	20,200	9,040	7,560	7,900	19,400	22,100	26,100	16,500	6,430	7,900	5,910
12	11,500	20,100	8,890	7,930	8,500	23,500	20,700	25,900	15,800	5,630	7,690	6,730
13	11,000	19,300	9,360	7,820	8,190	29,400	20,000	25,900	15,400	4,800	8,740	6,730
14	10,900	18,700	9,370	7,970	7,840	34,200	19,100	26,000	14,400	5,660	8,510	4,730
15	11,000	18,300	8,530	8,080	7,050	38,000	18,800	24,900	13,500	5,250	8,610	5,490
16	10,300	17,100	7,160	7,770	6,610	41,700	18,900	23,200	13,300	5,280	8,420	5,600
17	10,300	16,900	7,820	7,940	6,370	45,600	18,600	21,700	12,800	5,250	7,980	4,420
18	10,200	15,700	7,560	8,220	8,210	48,800	18,900	20,200	12,600	4,330	8,340	4,240
19	9,790	16,000	8,630	8,180	7,920	50,600	20,900	19,000	12,400	4,730	8,220	3,600
20	9,820	15,300	9,060	8,080	7,580	51,600	20,500	17,700	12,200	4,380	7,780	4,380
21	10,200	14,300	9,020	8,460	7,290	51,300	21,700	16,600	11,200	4,780	8,020	4,380
22	10,100	14,500	9,060	9,230	7,370	50,200	22,200	17,200	10,600	4,360	9,020	4,340
23	10,200	13,600	9,490	9,090	7,070	48,500	22,200	16,400	10,800	5,150	9,090	4,090
24	10,800	13,100	9,280	8,710	6,550	46,700	20,900	16,300	10,100	4,800	6,300	4,800
25	10,100	13,000	8,790	9,430	6,600	44,800	20,500	17,100	10,000	4,750	8,300	4,150
26	10,200	12,500	8,720	9,820	6,540	43,000	20,200	17,500	8,930	4,800	7,780	4,930
27	10,600	12,000	8,420	9,780	6,620	41,200	19,100	18,800	8,930	4,200	7,620	3,560
28	10,800	11,200	8,760	9,950	7,500	39,400	18,800	20,600	8,990	4,360	7,820	4,400
29	11,000	10,700	8,410	8,760	-----	37,500	18,000	21,900	8,640	5,600	7,200	4,240
30	11,000	9,860	9,120	9,250	-----	34,900	17,700	22,700	7,620	4,420	7,120	6,090
31	11,600	-----	9,160	9,510	-----	33,700	-----	23,300	-----	4,470	7,580	-----
TOTAL	338,210	477,260	257,710	260,270	218,280	960,910	688,400	670,600	450,310	174,590	227,610	166,540
MEAN	10,910	15,910	8,313	8,396	7,796	31,000	22,950	21,630	15,010	5,632	7,342	5,551
MAX	12,300	21,600	10,200	9,950	9,790	51,600	33,500	26,100	23,800	7,940	9,090	7,900
MIN	9,790	9,860	5,850	7,210	6,370	7,090	17,700	16,300	7,620	4,200	4,800	3,560
(†)	310	304	291	299	293	347	312	347	338	337	354	315
MEAN ‡	11,220	16,210	8,604	8,695	8,089	31,350	23,260	21,980	15,350	5,969	7,696	5,866
CFSM ‡	0.30	0.44	0.23	0.24	0.22	0.85	0.63	0.60	0.42	0.16	0.21	0.16
IN. ‡	0.35	0.49	0.26	0.28	0.23	0.98	0.70	0.69	0.47	0.18	0.24	0.18

CAL YR 1972 TOTAL 7,121,960 MEAN 19,460 MAX 51,400 MIN 5,280 MEAN ‡ 19,790 CFSM ‡ 0.54 IN. ‡ 1.28  
WTR YR 1973 TOTAL 4,890,690 MEAN 13,400 MAX 51,600 MIN 3,560 MEAN ‡ 13,720 CFSM ‡ 0.37 IN. ‡ 5.05

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

‡ Adjusted for diversion.





## ST. CROIX RIVER BASIN

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05338500 Snake River near Pine City, Minn.

LOCATION.--Lat 45°50'30", long 92°56'00", in SE¼NW¼ sec.26, T.39 N., R.21 W., Pine County, on left bank at site of former powerplant and dam, 0.5 mi (0.8 km) downstream from Cross Lake and 1.5 mi (2.4 km) northeast of Pine City.

DRAINAGE AREA.--958 mi<sup>2</sup> (2,480 km<sup>2</sup>).

RECORDS AVAILABLE.--June 1913 to September, 1917, July 1951 to current year.

GAGE.--Water-stage recorder. Datum of gage is 919.00 ft (280.11 m) above mean sea level, datum of 1929.  
June 25, 1913, to Sept. 30, 1917, nonrecording gage at site 500 ft (152 m) downstream at different datum.  
July 1 to Oct. 28, 1951, nonrecording gage at present site and datum.

AVERAGE DISCHARGE.--26 years, 597 ft<sup>3</sup>/s (16.9 m<sup>3</sup>/s), 8.46 in/yr (215 mm/yr).

EXTREMES.--Current year: Maximum discharge, 5,560 ft<sup>3</sup>/s (157 m<sup>3</sup>/s) Mar. 18 (gage height, 7.20 ft or 2.195 m); minimum, 60 ft<sup>3</sup>/s (1.70 m<sup>3</sup>/s) July 22 (gage height, 2.94 ft or 0.896 m).

Period of record: Maximum discharge, 14,300 ft<sup>3</sup>/s (405 m<sup>3</sup>/s) July 27, 1972 (gage height, 10.38 ft or 3.164 m); minimum, 5.5 ft<sup>3</sup>/s (0.16 m<sup>3</sup>/s) Oct. 1, 1964 (gage height, 2.57 ft or 0.783 m), result of dam rehabilitation 0.5 mi (0.8 km) upstream.

A discharge measurement of 12,500 ft<sup>3</sup>/s (354 m<sup>3</sup>/s) 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	507	464	290	146	170	169	1,750	562	2,040	252	190	368
2	478	577	270	147	170	168	1,640	662	1,750	281	195	380
3	546	875	260	148	170	178	1,500	715	1,570	254	185	426
4	562	1,370	230	149	170	189	1,360	742	1,390	252	180	488
5	545	1,800	210	150	170	201	1,250	760	1,340	252	169	497
6	594	2,060	200	152	170	220	1,120	770	1,320	271	190	483
7	562	2,130	185	153	170	249	1,000	751	1,270	263	196	465
8	546	2,030	175	154	170	286	899	742	1,200	246	335	429
9	493	1,930	160	155	170	342	797	780	1,050	233	455	399
10	471	1,790	150	156	170	444	774	816	920	215	582	376
11	478	1,610	145	158	170	688	706	830	806	190	667	338
12	457	1,410	135	160	168	1,020	629	853	699	185	655	297
13	471	1,200	130	161	168	1,670	580	880	595	174	632	271
14	471	1,090	129	162	168	2,480	546	891	503	152	543	261
15	402	935	129	164	168	3,570	577	881	401	135	474	239
16	402	826	129	165	168	4,640	628	801	419	121	427	218
17	402	733	130	168	168	5,200	636	710	430	115	398	218
18	370	662	130	172	168	5,530	688	639	435	114	389	201
19	358	602	130	172	168	5,430	724	577	477	112	440	181
20	352	554	130	172	168	5,090	760	534	516	84	429	164
21	376	500	131	172	168	4,640	836	480	500	73	402	164
22	376	464	132	172	168	4,140	836	485	471	69	407	233
23	402	422	133	172	168	3,640	817	470	436	108	404	187
24	498	402	134	172	169	3,210	826	547	406	190	399	174
25	457	416	135	172	166	2,870	817	990	388	183	389	256
26	457	409	136	172	168	2,630	798	1,510	385	182	372	294
27	464	383	137	172	164	2,450	742	1,970	303	188	356	348
28	457	340	138	172	165	2,310	670	2,260	314	194	333	385
29	428	322	140	171	-----	2,180	594	2,400	290	191	317	418
30	416	310	143	170	-----	2,050	554	2,400	273	197	308	436
31	442	-----	145	170	-----	1,900	-----	2,260	-----	194	360	-----
TOTAL	14,200	28,616	4,941	5,051	4,718	69,784	26,054	30,668	22,977	5,670	11,778	9,594
MEAN	461	954	159	163	169	2,251	868	989	766	183	380	320
MAX	594	2,130	290	172	170	5,530	1,750	2,400	2,040	281	667	497
MIN	352	310	129	146	164	168	546	470	273	69	169	164
CFSM	.48	1.00	.17	.17	.18	2.35	.91	1.03	.80	.19	.40	.33
IN.	.55	1.11	.19	.20	.18	2.71	1.01	1.19	.89	.22	.46	.37
AC-FT	28,340	56,760	9,800	10,020	9,360	138,400	51,680	60,830	45,570	11,250	23,360	19,030
CAL YR 1972	TOTAL 4,396,595	MEAN 12,010	MAX 14,200	MIN 129	CFSM 12.5	IN 170.72	AC-FT 8,721,000					
WTR YR 1973	TOTAL 234,141	MEAN 641	MAX 5,530	MIN 69	CFSM .67	IN 9.09	AC-FT 464,400					

05340050 Sunrise River near Lindstrom, Minn.

LOCATION.--Lat 45°27'00", long 92°53'10", in SW°NE° sec.7, T.34 N., R.20 W., Chisago County, on left bank 20 ft (6 m) downstream from highway bridge and 4.5 mi (7.2 km) northwest of Lindstrom.

PERIOD OF RECORD.--July 1965 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 850 ft (259 m) from topographic map).

AVERAGE DISCHARGE.--8 years, 87.6 ft<sup>3</sup>/s (2.48 m<sup>3</sup>/s), 63,470 acre-ft/yr (78.3 hm<sup>3</sup>/yr).

EXTREMES.--Current year: Maximum discharge, 285 ft<sup>3</sup>/s (8.07 m<sup>3</sup>/s) Mar. 21 (gage height, 5.89 ft or 1.80 m); minimum, 9.3 ft<sup>3</sup>/s (0.26 m<sup>3</sup>/s) July 23 (gage height, 2.27 ft or 0.69 m).

Period of record: Maximum discharge, 704 ft<sup>3</sup>/s (19.9 m<sup>3</sup>/s) Apr. 11, 1969 (gage height, 7.28 ft or 2.22 m); minimum, 4.5 ft<sup>3</sup>/s (0.13 m<sup>3</sup>/s) Oct. 3, 1971 (gage height, 1.98 ft or 0.60 m).

REMARKS.--Records good except those for winter period, which are fair. Some regulation by Minnesota Game and Fish Wildlife Refuge ponds above the station. At high stages a small part of flow discharges into the Rum River and Coon Creek basins from West Arm of Coon Lake and South Coon Lake, respectively.

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	77	80	98	57	47	48	250	143	248	139	17	40
2	75	100	98	57	47	49	247	146	251	135	15	39
3	77	114	97	57	47	50	245	148	256	125	11	37
4	78	114	94	57	46	52	240	145	275	112	11	36
5	78	115	92	57	46	51	236	144	275	101	11	35
6	80	118	87	58	46	53	233	143	267	95	11	32
7	80	120	82	58	46	58	227	147	258	86	12	30
8	79	122	78	58	46	69	221	146	250	78	15	30
9	77	125	73	58	46	76	213	143	245	72	18	29
10	79	129	70	58	45	75	207	145	238	67	16	29
11	82	132	66	58	45	92	205	150	229	61	14	27
12	79	133	62	58	45	123	203	158	218	57	13	26
13	79	133	59	58	45	157	195	161	207	54	19	26
14	78	132	56	58	45	176	192	162	199	50	19	26
15	76	132	56	58	44	194	189	162	190	48	19	25
16	77	131	56	58	44	218	187	164	184	46	21	25
17	75	130	56	58	44	244	182	164	186	43	21	25
18	72	128	56	59	44	264	176	163	180	28	21	24
19	71	125	56	59	44	274	169	164	178	16	21	24
20	71	124	56	59	44	281	167	160	178	14	20	23
21	78	120	56	59	43	284	166	159	170	12	21	30
22	76	119	56	59	43	284	162	163	154	11	30	38
23	76	115	56	59	44	282	156	165	143	16	37	33
24	77	114	56	59	44	282	152	166	128	22	36	32
25	78	113	56	57	45	282	148	207	167	17	38	38
26	78	110	57	54	46	279	145	237	178	16	39	48
27	77	108	57	52	46	274	141	236	161	18	40	51
28	76	105	57	50	47	271	134	229	155	19	40	49
29	74	103	57	48	-----	267	127	228	149	19	39	48
30	74	101	57	47	-----	259	126	234	145	19	40	47
31	79	-----	57	47	-----	257	-----	242	-----	18	40	-----
TOTAL	2,393	3,545	2,070	1,749	1,264	5,625	5,641	5,324	6,062	1,614	725	1,002
MEAN	76.9	114	66.8	56.4	45.1	181	188	172	202	52.1	23.4	33.4
MAX	82	133	98	59	47	284	250	242	275	139	40	51
MIN	71	80	56	47	43	48	126	143	128	11	11	23
AC-FT	4,730	7,030	4,110	3,470	2,510	11,160	11,190	10,560	12,020	3,200	1,440	1,990

CAL YR 1972 TOTAL 33,805 MEAN 92.4 MAX 234 MIN 35 AC-FT 67,050  
 WTR YR 1973 TOTAL 37,004 MEAN 101 MAX 284 MIN 11 AC-FT 73,400

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 (550 m) downstream from powerplant of Northern States Power Co., in St. Croix Falls, and at mile 52.2 (84.0 km).

DRAINAGE AREA.--5,930 mi<sup>2</sup> (15,360 km<sup>2</sup>), 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 (210.294 m) 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.--71 years, 4,158 ft<sup>3</sup>/s (117.8 m<sup>3</sup>/s), 9.52 in/yr (242 mm/yr).

EXTREMES.--Current year: Maximum discharge, 25,100 ft<sup>3</sup>/s (711 m<sup>3</sup>/s) Mar. 18, gage height, 11.89 ft (3.624 m); minimum daily, 1,860 ft<sup>3</sup>/s (52.7 m<sup>3</sup>/s) July 22.

Period of record: Maximum discharge, 54,900 ft<sup>3</sup>/s (1,550 m<sup>3</sup>/s) May 8, 1950, gage height, 25.19 ft (7.678 m); minimum daily, 75 ft<sup>3</sup>/s (2.12 m<sup>3</sup>/s) July 17, 1910.

REMARKS.--Records are good. Diurnal fluctuation caused by St. Croix Falls powerplant 1,800 ft (550 m) upstream.

REVISIONS (WATER YEARS).--WSP 1115: 1929.

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5,250	4,510	2,800	2,910	2,810	2,340	11,300	5,910	10,100	2,880	3,010	4,900
2	4,570	5,160	2,900	2,970	2,740	2,670	11,600	6,300	8,810	3,620	2,110	4,700
3	5,070	6,350	2,140	3,060	2,760	2,410	9,360	6,750	8,240	2,860	2,570	4,290
4	6,260	10,100	2,130	3,030	2,760	2,750	7,860	7,350	8,050	2,910	2,350	4,580
5	5,500	11,500	2,120	2,780	2,500	3,090	8,520	7,380	8,150	3,040	2,000	5,300
6	5,590	11,600	2,320	2,820	2,890	3,200	7,860	7,370	8,010	3,040	2,290	5,570
7	5,770	10,800	2,320	2,990	2,870	3,190	7,590	7,230	7,680	2,800	3,190	5,230
8	5,540	10,200	2,960	2,510	2,820	3,930	7,100	6,590	7,370	2,370	2,160	4,530
9	5,270	9,640	2,830	2,540	2,750	3,980	6,740	7,110	6,990	3,020	4,440	4,100
10	5,270	8,830	2,870	2,160	2,590	4,670	6,150	7,000	6,290	2,310	5,670	4,230
11	5,250	8,390	3,160	2,800	2,590	5,710	5,690	7,290	6,000	2,540	5,390	3,470
12	4,660	7,740	2,880	2,910	2,560	8,320	5,630	7,310	5,680	3,170	4,960	3,630
13	4,770	7,240	2,880	2,520	2,390	11,600	5,280	7,350	4,890	2,090	4,990	3,380
14	4,900	6,850	2,730	2,640	2,520	14,100	4,900	7,210	4,540	2,400	4,950	3,030
15	4,560	6,470	2,830	2,850	2,610	20,700	5,270	6,390	4,520	1,990	4,470	3,020
16	4,460	6,350	2,700	2,900	2,440	22,700	5,660	6,150	3,550	2,460	4,790	2,440
17	4,330	5,120	2,740	2,600	2,450	24,500	6,290	5,890	3,600	1,910	4,750	2,750
18	3,180	4,990	2,790	2,600	2,360	24,800	6,560	5,420	4,430	2,550	4,890	2,920
19	3,840	4,900	3,020	3,110	2,620	24,300	6,400	4,960	3,620	2,140	4,300	2,360
20	3,730	4,920	2,400	3,120	2,360	22,800	6,620	4,830	3,770	2,000	4,280	2,730
21	4,020	4,500	2,860	2,830	2,520	20,500	7,010	4,530	3,720	2,050	4,820	2,930
22	3,890	4,410	2,940	3,360	2,440	18,300	7,780	4,860	3,350	1,860	5,120	2,550
23	4,230	3,520	2,360	2,970	2,630	16,500	6,030	4,330	3,140	2,410	4,540	2,780
24	4,920	3,910	2,570	3,040	2,290	15,400	7,530	5,890	3,260	2,510	4,490	3,110
25	4,170	4,710	3,150	3,070	2,470	15,000	7,180	8,040	3,060	2,510	4,220	3,210
26	4,070	4,320	3,030	2,840	2,740	14,700	6,770	13,500	3,510	2,620	3,720	4,000
27	4,550	3,790	2,740	2,990	2,340	14,400	6,440	15,500	3,510	2,590	3,670	3,990
28	4,180	3,440	2,810	2,950	2,690	14,000	6,350	16,100	3,240	2,630	3,550	4,310
29	4,290	2,710	2,890	3,090	-----	13,200	5,250	15,100	3,140	2,650	3,470	4,060
30	3,870	2,800	2,780	2,920	-----	12,700	5,140	13,300	2,900	2,950	3,280	3,950
31	4,100	-----	2,800	2,800	-----	12,000	-----	11,700	-----	2,580	4,500	-----
TOTAL	144,060	189,770	84,450	88,680	72,510	378,460	209,860	244,640	157,120	79,460	122,940	112,070
MEAN	4,647	6,326	2,724	2,861	2,590	12,210	6,995	7,892	5,237	2,563	3,966	3,736
MAX	6,260	11,600	3,160	3,360	2,890	24,800	11,600	16,100	10,100	3,620	5,670	5,570
MIN	3,180	2,710	2,120	2,160	2,290	2,340	4,900	4,330	2,900	1,860	2,000	2,380
CFSM	.78	1.07	.46	.48	.44	2.06	1.18	1.33	.88	.43	.67	.63
IN,	.90	1.19	.53	.56	.45	2.37	1.32	1.53	.99	.50	.77	.70
CAL YR 1972	TOTAL 2,416,600	MEAN 6,603	MAX 42,500	MIN 2,110	CFSM 1.11	IN 15.16						
WTR YR 1973	TOTAL 1,884,020	MEAN 5,162	MAX 24,800	MIN 1,860	CFSM .87	IN 11.82						

## 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 (61 m) downstream from St. Croix River, 300 ft (91 m) south of Chicago, Burlington & Quincy Railroad bridge, 800 ft (244 m) south of bridge on U.S. Highway 10, and at mile 811.4 (1,305 km) upstream from Ohio River.

DRAINAGE AREA.--44,800 mi<sup>2</sup> (116,000 km<sup>2</sup>), approximately.

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

GAGE.--Water-stage recorder. Datum of gage is 649.50 ft (197.97 m) above mean sea level, datum of 1929. Prior to Aug. 2, 1932, nonrecording gage at railroad bridge 300 ft (91 m) upstream at following datums: June 3, 1928, to Sept. 30, 1929, 19.27 ft (5.873 m) higher; Oct. 1, 1929, to Sept. 30, 1930, 17.68 ft (5.390 m) higher; Oct. 1, 1930, to Aug. 1, 1932, 19.28 ft (5.877 m) higher. Aug. 2, 1932, to Oct. 30, 1938, water-stage recorder at present site at datum 19.28 ft (5.877 m) higher; Nov. 1, 1938, to Sept. 7, 1971, water-stage recorder at present site at datum 50.00 ft (15.240 m) lower.

AVERAGE DISCHARGE.--45 years, 16,011 ft<sup>3</sup>/s (453 m<sup>3</sup>/s), 4.88 in/yr (124 mm/yr).

EXTREMES.--Current year: Maximum discharge, 78,300 ft<sup>3</sup>/s (2,220 m<sup>3</sup>/s) Mar. 20 (gage height, 33.83 ft or 10.311 m); minimum daily, 5,300 ft<sup>3</sup>/s (150 m<sup>3</sup>/s) Dec. 4; minimum gage height, 24.49 ft (7.465 m) Dec. 3. Period of record: Maximum discharge, 228,000 ft<sup>3</sup>/s (6,460 m<sup>3</sup>/s) Apr. 18, 1965 (gage height, 43.11 ft or 13.140 m); minimum daily, 1,380 ft<sup>3</sup>/s (39.1 m<sup>3</sup>/s) July 13, 1940; minimum gage height, 15.08 ft (4.596 m) 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	20,300	18,000	12,500	8,400	10,500	9,900	47,900	29,400	38,300	12,300	11,400	12,200
2	19,800	19,200	11,500	8,300	9,600	10,900	46,800	30,100	37,300	12,400	11,900	12,800
3	19,100	22,500	9,600	10,300	9,000	11,600	45,200	30,500	36,600	12,700	11,300	13,200
4	19,600	24,000	5,300	10,100	9,400	11,800	43,200	31,800	35,700	12,500	10,700	12,800
5	19,300	27,200	5,400	9,200	9,500	16,100	40,600	33,300	34,900	12,300	10,400	12,600
6	19,300	30,700	7,500	8,600	9,200	16,400	39,500	34,400	33,900	12,300	9,400	12,600
7	18,900	33,500	6,500	8,500	8,800	17,900	38,900	35,700	32,400	12,300	10,300	13,000
8	18,800	33,900	6,800	8,900	8,000	20,400	37,100	36,200	31,600	11,800	10,800	13,500
9	18,000	33,700	6,700	8,400	8,000	21,900	36,000	35,900	30,200	10,300	10,800	13,100
10	17,600	33,700	7,200	8,500	8,700	25,600	33,600	36,800	28,900	9,510	12,000	12,300
11	18,200	32,800	9,600	8,600	8,200	28,100	32,500	37,100	27,600	10,000	13,600	11,500
12	18,100	31,700	11,200	8,800	8,400	31,500	31,500	36,600	26,300	10,000	14,300	10,500
13	17,300	30,500	10,500	8,900	9,400	36,000	29,800	36,400	24,700	10,200	14,800	9,930
14	17,000	29,100	10,800	8,500	8,500	43,800	28,800	36,400	23,900	9,980	15,500	9,510
15	16,500	29,000	10,600	8,700	6,900	53,000	28,400	35,900	21,700	10,100	15,300	9,460
16	15,800	28,600	10,500	9,600	6,600	61,700	28,800	34,700	20,000	10,000	15,700	9,080
17	15,700	27,700	7,500	9,600	6,500	68,200	27,400	32,300	19,000	10,500	15,600	8,600
18	14,900	26,100	8,200	9,300	6,400	73,700	28,900	31,100	18,100	10,100	14,200	8,750
19	14,300	25,300	9,500	8,700	7,500	76,700	30,700	29,400	17,700	8,710	14,200	9,170
20	14,500	24,500	10,900	9,000	8,000	78,000	31,100	27,800	17,400	8,480	13,600	9,300
21	14,800	24,100	10,000	9,100	7,200	77,000	32,000	26,700	17,000	8,640	13,300	10,600
22	15,400	23,400	9,500	10,000	8,300	74,200	32,200	26,400	16,000	8,750	13,500	9,880
23	15,600	21,900	9,600	11,000	9,200	70,900	32,800	25,900	14,600	8,760	16,300	10,200
24	15,700	21,000	9,100	10,400	9,000	67,800	33,000	25,300	14,600	9,300	15,400	10,400
25	16,200	20,200	9,600	10,600	8,500	64,900	32,900	26,300	14,400	9,290	13,000	10,600
26	16,000	20,300	10,000	10,600	8,700	62,100	32,200	28,300	13,500	8,920	12,900	11,900
27	16,000	19,400	9,700	10,500	8,900	59,800	31,100	31,900	12,900	8,980	12,800	13,200
28	16,400	17,000	8,800	10,000	8,600	58,100	30,400	35,300	12,700	9,150	12,300	11,600
29	16,800	15,000	9,000	9,100	-----	55,400	29,700	37,500	12,200	10,200	11,700	11,700
30	16,900	14,000	11,100	9,000	-----	53,100	29,200	38,400	12,100	10,200	11,700	12,100
31	17,500	-----	10,800	9,900	-----	49,700	-----	38,700	-----	10,400	11,700	-----
TOTAL	530,300	758,000	285,500	289,100	235,500	1,406,2M	1,022,2M	1,012,5M	696,200	319,070	400,400	336,080
MEAN	17,110	25,270	9,210	9,326	8,411	45,360	34,070	32,660	23,210	10,290	12,920	11,200
MAX	20,300	33,900	12,500	11,000	10,500	78,000	47,900	38,700	38,300	12,700	16,300	13,500
MIN	14,300	14,000	5,300	8,300	6,400	9,900	27,400	25,300	12,100	8,480	9,400	8,600
CF8M	.38	.56	.21	.21	.19	1.01	.76	.73	.52	.23	.29	.25
IN,	.44	.63	.24	.24	.20	1.17	.85	.84	.58	.26	.33	.28
CAL YR 1972	TOTAL 10,063,600	MEAN 27,500	MAX 94,800	MIN 5,300	CF8M .61	IN 8.36						
WTR YR 1973	TOTAL 7,291,050	MEAN 19,980	MAX 78,000	MIN 5,300	CF8M .45	IN 6.05						

M Expressed in thousands.

05353800 Straight River near Faribault, Minn.

LOCATION.--Lat 44°15'29", long 93°13'51", in W½SE¼ sec.9, T.109 N., R.20 W., Rice County, on right bank 15 ft (5 m) downstream from highway bridge, 2.8 mi (4.5 km) upstream from Falls Creek and 3.2 mi (5.1 km) southeast of Faribault.

PERIOD OF RECORD.--October 1965 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,035 ft (315 m) from topographic map).

AVERAGE DISCHARGE.--8 years, 248 cfs (7.02 m³/s).

EXTREMES.--Current year: Maximum discharge, 5,990 cfs (170 m³/s) May 1 (gage height, 11.20 ft or 3.414 m); maximum gage height, 12.68 ft (3.865 m) Mar. 8 (backwater from ice); minimum discharge, 49 cfs (1.39 m³/s) July 23 (gage height, 4.06 ft or 1.237 m).

Period of record: Maximum discharge, 5,990 cfs (170 m³/s) May 1, 1973 (gage height, 11.20 ft or 3.414 m); maximum gage height, 12.68 ft (3.865 m) Mar. 8, 1973 (backwater from ice); minimum daily discharge, 11 cfs (0.31 m³/s) 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	510	335	125	155	110	140	506	4,850	339	108	189	139
2	406	674	117	150	110	165	526	5,410	300	171	138	133
3	301	830	113	135	105	210	519	3,880	322	162	111	126
4	327	740	111	115	105	260	480	2,770	374	157	100	121
5	318	621	110	105	102	354	435	2,100	378	190	82	121
6	208	618	110	95	100	750	402	1,700	330	173	84	110
7	282	587	110	92	100	1,900	383	1,400	289	140	85	99
8	246	533	108	90	98	1,880	360	2,020	266	117	80	97
9	235	502	108	89	98	1,800	332	1,940	231	105	87	96
10	213	493	106	88	97	1,740	220	1,580	205	98	83	96
11	195	489	106	86	96	3,230	287	1,230	205	89	82	95
12	179	461	106	88	96	3,610	429	945	224	82	70	93
13	171	426	106	88	95	2,730	631	762	189	77	87	88
14	158	400	106	88	95	2,930	732	662	175	73	94	87
15	148	367	106	88	94	2,860	1,140	585	166	69	101	84
16	107	342	105	90	91	2,250	2,250	514	171	66	97	82
17	140	319	105	130	89	1,810	2,190	456	146	61	88	85
18	129	298	105	220	89	1,450	1,690	413	175	57	78	86
19	121	278	105	320	89	1,170	1,300	377	179	55	70	80
20	121	268	105	300	89	952	1,020	337	184	53	63	77
21	141	255	104	280	90	800	862	332	170	52	62	74
22	149	243	104	270	90	705	735	327	158	53	114	74
23	319	228	104	265	91	650	602	310	153	53	911	71
24	479	221	104	250	92	654	517	298	141	724	1,390	71
25	482	219	104	220	93	733	470	306	131	498	1,010	87
26	427	217	103	200	95	743	437	298	128	313	651	777
27	370	210	105	170	100	674	401	327	131	194	436	1,460
28	314	195	108	150	118	610	367	400	131	137	306	1,350
29	272	165	120	135	-----	570	580	484	125	135	221	1,160
30	204	140	135	125	-----	533	771	453	116	419	178	1,250
31	279	-----	160	115	-----	500	-----	388	-----	276	152	-----
TOTAL	8,181	11,674	3,424	4,794	2,717	39,365	21,574	37,944	6,252	4,957	7,300	8,369
MEAN	264	389	110	155	97.0	1,270	719	1,224	208	160	235	279
MAX	510	830	160	320	118	3,610	2,250	5,410	378	724	1,390	1,460
MIN	121	140	103	88	89	140	220	298	116	52	62	71
AC=FT	16,230	23,160	6,790	9,510	5,390	78,080	42,790	75,260	12,400	9,830	14,480	16,600

CAL YR 1972 TOTAL 71,910 MEAN 198 MAX 1,800 MIN 16 AC=FT 142,600  
 WTR YR 1973 TOTAL 156,551 MEAN 429 MAX 5,410 MIN 52 AC=FT 310,500

## PEAK DISCHARGE (BASE, 1,500 CFS)

DATE	TIME	G. H.	DISCHARGE	DATE	TIME	G. H.	DISCHARGE
3-12	0400	9.77	3,940	8-24	0345	6.96	1,520
4-16	2115	8.22	2,410	9-27	1415	6.90	1,500
5-1	1330	11.20	5,990				

## 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 (9.1 m) upstream from ford, 0.25 mi (0.40 km) downstream from sewage plant, 1.6 mi (2.6 km) north of Rochester, 2 mi (3 km) downstream from Cascade Creek, and 2.5 mi (4.0 km) downstream from Silver Lake Dam.

DRAINAGE AREA.--304 mi<sup>2</sup> (787 km<sup>2</sup>).

PERIOD OF RECORD.--January 1952 to current year.

GAGE.--Water-stage recorder. Datum of gage is 949.56 ft (289.43 m) above mean sea level, datum of 1929.

AVERAGE DISCHARGE.--21 years, 139 ft<sup>3</sup>/s (3.94 m<sup>3</sup>/s), 6.21 in/yr (158 mm/yr).

EXTREMES.--Current year: Maximum discharge, 8,590 ft<sup>3</sup>/s (243 m<sup>3</sup>/s) Mar. 11 (gage height, 15.34 ft or 4.676 m); minimum, 60 ft<sup>3</sup>/s (1.70 m<sup>3</sup>/s) June 29 (gage height, 2.63 ft or 0.802 m).

Period of record: Maximum discharge, 19,600 ft<sup>3</sup>/s (555 m<sup>3</sup>/s) Mar. 1, 1965 (gage height, 19.12 ft or 5.828 m, from floodmark); minimum, 8.4 ft<sup>3</sup>/s (0.24 m<sup>3</sup>/s) Dec. 7, 1955.

Flood of July 21, 1951 reached a stage of about 17.5 ft (5.33 m), 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 1972 TO SEPTEMBER 1973

DAY	UCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	279	557	96	263	171	124	332	4,000	351	109	115	266
2	184	912	98	190	158	340	407	4,340	324	160	101	412
3	187	934	99	228	146	1,100	382	2,110	444	159	95	359
4	199	504	100	154	149	1,510	330	1,150	406	982	97	374
5	161	377	103	146	131	1,230	296	909	546	856	92	242
6	269	335	106	165	155	810	280	794	398	312	103	188
7	272	466	115	160	127	1,870	273	870	337	238	95	161
8	201	518	129	157	111	973	272	1,670	303	189	122	165
9	145	387	123	133	124	463	250	1,100	271	169	228	168
10	135	329	113	132	115	564	189	767	244	161	178	174
11	128	295	110	125	113	6,320	265	631	230	145	110	157
12	144	260	115	117	117	1,740	324	567	243	137	95	141
13	109	238	112	112	117	899	444	510	226	130	115	131
14	109	212	121	109	112	1,810	806	475	212	124	110	126
15	107	184	123	113	95	1,620	1,290	438	195	116	104	125
16	145	197	109	120	93	967	3,520	401	211	117	99	124
17	112	199	107	151	96	723	1,820	371	219	113	95	145
18	106	164	125	2,360	98	562	1,040	349	234	109	87	138
19	102	142	152	1,670	105	481	831	327	233	109	84	123
20	108	140	175	554	102	451	738	308	191	105	81	111
21	108	131	188	404	97	428	677	360	173	119	84	108
22	112	119	193	340	105	412	621	361	161	118	241	103
23	337	102	185	256	107	411	539	343	153	120	2,650	98
24	697	109	169	207	102	407	489	319	140	362	1,790	103
25	448	115	164	224	99	435	466	334	134	487	670	103
26	266	118	107	222	94	455	435	329	153	210	452	1,060
27	174	114	199	236	106	384	398	413	139	149	356	2,040
28	121	99	151	186	103	356	373	770	130	123	282	621
29	95	94	176	146	-----	343	687	688	104	120	232	630
30	97	95	566	188	-----	320	835	463	113	248	185	1,870
31	398	-----	707	169	-----	303	-----	392	-----	175	161	-----
TOTAL	6,053	6,446	5,178	9,746	3,248	28,791	19,609	26,859	7,218	6,771	9,309	10,566
MEAN	195	262	167	314	116	929	654	866	241	218	300	352
MAX	697	934	707	2,360	171	6,320	3,520	4,340	546	982	2,650	2,040
MIN	95	94	96	109	93	124	189	308	104	105	81	98
CFSM	.64	.93	.55	1.03	.38	3.06	2.15	2.85	.79	.72	.99	1.16
IN.	.74	1.03	.63	1.19	.40	3.52	2.40	3.29	.88	.83	1.14	1.29

CAL YR 1972 TOTAL 55,223 MEAN 151 MAX 1,570 MIN 33 CFSM .50 IN 6.76  
WTR YR 1973 TOTAL 141,794 MEAN 388 MAX 6,320 MIN 81 CFSM 1.28 IN 17.35

## PEAK DISCHARGE (BASE, 1,300 CFS, REVISED)

DATE	TIME	G. H.	DISCHARGE	DATE	TIME	G. H.	DISCHARGE
12-30	2100	6.93	1,540	5-1	2100	13.36	6,770
1-18	2130	10.00	3,480	5-8	1030	8.09	1,830
3-4	0700	7.75	1,650	7-5	0200	7.98	2,030
3-7	0845	9.51	2,400	8-23	2100	11.21	4,680
3-11	1345	15.34	8,590	9-27	0330	9.83	3,260
3-14	1730	9.64	2,480	9-30	0900	8.35	2,110
4-16	1200	11.38	4,530				

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 (305 m) downstream from Cold Creek, 0.7 mi (1.1 km) upstream from bridge on U.S. Highway 63, and 6.3 mi (10.1 km) downstream from North Fork.

**DRAINAGE AREA.**--1,130 mi<sup>2</sup> (2,930 km<sup>2</sup>), 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 (247.27 m) above mean sea level, datum of 1929. Prior to Nov. 11, 1933, nonrecording gage on bridge 800 ft (244 m) downstream at same datum.

AVERAGE DISCHARGE.--51 years (1909-17, 1930-73), 503 ft<sup>3</sup>/s (14.24 m<sup>3</sup>/s), 6.04 in/yr (153 mm/yr).

EXTREMES.--Current year: Maximum discharge, 22,200 ft<sup>3</sup>/s (629 m<sup>3</sup>/s) May 2 (gage height, 25.06 ft or 7.638 m); minimum, 139 ft<sup>3</sup>/s (3.94 m<sup>3</sup>/s) Feb. 26 (gage height, 6.49 ft or 1.978 m).  
Period of record: Maximum discharge, 35,900 ft<sup>3</sup>/s (1,020 m<sup>3</sup>/s) July 22, 1957 (gage height, 30.80 ft or 9.388 m, from floodmark); minimum, 27 ft<sup>3</sup>/s (0.76 m<sup>3</sup>/s) Jan. 12, 1935; minimum gage height, 5.96 ft (1.817 m) Nov. 27, 1967.

Flood of April 1888 reached stage of about 30.5 ft (9.30 m) at present site or 29.7 ft (9.05 m) 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 water temperatures and 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1,470	862	312	790	585	432	984	7,650	1,020	368	916	626
2	1,040	1,090	360	585	620	483	1,020	19,500	971	501	787	731
3	1,000	2,130	319	523	565	1,160	1,110	10,800	978	716	604	862
4	906	2,950	448	585	478	2,820	1,080	4,560	1,020	550	560	854
5	893	1,830	235	436	469	3,780	991	3,350	1,030	967	535	624
6	874	1,590	420	625	514	3,550	926	2,810	1,020	873	519	623
7	862	1,440	492	3,940	452	6,600	913	2,530	926	800	548	474
8	850	1,490	482	2,700	416	6,100	913	4,030	880	531	540	461
9	640	1,430	814	1,800	370	3,510	900	4,560	856	489	616	681
10	826	1,290	802	1,300	415	2,660	844	2,970	850	561	638	517
11	814	1,200	738	900	390	14,900	844	2,310	850	449	496	395
12	808	1,120	528	640	376	14,000	893	1,910	661	455	495	634
13	802	1,050	424	448	420	5,800	1,020	1,670	832	433	600	505
14	796	984	396	474	436	5,960	1,080	1,520	560	392	513	461
15	790	939	392	428	430	6,870	2,340	1,410	716	388	472	439
16	784	880	408	460	335	4,170	7,610	1,290	610	409	545	429
17	772	862	352	465	360	2,860	8,070	1,330	635	510	460	517
18	772	850	396	2,340	392	2,240	3,330	1,060	625	325	436	424
19	766	844	436	4,310	352	1,950	2,430	1,020	620	321	420	484
20	550	838	469	2,380	370	1,680	2,080	997	600	372	492	477
21	546	838	356	1,390	365	1,520	1,760	984	625	372	627	406
22	532	832	384	1,170	368	1,360	1,650	1,010	600	378	513	393
23	656	814	392	997	388	1,260	1,440	1,000	478	486	1,300	332
24	965	814	416	900	388	1,220	1,290	978	478	1,140	4,070	465
25	900	814	368	868	225	1,240	1,170	965	550	1,040	2,900	380
26	868	808	319	850	410	1,320	1,100	971	590	913	1,760	1,270
27	844	796	360	838	523	1,280	1,020	971	537	864	1,230	3,500
28	820	333	356	469	412	1,190	971	1,180	546	777	1,030	2,950
29	808	263	408	615	-----	1,120	1,010	1,510	420	476	957	1,880
30	814	220	650	656	-----	1,060	1,690	1,290	408	1,070	892	2,140
31	826	-----	919	590	-----	1,010	-----	1,100	-----	802	874	-----
TOTAL	25,594	32,201	14,151	35,472	11,824	105,105	52,479	89,236	21,492	18,728	27,345	24,934
MEAN	826	1,073	456	1,144	422	3,390	1,749	2,879	716	604	882	831
MAX	1,470	2,950	919	4,310	620	14,900	8,070	19,500	1,030	1,140	4,070	3,500
MIN	532	220	235	428	225	432	844	965	408	321	420	332
CF8M	.73	.95	.40	1.01	.37	3.00	1.55	2.55	.63	.53	.78	.74
IN.	.84	1.06	.47	1.17	.39	3.46	1.73	2.94	.71	.62	.90	.82
CAL YR 1972	TOTAL	71,946	MEAN	197	MAX	2,950	MIN	110	CF8M	.17	IN	2.37
NTR YR 1973	TOTAL	458,561	MEAN	1,256	MAX	19,500	MIN	220	CF8M	1.11	IN	15.10

## 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 mi (3.7 km) upstream from Middle Fork, 2.4 mi (3.9 km) west of Elba, and 3.5 mi (5.6 km) upstream from confluence with South Fork.

DRAINAGE AREA.--101 mi<sup>2</sup> (262 km<sup>2</sup>).

PERIOD OF RECORD.--May 1939 to September 1941, July 1967 to current year.

GAGE.--Water-stage recorder. Datum of gage is 769.60 ft (234.57 m) above mean sea level, datum of 1929. Oct. 12, 1939, to Sept. 30, 1941, water-stage recorder at site 600 ft (183 km) downstream at same datum. Prior to Oct. 12, 1939, nonrecording gage at site 2 mi (3.2 km) downstream at different datum.

AVERAGE DISCHARGE.--8 years (1939-41, 1967-73), 35.5 ft<sup>3</sup>/s (1.005 m<sup>3</sup>/s), 4.77 in/yr (121 mm/yr).

EXTREMES.--Current year: Maximum discharge, 5,010 ft<sup>3</sup>/s (142 m<sup>3</sup>/s) Mar. 11 (gage height, 10.34 ft or 3.152 m); minimum, 28 ft<sup>3</sup>/s (0.79 m<sup>3</sup>/s) Dec. 6 (gage height, 2.57 ft or 0.783 m).

Period of record: Maximum discharge, 5,010 ft<sup>3</sup>/s (142 m<sup>3</sup>/s) Mar. 11, 1973 (gage height, 10.34 ft or 3.152 m); minimum, 11 ft<sup>3</sup>/s (0.31 m<sup>3</sup>/s) Feb. 21, 1968.

Flood of June 15, 1967 reached a stage of 8.56 ft (2.61 m) from highwater mark in well (discharge, 2,850 ft<sup>3</sup>/s or 80.7 m<sup>3</sup>/s).

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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	50	54	38	58	45	41	56	284	76	53	44	49
2	44	93	37	44	45	59	55	315	73	55	42	56
3	43	90	33	42	42	436	53	209	73	56	41	55
4	43	70	33	36	40	405	52	157	77	59	159	50
5	41	63	33	36	40	263	50	142	119	52	52	48
6	42	63	32	36	39	288	49	131	80	49	50	46
7	43	77	32	35	39	929	49	138	70	49	50	45
8	41	75	32	35	37	236	48	194	67	48	49	46
9	38	65	32	34	36	96	48	133	64	46	50	46
10	36	62	32	33	36	230	41	116	63	48	48	45
11	37	59	32	33	37	2,460	37	108	60	46	45	45
12	36	56	32	32	37	252	45	106	63	46	44	44
13	35	54	32	33	37	157	49	102	60	45	45	44
14	35	52	32	34	37	370	69	97	59	45	48	44
15	34	50	32	35	36	164	124	94	57	45	46	44
16	34	49	32	35	34	114	286	91	59	44	45	44
17	35	48	32	36	34	100	197	88	59	45	44	44
18	33	47	32	835	36	88	138	85	57	44	44	44
19	33	46	32	184	38	83	119	84	59	46	44	44
20	33	45	32	90	37	78	121	81	56	46	42	42
21	37	44	32	82	36	74	100	80	55	46	42	42
22	41	43	32	73	35	71	93	84	53	48	62	42
23	67	41	32	61	35	69	87	83	53	46	197	42
24	66	42	32	50	36	67	84	80	53	126	76	41
25	54	44	32	48	35	67	81	81	52	60	60	53
26	48	43	31	45	34	64	78	78	53	48	55	179
27	45	41	33	45	35	62	76	81	62	46	52	113
28	43	38	32	45	36	60	74	129	56	45	44	59
29	41	38	34	40	-----	57	103	110	55	46	49	53
30	40	39	120	45	-----	56	102	85	53	57	48	53
31	48	-----	191	43	-----	55	-----	78	-----	48	48	-----
TOTAL	1,296	1,631	1,255	2,313	1,044	7,551	2,564	3,724	1,896	1,583	1,765	1,602
MEAN	41.8	54.4	40.5	74.6	37.3	244	85.5	120	63.2	51.1	56.9	53.4
MAX	67	93	191	835	45	2,460	286	315	119	126	197	179
MIN	33	38	31	32	34	41	37	78	52	44	41	41
CFSM	.41	.54	.40	.74	.37	2.42	.85	1.19	.63	.51	.51	.53
IN.	.48	.60	.46	.85	.38	2.78	.94	1.37	.70	.58	.65	.59
CAL YR 1972	TOTAL 14,803	MEAN 40.4	MAX 720	MIN 21	CFSM .40	IN 5.45						
WTR YR 1973	TOTAL 28,224	MEAN 77.3	MAX 2,460	MIN 31	CFSM .77	IN 10.40						



05378300 Straight Valley Creek near Rollingstone, Minn.

LOCATION.--Lat 44°05'09", long 91°50'34", in SE¼NE¼ sec.12, T.107 N., R.9 W., Winona County, at bridge on County Highway, 0.2 mi (0.3 km) above mouth, and 1.5 mi (2.4 km) southwest of Rollingstone.

DRAINAGE AREA.--5.16 mi<sup>2</sup> (13.36 km<sup>2</sup>).

PERIOD OF RECORD.--Annual maximums, water years 1959-70. October 1970 to current year.

GAGE.--Water-stage recorder and crest-stage gage. Nov. 6, 1958, to Oct. 20, 1966, crest-stage gage at present site and datum.

EXTREMES.--Current year: Maximum discharge, 470 ft<sup>3</sup>/s (13.3 m<sup>3</sup>/s) Mar. 10 (gage height, 14.50 ft or 4.420 m); minimum daily, 0.85 ft<sup>3</sup>/s (0.024 m<sup>3</sup>/s) Feb. 18, 19, 21.

Period of record: Maximum discharge, 1,200 ft<sup>3</sup>/s (34.0 m<sup>3</sup>/s) June 26, 1959 (gage height, 17.28 ft or 5.267 m); minimum observed, 0.12 ft<sup>3</sup>/s (0.003 m<sup>3</sup>/s) Aug. 5, 1960.

REMARKS.--Records fair.

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.8	2.4	1.8	2.5	2.1	1.7	2.5	9.4	2.5	2.0	1.9	2.1
2	2.8	7.0	1.7	1.7	2.0	4.8	2.3	7.2	2.5	2.3	1.8	2.1
3	3.4	3.0	1.7	1.6	1.8	8.8	2.3	4.0	2.5	2.1	1.8	3.9
4	3.0	2.8	2.1	1.5	1.6	4.2	2.3	3.5	2.7	2.1	1.9	2.1
5	2.8	2.6	1.7	1.5	1.4	2.4	2.3	3.4	2.4	2.1	1.8	1.9
6	2.9	2.7	1.7	1.5	1.2	11	2.4	3.2	2.4	2.1	2.0	1.8
7	2.6	3.7	1.7	1.5	1.1	11	2.4	5.1	2.3	2.1	2.2	1.8
8	2.4	2.8	1.7	1.5	1.0	3.5	2.4	3.8	2.3	2.1	2.4	1.8
9	2.2	2.6	1.5	1.5	.94	2.9	2.3	3.2	2.1	2.1	2.4	1.8
10	2.1	2.6	1.5	1.5	.92	64	2.5	3.1	2.2	2.0	2.0	1.8
11	2.1	2.4	1.4	1.5	.92	17	2.5	3.0	2.1	2.0	1.9	1.7
12	2.1	2.4	1.3	1.5	.99	4.5	2.8	3.0	2.1	2.0	1.8	1.6
13	2.0	2.3	1.2	1.5	1.2	4.0	3.5	2.9	2.0	2.0	2.1	1.6
14	1.8	2.3	.96	1.5	1.2	14	4.5	2.8	1.9	2.0	2.1	1.6
15	1.8	2.2	.96	1.5	1.2	4.7	11	2.8	2.0	2.0	2.0	1.7
16	2.0	2.2	.96	1.5	.99	4.3	11	2.8	2.1	2.0	2.1	1.8
17	1.8	2.2	3.5	3.0	.92	3.8	5.0	2.5	2.1	2.0	1.9	1.8
18	1.8	2.2	29	43	.85	3.7	3.7	2.5	2.3	2.0	1.8	1.6
19	1.8	2.1	3.7	2.6	.85	4.0	3.4	2.5	2.2	2.0	1.9	1.5
20	2.1	2.1	3.2	2.3	.92	3.2	3.2	2.4	2.1	2.0	1.8	1.4
21	2.1	2.0	3.2	2.3	.85	2.6	3.1	2.6	2.1	2.0	1.8	1.4
22	4.3	2.0	2.6	2.1	.99	2.6	2.9	2.8	2.0	2.0	4.6	1.4
23	5.7	2.0	1.8	2.1	.99	2.6	2.8	2.5	2.1	2.0	6.6	1.4
24	2.8	2.0	1.8	2.1	.99	2.9	2.6	2.5	2.0	2.0	2.4	1.5
25	2.6	2.0	1.7	2.1	.92	2.9	2.6	2.6	2.0	2.0	2.2	2.0
26	2.4	2.0	1.7	2.0	.92	2.8	2.6	2.5	2.1	1.9	2.2	5.2
27	2.3	1.8	1.7	2.0	.92	2.4	2.5	3.9	2.1	1.9	2.0	2.0
28	2.2	1.8	1.7	2.1	.99	2.3	2.5	5.9	2.2	1.8	2.0	2.0
29	2.2	1.8	1.7	2.1	-----	2.3	3.1	3.1	2.1	5.1	2.2	2.1
30	2.2	1.8	2.9	2.1	-----	2.3	3.1	2.9	2.1	3.2	2.2	2.0
31	3.0	-----	9.5	2.1	-----	2.2	-----	2.8	-----	1.9	2.1	-----
TOTAL	78.1	73.8	93.58	99.3	31.67	205.4	102.1	107.2	65.6	66.8	69.9	58.4
MEAN	2.52	2.46	3.02	3.20	1.13	6.63	3.40	3.46	2.19	2.15	2.25	1.95
MAX	5.7	7.0	29	43	2.1	64	11	9.4	2.7	5.1	6.6	5.2
MIN	1.8	1.8	.96	1.5	.85	1.7	2.3	2.4	1.9	1.8	1.8	1.4
CFSM	.49	.48	.59	.62	.22	1.28	.66	.67	.42	.42	.44	.38
IN.	.56	.53	.67	.72	.23	1.48	.74	.77	.47	.48	.50	.42
CAL YR 1972 TOTAL	775.02			MEAN 2.12	MAX 30	MIN .86	CFSM .41	IN 5.59				
WTR YR 1973 TOTAL	1,051.85			MEAN 2.88	MAX 64	MIN .85	CFSM .56	IN 7.58				

## 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 mi (15.3 km) upstream from Trempealeau River and at mile 725.7 (1,167.7 km) upstream from the Ohio River.

DRAINAGE AREA.--59,200 mi<sup>2</sup> (153,300 km<sup>2</sup>), 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 (194.96 m) above mean sea level, datum of 1929. June 10, 1928, to Apr. 15, 1931, nonrecording gage at site 800 ft (244) upstream. Prior to Oct. 1, 1929, at datum 0.20 ft (0.06 m) higher and Oct. 1, 1929, to Apr. 15, 1931, at datum 0.12 ft (0.04 m) 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 mi (4.3 km) upstream at tailwater of navigation dam 5A.

AVERAGE DISCHARGE.--45 years, 25,980 ft<sup>3</sup>/s (1,019 m<sup>3</sup>/s), 5.96 in/yr (151 mm/yr).

EXTREMES.--Current year: Maximum discharge, 136,000 ft<sup>3</sup>/s (3,850 m<sup>3</sup>/s) Mar. 20 (gage height, 14.58 ft or 4.444 m); minimum, 9,390 ft<sup>3</sup>/s (266 m<sup>3</sup>/s) Sept. 22, result of regulation; minimum gage height, 4.81 ft (1.466 m) Aug. 28.

Period of record: Maximum discharge, 268,000 ft<sup>3</sup>/s (7,590 m<sup>3</sup>/s) Apr. 19, 1965 (gage height, 20.77 ft or 6.331 m, from floodmark); minimum, 2,250 ft<sup>3</sup>/s (63.7 m<sup>3</sup>/s) Dec. 29, 1933 (gage height, -1.18 ft or -0.360 m); minimum gage height, -3.38 ft (1.030 m) Aug. 31, 1934.

Flood of June 18, 1880, reached an elevation of 657.14 ft (200.30 m), according to Corps of Engineers (discharge not determined).

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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	47,000	51,100	24,300	22,900	22,400	17,700	71,400	50,100	63,700	21,300	16,200	20,600
2	46,000	32,800	22,000	22,800	22,500	19,300	69,000	55,000	62,000	21,000	16,400	20,400
3	43,900	34,200	16,900	22,700	22,600	22,300	67,000	63,100	60,100	21,400	16,700	20,500
4	42,800	36,500	13,700	22,600	22,600	26,500	65,100	72,100	56,500	21,700	16,900	21,100
5	39,200	41,100	12,300	21,700	22,600	27,900	63,000	76,900	57,300	22,100	19,100	24,400
6	39,600	43,400	12,600	21,700	21,500	31,400	61,800	64,400	55,800	21,700	22,200	25,100
7	40,700	50,100	13,000	21,700	21,500	36,100	60,000	67,600	54,800	21,500	20,100	23,100
8	42,800	51,900	13,000	20,900	21,300	42,000	58,000	62,200	54,900	20,900	15,100	22,000
9	42,000	54,000	13,000	20,600	19,800	45,300	57,100	75,100	55,600	20,200	16,200	21,500
10	39,600	55,200	17,000	20,600	19,500	47,300	56,300	71,300	54,800	18,700	16,800	22,400
11	36,000	57,000	17,000	20,700	19,500	54,300	53,100	69,600	51,700	17,300	20,000	21,900
12	38,100	57,300	17,900	20,500	19,000	65,300	51,000	69,300	49,500	16,000	21,700	19,900
13	38,600	55,600	19,000	20,500	19,000	78,400	49,900	69,200	47,000	14,800	23,900	18,900
14	37,700	54,100	19,400	20,500	19,200	82,500	45,400	69,100	43,400	13,900	26,400	16,300
15	32,800	52,500	19,600	20,500	20,200	93,100	46,100	66,000	41,000	14,700	24,800	14,100
16	31,400	50,800	20,100	20,600	20,500	109,000	51,300	65,200	39,500	15,500	24,200	16,000
17	32,300	48,400	22,000	20,900	20,600	120,000	53,200	62,300	38,800	15,400	23,900	16,100
18	29,300	46,400	22,100	23,800	21,000	129,000	56,300	58,800	36,000	15,100	23,800	14,700
19	27,900	43,000	22,100	26,700	20,000	134,000	59,700	56,000	33,200	15,200	23,800	12,100
20	26,800	40,200	22,300	27,200	18,500	135,000	60,300	53,200	31,100	15,000	23,900	11,400
21	25,200	39,400	22,700	27,200	18,800	130,000	63,600	50,800	31,300	14,200	23,000	12,700
22	24,100	37,800	23,000	26,900	18,800	123,000	62,300	47,800	30,700	13,600	21,800	12,600
23	28,200	37,400	23,100	26,600	18,800	113,000	59,700	47,500	29,900	13,500	26,000	13,700
24	29,300	34,600	22,900	26,500	19,700	106,000	56,700	46,200	24,600	12,700	30,100	15,900
25	29,600	33,300	22,800	26,400	19,500	99,600	54,300	44,100	26,600	13,700	26,200	15,300
26	30,300	32,400	22,800	26,400	19,400	93,200	54,200	45,700	24,600	14,400	26,500	19,200
27	30,100	31,000	22,700	26,300	18,500	88,000	51,900	46,400	24,500	16,400	26,900	24,400
28	31,800	29,000	22,700	26,300	16,500	82,900	50,000	54,500	22,900	17,600	21,300	27,000
29	32,000	27,200	22,600	24,800	-----	80,500	46,500	59,800	22,300	17,100	19,700	27,200
30	31,700	26,400	22,700	23,500	-----	77,400	46,700	63,700	21,600	16,200	20,500	27,200
31	32,100	-----	22,900	22,400	-----	74,400	-----	64,700	-----	16,500	20,500	-----
TOTAL	1,078.9M	1,264.1M	612.200	723.400	565.800	2,384.4M	1,702.9M	1,929.7M	1,252.9M	529.300	676.600	577.700
MEAN	34,600	42,140	19,750	23,340	20,210	76,920	56,760	62,250	41,760	17,070	21,830	19,260
MAX	47,000	57,300	24,300	27,200	22,000	135,000	71,400	87,600	63,700	22,100	30,100	27,200
MIN	24,100	26,400	12,300	20,500	16,500	17,700	45,400	44,100	21,600	12,700	15,100	11,400
CFSM	.59	.71	.33	.39	.34	1.30	.96	1.05	.71	.29	.37	.33
IN.	.66	.79	.38	.45	.36	1.50	1.07	1.21	.79	.33	.43	.36

CAL YR 1972 TOTAL 14,393,900 MEAN 39,330 MAX 98,400 MIN 12,300 CFSM .66 IN 9.04  
WTR YR 1973 TOTAL 13,297,900 MEAN 36,430 MAX 135,000 MIN 11,400 CFSM .62 IN 8.36

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 0.5 mi (0.8 km) upstream from highway bridge, 1.2 mi (1.9 km) upstream from South Branch, and 2.5 mi (4.0 km) north-east of Lanesboro.

DRAINAGE AREA.--615 mi<sup>2</sup> (1,593 km<sup>2</sup>).

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 (241.19 m) above mean sea level, datum of 1929. Prior to Oct. 1, 1917, nonrecording gage at site 0.5 mi (0.8 km) downstream at datum about 1.5 ft (0.5 m) higher.

AVERAGE DISCHARGE.--38 years (1911-14, 1915-17, 1940-73), 327 ft<sup>3</sup>/s (9.26 m<sup>3</sup>/s), 7.22 in/yr (183 mm/yr).

EXTREMES.--Current year: Maximum discharge, 11,400 ft<sup>3</sup>/s (323 m<sup>3</sup>/s) Mar. 12 (12.03 ft or 3.667 m); maximum gage height, 15.28 ft (4.657 m) Jan. 19 (backwater from ice); minimum discharge, 139 ft<sup>3</sup>/s (3.94 m<sup>3</sup>/s) Dec. 4 (gage height, 1.21 ft or 0.369 m, result of freeze-up).  
Period of record: Maximum discharge, 22,100 ft<sup>3</sup>/s (626 m<sup>3</sup>/s) Mar. 29, 1962 (gage height, 16.11 ft or 4.910 m); maximum gage height, 17.83 ft (5.435 m) Mar. 1, 1965 (from floodmark, backwater from ice); minimum discharge, 29 ft<sup>3</sup>/s (0.821 m<sup>3</sup>/s) Aug. 27, 1949 (gage height, 1.08 ft or 0.329 m); minimum gage height, 0.80 ft (0.244 m) Dec. 15, 1967.

REMARKS.--Records good except those for winter period, 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1,320	756	340	440	395	425	518	2,720	762	409	319	290
2	990	1,080	282	380	380	1,200	609	4,940	700	433	295	303
3	830	1,910	230	360	365	1,940	759	4,550	689	467	285	423
4	765	1,400	143	345	355	2,970	647	2,210	895	3,560	431	371
5	667	1,010	205	335	345	2,130	548	1,560	1,040	4,250	317	412
6	636	880	175	325	338	1,430	501	1,310	854	1,110	315	338
7	636	1,050	175	315	330	3,140	466	1,380	746	771	402	307
8	604	1,770	269	314	320	2,310	448	3,530	667	608	381	295
9	546	1,310	300	313	315	1,310	464	2,740	616	528	657	297
10	506	1,040	300	312	310	1,200	380	1,570	575	493	540	300
11	470	934	300	311	308	8,470	421	1,250	543	467	403	296
12	446	858	300	311	302	5,930	433	1,090	544	444	344	286
13	421	779	300	311	298	1,940	461	994	534	421	329	280
14	407	712	300	311	295	2,850	635	922	509	395	321	275
15	386	658	300	311	290	3,610	3,100	867	509	378	315	275
16	376	614	300	311	287	2,140	7,340	819	514	363	311	276
17	362	581	300	330	283	1,420	6,720	762	513	351	303	288
18	344	551	300	550	280	1,120	2,680	723	1,090	338	289	294
19	334	526	295	4,000	278	889	1,780	688	984	340	281	266
20	330	507	290	2,550	276	762	1,460	650	919	324	272	276
21	358	489	285	1,650	275	685	1,240	652	678	321	266	275
22	386	471	280	960	273	635	1,090	675	572	337	280	264
23	756	451	275	790	271	608	941	646	530	336	810	275
24	2,000	441	270	690	270	600	850	623	498	341	692	269
25	1,600	437	265	610	270	617	796	622	469	503	486	364
26	1,070	436	260	560	270	686	737	617	455	392	430	480
27	869	426	255	515	270	682	687	642	480	350	382	1,250
28	743	405	255	480	270	594	652	943	446	325	346	977
29	658	371	255	455	-----	553	818	1,500	432	312	324	743
30	598	360	330	435	-----	535	1,090	1,140	420	428	305	4,410
31	629	-----	500	410	-----	524	-----	873	-----	386	301	-----
TOTAL	21,043	23,213	8,634	20,290	8,519	53,905	39,271	44,208	19,163	20,481	11,736	15,494
MEAN	679	774	279	655	304	1,739	1,309	1,426	639	661	379	517
MAX	2,000	1,910	500	4,000	395	8,470	7,340	4,940	1,090	4,250	410	4,410
MIN	330	360	143	311	270	425	380	617	420	312	266	269
CFSM	1.10	1.26	.45	1.07	.49	2.83	2.13	2.32	1.04	1.07	.62	.84
IN.	1.27	1.40	.52	1.23	.52	3.26	2.38	2.67	1.16	1.24	.71	.94

CAL YR 1972 TOTAL 138,052 MEAN 377 MAX 6,140 MIN 124 CFSM .61 IN 8.35  
WTR YR 1973 TOTAL 285,962 MEAN 763 MAX 8,470 MIN 143 CFSM 1.27 IN 17.30

## PEAK DISCHARGE (BASE, 3,500 CFS)

DATE	TIME	G. H.	DISCHARGE	DATE	TIME	G. H.	DISCHARGE
1-19	0800	15.28	about 4,200	5-3	0345	9.26	6,140
3-12	0045	12.03	11,400	5-8	1330	7.77	4,550
3-15	0145	8.11	4,720	7-5	0200	10.21	7,630
4-16	2245	11.63	10,800	9-30	1545	8.94	5,800

## 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 mi (2.4 km) northwest of Rushford and 3 mi (5 km) upstream from mouth.

DRAINAGE AREA.--129 mi<sup>2</sup> (334 km<sup>2</sup>).

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 (223.89 m) above mean sea level, datum of 1929. Prior to June 14, 1950, water-stage recorder at site 100 ft (30 m) upstream; at datum 5 ft (1.52 m) higher, Aug. 5, 1942, to Oct. 27, 1945; at datum 3 ft (0.91 m) higher, Oct. 28, 1945, to Aug. 3, 1949; at present datum, Aug. 4, 1949, to June 13, 1950.

AVERAGE DISCHARGE.--31 years, 53.3 ft<sup>3</sup>/s (1.509 m<sup>3</sup>/s), 5.61 in/yr (142 mm/yr).

EXTREMES.--Current year: Maximum discharge, 2,030 ft<sup>3</sup>/s (57.5 m<sup>3</sup>/s) Aug. 23 (gage height, 5.74 ft or 1.75 m); minimum daily, 37 ft<sup>3</sup>/s (1.05 m<sup>3</sup>/s) Feb. 16-18, 25, 26; minimum gage height, 0.95 ft (0.290 m) Feb. 26.

Period of record: Maximum discharge, 11,600 ft<sup>3</sup>/s (329 m<sup>3</sup>/s) Mar. 26, 1950 (gage height 13.54 ft or 4.127 m, from floodmark), from rating curve extended above 1,400 ft<sup>3</sup>/s (39.6 m<sup>3</sup>/s) on basis of contracted-opening measurements at gage heights 11.0 ft (3.4 m) and 13.5 ft (4.1 m); minimum, 17 ft<sup>3</sup>/s (0.48 m<sup>3</sup>/s) May 22, 1959; minimum gage height, 0.93 ft (0.283 m) June 16, 17, 18, 1963.

Flood of June 28, 29, 1942, reached a discharge of 11,000 ft<sup>3</sup>/s (312 m<sup>3</sup>/s) (by slope-area measurement of peak flow).

REMARKS.--Records fair.

## DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	61	55	51	61	45	68	63	180	75	66	63	71
2	68	56	50	54	43	144	61	171	74	69	61	70
3	56	62	49	50	42	196	59	113	74	67	61	89
4	86	60	48	47	42	125	61	96	74	68	69	76
5	58	59	47	44	43	118	59	93	74	67	66	71
6	57	66	46	43	42	70	59	88	71	68	80	71
7	57	58	45	43	40	304	60	99	71	68	93	71
8	56	59	45	42	40	106	61	107	72	66	77	71
9	55	58	45	42	39	77	61	95	70	66	100	71
10	53	57	45	41	39	218	62	88	69	68	70	71
11	53	57	45	41	39	827	63	83	71	67	66	71
12	52	57	45	42	38	113	61	82	71	66	64	69
13	53	56	44	42	38	102	63	80	69	64	67	69
14	51	55	44	43	38	168	66	78	69	62	68	69
15	51	56	44	45	38	90	72	78	71	61	66	69
16	51	55	44	48	37	80	137	77	71	62	68	68
17	51	55	44	55	37	76	96	76	69	63	66	70
18	51	54	43	1,060	37	72	85	76	71	63	66	70
19	51	54	43	207	38	70	80	76	69	64	66	68
20	54	53	42	72	38	68	78	74	67	63	64	67
21	53	53	42	50	38	66	77	78	64	63	66	66
22	56	53	42	48	38	63	76	75	64	63	86	72
23	71	52	42	46	38	63	72	75	69	63	673	66
24	64	53	42	49	38	63	71	75	68	63	110	66
25	61	53	42	54	37	62	71	78	64	62	88	70
26	58	53	42	51	37	61	70	74	66	62	83	93
27	57	52	42	46	38	61	68	78	69	63	80	81
28	55	51	42	45	38	60	68	97	67	61	76	77
29	55	51	43	44	-----	60	89	82	67	62	74	80
30	53	51	135	43	-----	60	77	78	67	67	72	77
31	58	-----	96	43	-----	60	-----	76	-----	67	71	-----
TOTAL	1,766	1,664	1,519	2,641	1,095	3,771	2,146	2,776	2,087	2,004	2,880	2,170
MEAN	57.0	55.5	49.0	85.2	39.1	122	71.5	89.5	69.6	64.6	92.9	72.3
MAX	86	66	135	1,060	45	827	137	180	75	69	673	93
MIN	51	51	42	41	37	60	59	74	64	61	61	66
CFSM	.44	.43	.38	.66	.30	.95	.55	.69	.54	.50	.72	.56
IN.	.51	.48	.44	.76	.32	1.09	.62	.80	.60	.58	.83	.63

CAL YR 1972 TOTAL 21,170 MEAN 57.8 MAX 977 MIN 35 CFSM .45 IN 6.10  
WTR YR 1973 TOTAL 26,519 MEAN 72.7 MAX 1,060 MIN 37 CFSM .56 IN 7.65

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 mi (1.6 km) west of Houston and 2.5 mi (4.0 km) upstream from South Fork.

DRAINAGE AREA.--1,270 mi<sup>2</sup> (3,290 km<sup>2</sup>), 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 1508.

GAGE.--Water-stage recorder. Datum of gage is 671.86 ft (204.78 m) above mean sea level, datum of 1929. May 28, 1909, to Sept. 30, 1917, nonrecording gage at site 1.5 mi (2.4 km) downstream at different datum. May 4, 1929, to Sept. 27, 1933, nonrecording gage at present site and datum.

AVERAGE DISCHARGE.--51 years (1909-17, 1930-73), 651 ft<sup>3</sup>/s (18.4 m<sup>3</sup>/s), 6.96 in/yr (177 mm/yr).

EXTREMES.--Current year: Maximum discharge, 11,700 ft<sup>3</sup>/s (331 m<sup>3</sup>/s) Apr. 17 (gage height, 10.48 ft or 3.194 m); maximum gage height, 11.21 ft (3.417 m) Jan. 19 (backwater from ice); minimum discharge, 303 ft<sup>3</sup>/s (8.58 m<sup>3</sup>/s) Dec. 7 (gage height, 2.62 ft or 0.799 m); minimum gage height, 1.33 ft (0.405 m) Feb. 17. Period of record: Maximum discharge, 37,000 ft<sup>3</sup>/s (1,050 m<sup>3</sup>/s) April, 1952 (gage height, 13.90 ft or 4.237 m); maximum gage height, 18.32 ft (5.584 m) Mar. 2, 1965 (backwater from ice); minimum discharge, 65 ft<sup>3</sup>/s (1.84 m<sup>3</sup>/s) 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 specific conductance, temperature 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2,730	1,210	720	970	960	660	1,130	2,210	1,560	883	790	742
2	2,010	1,540	700	790	940	1,610	1,170	6,350	1,460	907	744	744
3	1,700	2,090	640	650	920	2,600	1,370	6,620	1,390	918	722	799
4	1,610	2,410	570	630	874	3,930	1,390	4,480	1,410	1,380	967	878
5	1,410	1,790	530	620	863	3,430	1,230	3,250	1,830	5,440	871	824
6	1,320	1,580	495	615	825	2,430	1,140	2,770	1,630	2,460	808	802
7	1,220	1,560	305	615	755	3,980	1,070	2,970	1,500	1,630	949	746
8	1,170	2,140	495	620	680	4,000	1,040	3,930	1,380	1,380	951	712
9	1,070	2,300	530	620	625	2,500	1,060	5,250	1,300	1,230	1,500	710
10	994	1,800	560	620	680	1,950	1,030	3,410	1,230	1,130	1,180	698
11	929	1,610	560	625	695	7,390	935	2,700	1,180	1,050	1,010	690
12	863	1,490	560	630	670	9,430	982	2,320	1,160	987	886	671
13	825	1,390	565	640	650	4,270	988	2,080	1,120	936	859	647
14	795	1,290	565	650	630	3,810	1,030	1,920	1,090	890	875	646
15	765	1,200	565	660	600	5,250	2,370	1,790	1,050	852	824	644
16	735	1,130	570	670	490	3,900	6,860	1,670	1,070	821	852	640
17	720	1,070	570	680	440	2,880	10,600	1,570	1,060	788	809	662
18	695	1,020	570	1,490	565	2,300	5,700	1,900	1,360	770	770	679
19	670	982	575	4,960	610	1,920	3,670	1,430	1,640	757	758	673
20	665	946	575	3,430	590	1,660	2,960	1,370	1,720	755	730	670
21	705	913	575	2,090	565	1,510	2,530	1,330	1,390	747	702	672
22	725	880	580	1,660	550	1,430	2,240	1,350	1,210	751	781	766
23	970	852	580	1,500	555	1,340	1,990	1,340	1,120	753	2,790	712
24	1,950	831	580	1,380	580	1,280	1,790	1,300	1,060	757	1,680	689
25	2,760	825	580	1,300	590	1,250	1,650	1,290	1,010	793	1,270	752
26	1,940	820	585	1,220	560	1,260	1,540	1,270	973	879	1,090	958
27	1,610	810	585	1,170	545	1,320	1,440	1,280	986	816	1,000	1,310
28	1,420	790	590	1,100	560	1,250	1,360	1,660	969	773	921	1,640
29	1,280	755	595	1,070	-----	1,180	1,430	2,070	932	749	895	1,380
30	1,160	740	625	1,040	-----	1,130	1,600	2,190	905	799	811	2,680
31	1,150	-----	940	1,000	-----	1,120	-----	1,770	-----	857	769	-----
TOTAL	38,566	38,764	18,035	35,715	18,567	83,990	65,295	75,640	37,695	34,638	30,564	25,836
MEAN	1,244	1,292	582	1,152	663	2,709	2,177	2,440	1,257	1,117	986	861
MAX	2,760	2,410	940	4,960	960	9,430	10,600	6,620	1,830	5,440	2,790	2,680
MIN	665	740	305	615	440	660	935	1,270	905	747	702	640
CF8M	.98	1.02	.46	.91	.52	2.13	1.71	1.92	.99	.88	.78	.68
IN.	1.13	1.14	.53	1.05	.54	2.46	1.91	2.22	1.10	1.01	.90	.76

CAL YR 1972 TOTAL 276,442 MEAN 755 MAX 8,650 MIN 305 CF8M .59 IN 8.10  
 WTR YR 1973 TOTAL 503,305 MEAN 1,379 MAX 10,600 MIN 305 CF8M 1.09 IN 14.74

## PEAK DISCHARGE (BASE, 5,000 CFS)

DATE	TIME	G. H.	DISCHARGE	DATE	TIME	G. H.	DISCHARGE
1-19	0900	11.10	5,440	5-2	1600	8.68	7,250
3-7	1730	6.99	5,070	5-9	0530	7.62	5,820
3-12	1530	10.03	10,300	7-5	1430	8.13	6,480
3-15	1215	7.66	5,870	8-23	1030	7.33	5,480
4-17	1600	10.48	11,700				

05385500 South Fork Root River near Houston, Minn.

LOCATION.--Lat 43°44'19", long 91°33'50", in NE¼SW¼ sec.9, T.103 N., R.6 W., Houston County, on left bank 50 ft (15 m) downstream from bridge on State Highway 76, 0.5 mi (0.8 km) upstream from Badger Creek and 1.5 mi (2.4 km) south of Houston.

DRAINAGE AREA.--275 mi<sup>2</sup> (712 km<sup>2</sup>).

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

GAGE.--Water-stage recorder. Datum of gage is 680.41 ft (207.39 m) above mean sea level, datum of 1929.

AVERAGE DISCHARGE.--20 years, 125 ft<sup>3</sup>/s (3.54 m<sup>3</sup>/s), 6.17 in/yr (157 mm/yr).

EXTREMES.--Current year: Maximum discharge, 1,950 ft<sup>3</sup>/s (55.2 m<sup>3</sup>/s) Mar. 11 (gage height, 10.81 ft or 3.295 m); maximum gage height, 11.87 ft (3.618 m) Jan. 18 (backwater from ice); minimum discharge, 106 ft<sup>3</sup>/s (3.00 m<sup>3</sup>/s) Feb. 16 (gage height, 1.72 ft or 0.524 m).

Period of record: Maximum discharge, 8,420 ft<sup>3</sup>/s (238 m<sup>3</sup>/s) Mar. 29, 1962 (gage height, 13.35 ft or 4.069 m); maximum gage height, 13.74 ft (4.188) Mar. 26, 1961 (backwater from ice); minimum discharge, 11 ft<sup>3</sup>/s (0.31 m<sup>3</sup>/s) Nov. 28, 1961 (gage height, 1.47 ft or 0.448 m); minimum gage height, 0.85 ft (0.259 m) Aug. 17, 1967.

Flood of Mar. 26, 1950, reached a stage of 12.81 ft (3.904 m), from floodmark.

REMARKS.--Records good except those for period of no gage-height record and 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	225	200	150	240	190	389	260	313	269	188	157	174
2	210	213	140	175	300	462	265	500	262	196	155	174
3	209	229	135	150	200	297	275	499	266	192	155	173
4	309	214	130	140	192	272	275	433	262	196	428	170
5	216	210	122	130	229	216	265	396	275	193	229	162
6	213	206	118	130	194	195	255	384	252	183	179	155
7	202	217	111	128	169	503	245	395	242	182	260	151
8	196	212	112	125	152	271	235	484	236	179	345	151
9	185	202	112	123	171	189	230	416	229	179	336	153
10	180	200	113	118	159	262	220	393	224	179	249	151
11	175	197	114	119	154	1,310	210	364	223	175	197	147
12	171	190	115	120	148	387	205	343	235	174	188	143
13	165	186	116	120	147	266	195	322	216	174	190	142
14	163	183	116	123	148	465	187	307	213	170	214	141
15	159	179	116	126	140	430	277	294	205	169	190	137
16	159	177	117	134	137	400	729	264	200	167	186	135
17	155	175	117	160	137	375	612	272	200	167	183	141
18	151	171	118	900	137	355	502	268	300	165	179	138
19	149	168	119	510	137	330	438	263	280	165	178	130
20	150	166	120	300	137	315	398	254	260	164	171	125
21	159	163	120	264	137	305	363	252	240	166	173	122
22	163	161	122	238	138	300	331	259	230	175	182	144
23	222	159	123	215	141	290	302	246	220	169	229	131
24	224	158	125	192	159	295	283	244	210	167	200	119
25	201	158	127	190	161	300	268	248	200	166	188	128
26	199	159	129	182	140	305	259	236	201	166	185	137
27	193	158	131	178	135	295	246	251	209	166	179	156
28	185	154	133	172	137	285	238	377	200	162	174	127
29	176	152	134	169	-----	275	258	342	192	160	173	124
30	173	154	250	173	-----	265	268	290	189	175	173	175
31	191	-----	380	170	-----	255	-----	278	-----	161	175	-----
TOTAL	5,830	5,471	4,185	6,214	4,526	10,859	9,094	10,207	6,940	5,390	6,400	4,356
MEAN	188	182	135	200	162	350	303	329	231	174	206	145
MAX	309	229	380	900	300	1,310	729	500	300	196	428	175
MIN	149	152	111	116	135	189	187	236	189	160	155	119
CFSM	.66	.66	.49	.73	.59	1.27	1.10	1.20	.84	.63	.75	.53
IN,	.79	.74	.57	.84	.61	1.47	1.23	1.38	.94	.73	.87	.59

CAL YR 1972 TOTAL 15,486 MEAN 42.3 MAX 610 MIN 86 CFSM .15 IN 2.09  
WTR YR 1973 TOTAL 79,472 MEAN 216 MAX 1,310 MIN 111 CFSM .79 IN 10.75

PEAK DISCHARGE (BASE, 900 CFS)

NOTE.--No gage-height record Mar. 15 to Apr. 13.

DATE	TIME	G. H.	DISCHARGE	DATE	TIME	G. H.	DISCHARGE
1-18	1730	11.87	994	8-4	1715	7.59	972
3-11	1045	10.81	1,950				

05457000 Cedar River near Austin, Minn.

LOCATION.--Lat 43°38'10", long 92°58'20", in NE¼SE¼ sec.15, T.102 N., R.18 W., Freeborn County, on left bank 200 ft (61 m) upstream from abandoned powerhouse, 500 ft (152 m) downstream from highway bridge, 1.1 mi (1.8 km) downstream from Turtle Creek, and 1.1 mi (1.8 km) south of Austin.

DRAINAGE AREA.--425 mi<sup>2</sup> (1,100 km<sup>2</sup>).

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 (354.21 m) above mean sea level, datum of 1929. May 1909 to April 1912, nonrecording gage in tailwater of powerplant 200 ft (61 m) downstream at datum 3.1 ft (0.94 m) lower. May 1912 to September 1914, nonrecording gage on highway bridge 500 ft (152 m) downstream at datum 1.1 ft (0.34 m) lower.

AVERAGE DISCHARGE.--34 years, 182 ft<sup>3</sup>/s (5.15 m<sup>3</sup>/s), 5.82 in/yr (148 mm/yr).

EXTREMES.--Current year: Maximum discharge, 8,270 ft<sup>3</sup>/s (234 m<sup>3</sup>/s) Mar. 11 (gage height, 16.05 ft or 4.892 m); minimum, 76 ft<sup>3</sup>/s (2.15 m<sup>3</sup>/s) Feb. 15 (gage height, 2.37 ft or 0.722 m).  
Period of record: Maximum discharge, 9,530 ft<sup>3</sup>/s (270 m<sup>3</sup>/s) Mar. 29, 1962 (gage height, 17.18 ft or 5.236 m); maximum gage height 18.87 ft (5.752 m) 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 temperatures and suspended sediment loads 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	573	400	156	302	134	170	400	2,730	292	137	145	148
2	167	961	156	249	128	583	508	4,990	262	235	134	142
3	291	1,590	116	198	127	1,660	500	2,640	281	262	127	140
4	259	915	145	160	129	2,150	392	1,200	285	1,610	119	137
5	249	555	132	143	129	2,140	331	795	271	1,570	109	104
6	244	447	121	130	129	1,760	299	639	249	527	119	116
7	228	547	121	125	121	2,360	278	711	229	278	119	109
8	225	740	119	121	116	1,980	265	2,120	218	218	116	114
9	200	575	114	116	103	1,180	232	1,570	201	190	198	111
10	176	451	107	107	111	1,130	151	835	187	173	220	111
11	168	407	105	100	109	6,760	190	587	176	156	184	109
12	154	361	109	97	92	4,190	258	475	176	142	142	102
13	147	327	109	96	90	1,840	500	411	165	134	151	100
14	144	299	109	95	86	2,910	1,220	368	156	124	153	100
15	134	268	109	95	81	2,900	2,410	342	159	116	156	97
16	135	252	100	101	80	1,720	5,920	323	204	111	148	95
17	129	237	97	115	78	1,170	2,320	292	407	107	140	102
18	123	226	104	1,140	78	868	1,100	278	571	107	132	100
19	114	215	99	1,450	78	671	752	265	852	102	121	97
20	125	212	100	779	78	563	620	249	431	97	114	93
21	136	207	100	455	78	500	592	268	278	107	111	89
22	168	198	100	316	79	447	504	271	232	121	173	91
23	490	184	98	235	81	439	419	255	204	127	249	87
24	1,060	192	107	215	84	483	353	243	181	919	1,130	102
25	760	192	107	198	88	659	327	240	165	2,160	799	159
26	457	187	107	184	94	716	312	240	187	539	327	771
27	347	178	109	176	100	575	288	271	243	262	240	2,800
28	286	151	109	156	132	492	265	435	212	218	198	1,370
29	245	167	132	150	-----	455	265	587	170	187	170	1,190
30	225	170	240	142	-----	423	361	447	151	184	151	3,110
31	264	-----	411	139	-----	384	-----	345	-----	159	140	-----
TOTAL	8,623	11,811	3,948	8,085	2,813	44,278	22,332	25,422	7,795	11,379	6,535	11,996
MEAN	278	394	127	261	100	1,428	744	820	260	367	211	400
MAX	1,060	1,590	411	1,450	134	6,760	5,920	4,990	852	2,160	1,130	3,110
MIN	114	151	97	95	78	170	151	240	151	97	109	87
CFSM	.65	.93	.30	.61	.24	3.36	1.75	1.93	.61	.86	.50	.94
IN.	.75	1.03	.35	.71	.25	3.88	1.95	2.23	.68	1.00	.57	1.05

CAL YR 1972 TOTAL 68,039 MEAN 186 MAX 1,700 MIN 33 CFSM .44 IN 5.96  
WTR YR 1973 TOTAL 165,017 MEAN 452 MAX 6,760 MIN 78 CFSM 1.06 IN 14.44

## PEAK DISCHARGE (BASE, 1,400 CFS)

DATE	TIME	G. H.	DISCHARGE	DATE	TIME	G. H.	DISCHARGE
11-3	0515	6.45	1,680	7-5	0115	7.78	2,310
1-8	2100	7.35	2,120	7-25	0300	9.45	3,310
3-11	1415	16.05	8,270	8-24	1630	6.33	1,620
4-16	1000	14.33	6,840	9-27	1115	9.59	3,450
5-2	0215	13.48	6,180	9-30	1615	9.97	3,720
5-8	1300	7.96	2,430				

## DES MOINES RIVER BASIN

05476000 Des Moines River at Jackson, Minn.

LOCATION.--Lat 43°37'10", long 94°59'10", in SE¼SW¼ sec.24, T.102 N., R.35 W., Jackson County, on right bank in storage room of city powerplant in Jackson.

DRAINAGE AREA.--1,220 mi<sup>2</sup> (3,160 km<sup>2</sup>), 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 (392.51 m) above mean sea level, datum of 1929. May 31, 1909, to Dec. 20, 1913, nonrecording gage at site 0.6 mi (1.0 km) downstream at datum 0.99 ft (0.30) lower. Aug. 22, 1930, to Sept. 30, 1944, nonrecording gage at site 7 mi (11 km) upstream at datum 17.10 ft (5.21 m) higher. Oct. 1, 1944, to Oct. 26, 1949, nonrecording gage at site (600 ft (183 m) upstream at datum 10.64 ft (3.24 m) higher. Oct. 27, 1949 to Dec. 15, 1965, water-stage recorder 200 ft (61 m) downstream at same datum.

AVERAGE DISCHARGE.--38 years (1935-73), 282 ft<sup>3</sup>/s (7.99 m<sup>3</sup>/s), 3.14 in/yr (80 mm/yr).

EXTREMES.--Current year: Maximum discharge, 2,000 ft<sup>3</sup>/s (56.6 m<sup>3</sup>/s) Mar. 14 (gage height, 10.00 ft or 3.048 m); minimum, 2.4 ft<sup>3</sup>/s (0.068 m<sup>3</sup>/s) Sept. 5 (gage height, 3.09 ft or 0.942 m); minimum gage height, 3.06 ft (0.933 m) Sept. 12.

Period of record: Maximum discharge, 15,700 ft<sup>3</sup>/s (445 m<sup>3</sup>/s) Apr. 11, 1969 (gage height, 19.45 ft or 5.928 m); 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 1972 TO SEPTEMBER 1973

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	42	70	100	54	165	180	942	552	489	89	44	6.0
2	42	124	100	45	168	240	936	579	468	101	36	6.6
3	41	159	98	40	165	310	924	597	445	96	42	6.0
4	33	199	98	37	162	400	900	630	424	98	46	3.9
5	20	217	98	35	160	500	864	639	398	94	47	3.4
6	25	223	98	33	150	510	846	636	381	88	46	6.0
7	22	227	98	31	138	504	813	621	355	80	43	51
8	43	212	98	28	122	520	771	582	329	77	40	36
9	51	218	96	28	118	550	744	564	306	79	37	24
10	47	202	94	28	109	670	684	546	283	82	35	9.6
11	45	195	92	28	103	860	645	504	269	80	32	3.4
12	44	189	90	28	98	980	717	459	250	82	31	4.8
13	40	182	88	28	94	1,280	690	424	234	76	31	12
14	40	165	85	29	91	1,530	663	404	224	71	29	25
15	37	134	82	31	89	1,350	696	381	210	63	28	24
16	36	140	80	39	84	1,410	735	369	206	50	29	17
17	34	155	76	78	82	1,360	744	326	197	46	40	16
18	33	175	74	150	82	1,330	753	314	300	45	48	17
19	35	173	71	197	82	1,380	747	306	275	43	48	24
20	37	281	67	175	82	1,410	753	281	267	39	38	25
21	38	253	63	165	82	1,390	777	269	232	38	26	24
22	39	208	58	150	88	1,310	744	278	188	38	23	19
23	41	188	54	135	105	1,220	699	263	167	44	20	16
24	44	177	50	130	137	1,180	657	250	155	51	20	15
25	45	155	45	135	175	1,160	642	256	145	46	20	10
26	49	140	42	150	170	1,120	627	250	139	42	16	48
27	52	120	40	170	165	1,080	606	295	125	37	15	46
28	52	110	40	175	160	1,060	567	416	107	39	10	35
29	49	100	42	170	-----	1,000	537	462	98	47	8.0	139
30	52	100	62	165	-----	976	528	480	100	103	6.0	143
31	59	-----	70	160	-----	954	-----	489	-----	70	6.0	-----
TOTAL	1,267	5,191	2,349	2,847	3,426	29,724	21,951	13,422	7,766	2,034	940.0	815.7
MEAN	40.9	173	75.8	91.8	122	959	732	433	259	65.6	30.3	27.2
MAX	59	281	100	197	175	1,530	942	639	489	103	48	143
MIN	20	70	40	28	82	180	528	250	98	37	6.0	3.4
CFSM	.03	.14	.06	.08	.10	.79	.60	.35	.21	.05	.02	.02
IN.	.04	.16	.07	.09	.10	.91	.67	.41	.24	.06	.03	.02

CAL YR 1972 TOTAL 94,554.5 MEAN 258 MAX 1,360 MIN 8.7 CFSM .21 IN 2.88  
WTR YR 1973 TOTAL 91,732.7 MEAN 251 MAX 1,530 MIN 3.4 CFSM .21 IN 2.80

PEAK DISCHARGE (BASE, 500 CFS).--Mar. 14 (0715) 2,000 cfs (10.00 ft)



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 1973

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Measurements	
					Date	Discharge (cfs)
<u>Streams tributary to Lake Superior</u>						
*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, 1,650 feet upstream from mouth.	114	1911, 1912-17 <del>1912-17</del> , 1928-47 <del>1928-47</del> , 1952-61 <del>1952-61</del> , 1962-63, 1970-71, 1973	5-22-73	151
04018710	Mud Hen Creek near Forbes, Minn.	Lat 47°21'29", long 92°28'24", on line between secs.3 and 10, T.56 N., R.17 W., St. Louis County, at bridge on County Highway 16, 0.9 mile upstream from mouth, 4.5 miles north of Central Lakes, and 6 miles southeast of Forbes.	118	1970-71, 1973	8-30-73	22.0
04020800	Paleface River near Cotton, Minn.	Lat 47°12'37", long 92°29'17", in NW¼NW¼ sec.34, T.55 N., R.17 W., St. Louis County, at bridge on U.S. Highway 53, about two miles upstream from mouth, and 2.9 miles north of Cotton.	60	1970-71, 1973	8-30-73	11.5
04021200	Floodwood River near Floodwood, Minn.	Lat 46°58'05", long 92°54'29", in SW¼SW¼ sec.20, T.52 N., R.20 W., St. Louis County, at bridge on farm driveway,	-	1970-71, 1973	8-31-73	52.8
04021250	East Savanna River at Floodwood, Minn.	Lat 46°55'17", long 92°54'43", in SE¼NE¼ sec.7, T.51 N., R.20 W., St. Louis County, at bridge on U.S. Highway 2, 0.4 mile upstream from mouth, at Floodwood.	-	1970-71, 1973	8-31-73	81.4
04021530	Stoney Brook at Brookston, Minn.	Lat 46°51'42", long 92°36'17", in NW¼SE¼ sec.34, T.51 N., R.18 W., St. Louis County, at bridge on County Highway 31, 0.8 mile upstream from mouth, at Brookston.	105	1970-71, 1973	8-31-73	51.0
04021700	Cloquet River near Brimson, Minn.	Lat 47°15'24", long 91°52'02", in SE¼SW¼ sec.9, T.55 N., R.12 W., St. Louis County, at bridge on County Highway 52 (Forest Service Road 6202), about one mile upstream from Pine Creek, and 1.5 miles south of Brimson.	-	1970-71, 1973	8-30-73	69.1
04022970	Us-Kab-Wan-Ka River near Twig, Minn.	Lat 46°58'55", long 92°20'01", in SE¼SW¼ sec.14, T.52 N., R.16 W., St. Louis County, at bridge on trail, 0.8 mile upstream from mouth, and 6.2 miles north of Twig.	-	1970-71, 1973	8-31-73	14.1
04023400	Pine River near Cloquet, Minn.	Lat 46°47'52", long 92°26'58", on line between secs.23 and 24, T.50 N., R.17 W., St. Louis County, at concrete box culvert on State Highway 33, 0.9 mile upstream from mouth, and 5.2 miles north of Cloquet.	-	1970-71, 1973	8-31-73	20.1

\* Also a crest-stage partial-record station.

\* Operated as a continuous-record station.

a Approximately.

## Discharge measurements made at low-flow partial-record stations during water year 1973--Continued

Station No.	Station Name	Location	Drainage area (sq mi)	Period of record	Measurements	
					Date	Discharge (cfs)
<u>Streams tributary to Lake Superior--Continued</u>						
*04024095	Nemadji River near Holyoke, Minn.	Lat 46°31'04", long 92°23'22", in NE¼NE¼ sec.32, T.47 N., R.16 W., Carlton County, at bridge on State Highway 23, 3.5 miles north of Holyoke, about five miles upstream from Minnesota-Wisconsin border, and 7 miles south of Wrenshall.	a118	1970-71, 1973	11-15-72 9-18-73	78.0 35.8
<u>Red River of the North basin</u>						
05030140	Otter Tail River northwest of Luce, Minn.	Lat 46°40'20", long 95°39'56", in NW¼SW¼ sec.19, T.137 N., R.39 W., Otter Tail County, at bridge on U.S. Highway 10, 1 mile northwest of Luce.	331	1968, 1970-71, 1973	11-14-72 8-30-73	65.3 67.4
05030181	Otter Tail River at Little Pine Lake outlet, near Perham, Minn.	Lat 46°37'36", long 95°32'23", in NW¼NE¼ sec.1, T.136 N., R.39 W., Otter Tail County, at bridge on County Highway 8, 2.2 miles northeast of Perham.	a383	1933, 1964-66, 1970, 1973	8-30-73	67.8
05030255	Toad River near Perham, Minn.	Lat 46°39'55", long 95°31'27", IN S¼NE¼ sec.19, T.137 N., R.38 W., Otter Tail County, at bridge on County Highway 60, 5.5 miles northeast of Perham.	111	1968, 1970, 1973	8-30-73	9.00
05030260	Toad River above Big Pine Lake, near Perham, Minn.	Lat 46°39'05", long 95°31'10", on line between secs.29 and 30, T.137 N., R.38 W., Otter Tail County, at bridge on County Highway 13, 0.8 mile upstream from Big Pine Lake, and 4.2 miles northeast of Perham.	112	1964-68, 1970-73	11-14-72 8-30-73	17.3 8.84
05030300	Otter Tail River near Richville, Minn.	Lat 46°30'48", long 95°31'04", on line between secs.7 and 18, T.135 N., R.38 W., Otter Tail County, at bridge on County Highway 14, 5 miles east of Richville.	a765	1968, 1970-73	11-14-72 8-30-73	106 91.3
05030401	Otter Tail River at Otter Tail Lake outlet, near Amor, Minn.	Lat 46°21'34", long 95°44'00", in NE¼SW¼ sec.4, T.133 N., R.40 W., Otter Tail County, at bridge on County Highway 72, 4 miles south of Amor.	a1,160	1932-33, 1935-36, 1968, 1970-73	11-14-72 8-30-73	174 107
05046900	Mustinka River near Elbow Lake, Minn.	Lat 45°54'19", long 96°02'23", on line between secs.11 and 14, T.128 N., R.43 W., Grant County, at bridge on County Highway 8, 6.7 miles southwest of Elbow Lake.	a120	1964-66, 1970, 1973	8-31-73	.14
05047800	West Branch Mustinka River near Wheaton, Minn.	Lat 45°46'24", long 96°22'56", on line between secs.30 and 31, T.127 N., R.45 W., Traverse County, at bridge on County Highway 72, 0.2 mile upstream from Twelve Mile Creek, and 5.9 miles southeast of Wheaton.	a200	1964-66, 1970, 1973	8-30-73	0
05047850	Twelve Mile Creek near Dumont, Minn.	Lat 45°41'33", long 96°18'57", on line between secs.27 and 28, T.126 N., R.45 W., Traverse County, at culvert on county road, 0.5 mile upstream from West Fork, and 5.6 miles southeast of Dumont.	a115	1964-66, 1970, 1973	8-30-73	0
05047950	Twelve Mile Creek near Wheaton, Minn.	Lat 45°46'24", long 96°22'36", on line between secs.30 and 31, T.127 N., R.45 W., Traverse County, at bridge on County Highway 72, 0.1 mile upstream from mouth, and 6.1 miles southeast of Wheaton.	a175	1964-66, 1970, 1973	8-30-73	0
05050800	Wilkin County ditch near Campbell, Minn.	Lat 46°05'05", long 96°23'19", on line between secs.7 and 12, T.130 N., R.45 and 46 W., Wilkin County, at box culvert on county road, 0.1 mile south of Rabbit River, 0.2 mile upstream from mouth, and 1.1 miles southeast of Campbell.	a100	1964-66, 1970, 1973	8-30-73	.04

\* Also a crest-stage partial-record station.

a Approximately.

Discharge measurements made at low-flow partial-record stations during water year 1973--Continued

Station No.	Station Name	Location	Drainage area (sq mi)	Period of record	Measurements	
					Date	Discharge (cfs)
Red River of the North basin--Continued						
05050900	South Fork Rabbit River near Campbell, Minn.	Lat 46°03'54", long 96°23'01", on line between secs.18 and 19, T.130 N., R.45 W., Wilkin County, at bridge on county road, 2 miles upstream from mouth, and 2.2 miles southeast of Campbell.	a60	1964-66, 1970, 1973	8-30-73	0
05051520	Whiskey Creek near Kent, Minn.	Lat 46°24'41", long 96°39'32", 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 1973	8- 9-73 8-30-73	0 0
05051525	Wolverton Creek at Comstock, Minn.	Lat 46°39'59", long 96°44'13", 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, 1970-73	8- 9-73	0
05060820	Buffalo River near Ogema, Minn.	Lat 46°59'31", long 96°02'08", on line between secs.29 and 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.	-	1970-73	8- 9-73	11.0
05061080	Deerhorn Creek near Lawndale, Minn.	Lat 46°34'45", long 96°29'17", on line between secs.20 and 21, T.136 N., R.46 W., Wilkin County, at county road, 1.2 miles west of State Highway 9, 6 miles southwest of Barnesville, and 6.4 miles northwest of Lawndale.	-	1970-73	8- 9-73	4.76
05061100	South Branch Buffalo River near Barnesville, Minn.	Lat 46°39'35", long 96°34'57", on line between secs.23 and 26, T.137 N., R.47 W., Clay County, at bridge on County Highway 2, 4 miles south of Baker, and 7.4 miles west of Barnesville.	a185	1964-66, 1970-73	8- 9-73	5.08
05061490	Stony Creek near Sabin, Minn.	Lat 46°44'48", long 96°36'26", 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, 1970-73	8- 9-73	0
05062335	Wild Rice River near Roy Lake, Minn.	Lat 47°23'14", long 95°38'11", in NW¼SW¼ sec.9, T.145 N., R.39 W., Mahnomon County, at bridge on County Highway 4, about 5.8 miles northwest of Roy Lake.	a270	1964-67, 1970-73	8- 8-73	74.0
05062435	White Earth River near Mahnomon, Minn.	Lat 47°18'53", long 95°55'58", in NW¼SW¼ sec.6, T.144 N., R.42 W., Mahnomon County, at bridge on county road, 1.2 miles east of Mahnomon.	a190	1964-67, 1970-73	8- 8-73	3.08
05062440	Wild Rice River at Mahnomon, Minn.	Lat 47°18'40", long 95°57'07", in SW¼SW¼ sec.1, T.144 N., R.42 W., Mahnomon County, at bridge on County Highway 25, in southeast corner of Mahnomon, 0.5 mile east of junction of U.S. Highway 59 and County Highway 25.	a610	1964-67, 1970-73	8- 8-73	86.9
05062465	Marsh Creek near Mahnomon, Minn.	Lat 47°19'31", long 96°03'19", in NE¼NW¼ sec.6, T.144 N., R.42 W., Mahnomon County, at bridge on State Highway 31, about 4.2 miles west of Mahnomon.	a130	1964-67, 1970-73	8- 9-73	0
05062650	Mashaug Creek at Heiberg, Minn. (Formerly published as Wild Rice tributary at Heiberg)	Lat 47°17'05", long 96°16'35", in SW¼SW¼ sec.16, T.144 N., R.44 W., Norman County, at footbridge in park, 0.2 mile upstream from mouth, and 1.5 miles northwest of Twin Valley.	a70	1964-67, 1970-73	8- 9-73	.13
05063220	South Branch Wild Rice River near White Earth, Minn.	Lat 47°04'45", long 96°00'19", 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, 1970-73	8- 9-73	1.66

a Approximately.

Discharge measurements made at low-flow partial-record stations during water year 1973--Continued

Station No.	Station Name	Location	Drainage area (sq mi)	Period of record	Measurements	
					Date	Discharge
<u>Red River of the North basin--Continued</u>						
05067900	Sandhill River at Fertile, Minn.	Lat 47°32'35", long 96°15'31", in 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, 1970-73	8- 8-73	6.24
05073560	Shotley Brook near Shotley, Minn.	Lat 48°04'38", long 94°35'05", in 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, 1970-73	7-27-73	8.34
05073630	South Branch Battle River near Kelliher, Minn.	Lat 47°56'24", long 94°31'54", in NW¼SE¼ 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, 1970-73	7- 27-73	12.5
05073770	Blackduck River at Quiring, Minn.	Lat 47°52'36", long 94°43'16", in SE¼SE¼ sec.22, T.151 N., R.32 W., Beltrami County, at County Highway 101, 0.2 mile downstream from South Branch Cormorant River, and 0.5 mile southwest of Quiring.	a200	1964-67, 1970-73	7-26-73	37.9
05073790	North Branch Cormorant River near Shooks, Minn.	Lat 47°54'19", long 94°32'51", in SW¼SW¼ sec.7, T.151 N., R.30 W., Beltrami County, at bridge on County Highway 36, 5.5 miles northwest of Shooks.	a50	1964-67, 1970-73	7-26-73	6.66
05073980	Sandy River near Red Lake, Minn.	Lat 47°50'44", long 95°13'33", in NE¼NW¼ 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, 1970-73	7-26-73	20.0
05075700	Mud River near Grygla, Minn.	Lat 48°19'31", long 95°44'35", in 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, 1970-73	7-26-73	0
05078340	Hill River at Brooks, Minn.	Lat 47°49'22", long 96°00'00", in NE¼SW¼ sec.11, T.150 N., R.42 W., Red Lake County, at bridge on U.S. Highway 59, at Brooks.	a185	1933, 1950, 1966, 1970-73	7-25-73	5.31
05078380	Poplar River near Brooks, Minn.	Lat 47°48'13", 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, 1970-73	7-25-73	0
05078490	Badger Creek near Red Lake Falls, Minn.	Lat 47°50'48", long 96°13'53", 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.	-	1970-73	7-25-73	0
05079900	Burnham Creek at Girard, Minn. (Formerly published as Barnums Creek at Girard)	Lat 47°43'53", long 96°39'41", in NW¼NE¼ sec.15, T.149 N., R.47 W., Polk County, at bridge on county road, about 0.2 mile upstream from U.S. Highway 75, and 0.8 mile northeast of Girard.	a110	1964-67, 1970-73	7-25-73	0
05082610	Grand Marais Creek near East Grand Forks, Minn. (Formerly published as Grand Marais River near East Grand Forks)	Lat 48°01'09", long 97°01'13", in NE¼NE¼ sec.2, T.152 N., R.50 W., Polk County, at State Highway 220, 6 miles upstream from mouth, and 6 miles north of East Grand Forks.	-	1970, 1972-73	7-26-73	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 bridge on Minnesota Street in Warren.	a260	1945*, 1946, 1948-51, 1972	11- 3-72	0

\* Operated as a continuous-record station.  
a Approximately.

Discharge measurements made at low-flow partial-record stations during water year 1973--Continued

Station No.	Station Name	Location	Drainage area (sq mi)	Period of record	Measurements	
					Date	Discharge
<u>Red River of the North basin--Continued</u>						
05102900	Roseau River near Skime, Minn.	Lat 48°38'30", long 95°35'47", in SE¼SW¼ sec.30, T.160 N., R.38 W., Roseau County, at bridge on County Highway 4, 6.5 miles north of Skime, and about 11 miles southeast of Malung.	-	1971-73	7-26-73	.48
05105200	Hay Creek near Salol, Minn.	Lat 48°51'39", long 95°35'39", in SE¼SE¼ sec.7, T.162 N., R.38 W., Roseau County, at State Highway 11, 1.3 miles southwest of Salol, and about 8.5 miles northeast of Malung.	-	1971-73	7-26-73	.45
<u>Lake of the Woods basin</u>						
05129650	Little Fork River at Cook, Minn.	Lat 47°51'16", long 92°41'56", in NE¼SE¼ sec.13, T.62 N., R.19 W., St. Louis County, at bridge on U.S. Highway 53, 0.6 mile west of Cook.	-	1950, 1958-69, 1970-73	10-17-72 9-20-73	28.2 9.33
05129920	Little Fork River near Gheen, Minn.	Lat 47°51'46", long 92°54'15", in NE¼NW¼ sec.16, T.62 N., R.20 W., St. Louis County, at bridge on State Highway 1, 2.5 miles east of Meadow Brook, and 8.5 miles southwest of Gheen.	a290	1970-73	10-19-72 9-20-73	110 52.8
05131310	Bear River near Togo, Minn.	Lat 47°49'20", long 93°03'04", 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.	a170	1970-73	10-17-72 9-21-73	68.6 40.2
05131320	Sturgeon River near Togo, Minn.	Lat 47°51'56", long 93°02'07", 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.	a375	1970-73	10-19-72 9-20-73	146 168
05131325	Valley River near Rauch, Minn.	Lat 47°57'43", long 93°11'26", in SE¼NE¼ sec.7, T.63 N., R.22 W., Koochiching County, at bridge on County Highway 57, 2 miles upstream from mouth, 2 miles west of Rauch, and 9.5 miles northwest of Togo.	-	1970-73	10-20-72 9-21-73	12.9 6.19
05131470	Nett Lake River near Littlefork, Minn.	Lat 48°13'00", long 93°26'40", in SE¼SE¼ sec.8, T.66 N., R.24 W., Koochiching County, at bridge on County Highway 8, 2.2 miles upstream from mouth, and 13 miles southeast of Littlefork.	a215	1970-73	10-17-72 9-20-73	71.5 2.35
05131510	Beaver Brook near Littlefork, Minn.	Lat 48°24'12", long 93°30'57", on line between secs.2 and 11, T.68 N., R.25 W., Koochiching County, at bridge on State Highway 217, 1.5 miles upstream from mouth, and 1.5 miles east of Littlefork.	-	1970-73	10-16-72 9-20-73	30.4 5.44
*05131750	Big Fork River near Bigfork, Minn.	Lat 47°44'56", long 93°46'31", in SE¼NE¼ sec.27, T.61 N., R.27 W., Itasca County, at bridge on State Highway 6, 1 mile south of County Highway 14, and 5.5 miles west of Bigfork.	-	1970-73	8- 6-73	70.1
<u>Mississippi River main stem</u>						
05200010	Mississippi River at Lake Itasca, Minn.	Lat 47°14'35", long 95°12'38", in NW¼SW¼ sec.35, T.144 N., R.36 W., Clearwater County, at first culvert on County Highway 38, downstream from Lake Itasca, in Itasca State Park, 1 mile south of town of Lake Itasca, and about 22 miles southwest of Bemidji.	a80	1964-65, 1967, 1970-71, 1973	8-28-73	8.75
*05200445	Mississippi River at Bemidji, Minn.	Lat 47°27'04", long 94°54'23", in NW¼NW¼ sec.20, T.146 N., R.33 W., Beltrami County, at bridge on County Highway 11, 1.5 miles southwest of intersection of U.S. Highway 2 and County Highway 7 in Bemidji.	a400-	1950, 1964-65, 1970-71, 1973	11- 3-72 6-18-73 7-20-73	102 69.2 55.7

\* Also a crest-stage partial-record station.  
a Approximately.

Discharge measurements made at low-flow partial-record stations during water year 1973--Continued

Station No.	Station Name	Location	Drainage area (sq mi)	Period of record	Measurements	
					Date	Discharge
<u>Schoolcraft River basin</u>						
05200450	Schoolcraft River near Bemidji, Minn.	Lat 47°24'48", long 94°54'46", in SW¼SE¼ sec.31, T.146 N., R.33 W., Beltrami County, at bridge on County Highway 2, 0.1 mile downstream from Lake Plantagenet, and 4.6 miles south of Bemidji.	a165	1947, 1964-65, 1970-71, 1973	8-28-73	49.1
<u>Turtle River basin</u>						
05200850	Turtle River near Pennington, Minn.	Lat 47°32'34", long 94°35'52", in SE¼SW¼ sec.15, T.147 N., R.31 W., Beltrami County, at bridge on County Highway 20, 7 miles northwest of Pennington.	a165	1950, 1964-65, 1970-71, 1973	8-27-73 9-19-73	47.4 75.3
05200920	North Turtle River near Pennington, Minn.	Lat 47°32'26", long 94°34'29", in NW¼NW¼ sec.24, T.147 N., R.31 W., Beltrami County, at bridge on County Highway 20, 0.5 mile upstream from mouth, and 5.8 miles northwest of Pennington.	a70	1950, 1964-65, 1970-71, 1973	8-27-73 9-19-73	11.3 41.2
<u>Leech Lake River basin</u>						
05204400	Boy River at Longville, Minn.	Lat 46°59'00", long 94°12'33", in NW¼SE¼ sec.34, T.141 N., R.28 W., Cass County, at bridge on State Highway 84, at Girl Lake Outlet at Longville.	a160	1953-54, 1964-65, 1970-71, 1973	8-28-73	47.8
05205200	Boy River near Remer, Minn.	Lat 47°04'51", long 94°05'54", in SE¼SE¼ sec.28, T.142 N., R.27 W., Cass County, at bridge on County Highway 53, about 1.5 miles upstream from Boy Lake, and about 9 miles northwest of Remer.	a310	1964-65, 1970-71, 1973	8-28-73	85.7
<u>Prairie River basin</u>						
05212200	Prairie River near Nashauk, Minn.	Lat 47°29'37", long 93°19'14", in NW¼SW¼ sec.19, T.58 N., R.23 W., Itasca County, at bridge on County Highway 336, about 10 miles northwest of Nashauk.	a220	1964-65, 1970-71, 1973	8-28-73	63.8
<u>Willow River basin</u>						
05220670	Willow River near Hill City, Minn.	Lat 46°54'00", long 93°36'50", on line between secs.14 and 15, T.51 N., R.26 W., Aitkin County, at bridge on U.S. Highway 169, 6 miles south of intersection of State Highway 200 and U.S. Highway 169, at south edge of Hill City.	a160	1964-65, 1970-71, 1973	8-29-73	41.0
*05221020	Willow River below Palisade, Minn.	Lat 46°42'36", 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.	445	1946-48, 1953-54, 1957, 1964-65, 1970-71, 1973	9-17-73	124
<u>Rice River basin</u>						
05222200	Rice River at Hassman, Minn.	Lat 46°35'57", long 93°36'47", on line between secs.34 and 35, T.48 N., R.26 W., Aitkin County, at bridge on U.S. Highway 169, 0.5 mile south of junction of Highways 169 and 210, at Hassman.	a284	1936, 1944-51, 1953-54, 1957, 1964-65, 1970-71, 1973	8-29-73	394
<u>Ripple River basin</u>						
05227480	Ripple River at Aitkin, Minn.	Lat 46°31'47", long 93°42'26", in NE¼NE¼ sec.26, T.47 N., R.27 W., Aitkin County, at bridge on U.S. Highway 169, 0.2 mile south of intersection with U.S. Highway 210 in Aitkin, and about 0.8 mile upstream from mouth.	a125	1964-65, 1970-71, 1973	8-28-73	96.7

\* Also a crest-stage partial-record station.  
a Approximately.

Discharge measurements made at low-flow partial-record stations during water year 1973--Continued

Station No.	Station Name	Location	Drainage area (sq mi)	Period of record	Measurements	
					Date	Discharge
Pine River basin						
05229500	Pine River near Jenkins, Minn.	Lat 46°41'37", long 94°18'14", in NE¼SE¼ sec.11, T.137 N., R.29 W., Crow Wing County, at bridge on County Highway 15, 0.8 mile upstream from Upper Whitefish Lake, and 3.5 miles north-east of Jenkins.	a285	1964-65, 1970-71, 1973	8-28-73	127
05235500	Little Pine River near Cross Lake, Minn.	Lat 46°37'48", long 93°59'04", in SW¼SW¼ sec.33, T.137 N., R.26 W., Crow Wing County, at bridge on county road, 5 miles upstream from mouth, 6 miles southeast of the town of Cross Lake, and about 10 miles north of Crosby.	a195	1964-65, 1970-71, 1973	8-28-73	103
Crow Wing River basin						
05242960	Crow Wing River near Hubbard, Minn.	Lat 46°50'48", long 94°52'29", in NE¼NE¼ sec.20, T.139 N., R.33 W., Hubbard County, at bridge on State Highway 87, at Third Crow Wing Lake outlet, 6.6 miles east of Hubbard.	a218	1930-31, 1964-66, 1970-71, 1973	8-28-73	104
05243330	Straight River near Park, Rapids, Minn.	Lat 46°52'30", long 95°03'56", in NW¼NE¼ sec.11, T.139 N., R.35 W., Hubbard County, at bridge on U.S. Highway 71, 3.2 miles south of Park Rapids, and 3.7 miles northwest of Hubbard.	-	1970-71, 1973	8-28-73	52.3
05243730	Fishhook River near Hubbard, Minn. (Formerly published Straight River near Hubbard)	Lat 46°51'48", long 90°01'30", in NW¼NE¼ sec.18, T.139 N., R.34 W., Hubbard County, at bridge on State Highway 87, 0.5 mile downstream from Straight River, 2 miles northwest of Hubbard, and 4.4 miles southeast of Park Rapids.	a374	1964-66, 1970-71, 1973	8-28-73	146
05243740	Long Lake outlet at Hubbard, Minn.	Lat 46°50'28", long 95°00'44", in SW¼NW¼ sec.20, T.139 N., R.34 W., Hubbard County, at bridge on State Highway 87 at Hubbard.	a22	1964-66, 1970-71, 1973	8-28-73	24.8
05243750	Shell River near Hubbard, Minn.	Lat 46°49'47", long 95°01'53", in SW¼NW¼ sec.30, T.139 N., R.34 W., Hubbard County, at bridge on county road, just downstream from Fishhook River, and 1.2 miles southwest of Hubbard.	a600	1964-66, 1970-71, 1973	8-28-73	264
05244340	Leaf River near Bluffton, Minn.	Lat 46°26'57", long 95°16'13", in SE¼NW¼ sec.6, T.134 N., R.36 W., Otter Tail County, at bridge on County Highway 143, 2.2 miles southwest of Bluffton, and 4.6 miles northeast of Deer Creek.	a345	1970-71, 1973	8-29-73	16.3
05244350	Leaf River near Wadena, Minn.	Lat 46°28'09", long 95°10'33", in NW¼NW¼ sec.36, T.135 N., R.36 W., Otter Tail County, at bridge on County Highway 75, 2 miles northwest of Wadena.	-	1967, 1970, 1973	8-29-73	28.4
05244355	Union Creek near Wadena, Minn. (Formerly published as Leaf River tributary near Wadena)	Lat 46°28'13", long 95°05'40", on line between secs.28 and 33, T.135 N., R.35 W., Wadena County, at bridge on county road, 0.1 mile east of U.S. Highway 71, and 3 miles northeast of Wadena.	-	1968, 1970, 1973	8-28-73	9.26
05244360	Leaf River near Verndale, Minn.	Lat 46°29'28", long 95°00'34", on line between secs.19 and 20, T.135 N., R.34 W., Wadena County, at bridge on County Highway 22, 6.4 miles north of Verndale.	a419	1964-66, 1968-71, 1973	10-18-72 9-12-73	101 58.6
05244370	Wing River near Hewitt, Minn.	Lat 46°21'16", long 95°05'35", on line between secs.3 and 4, T.133 N., R.35 W., Todd County, at bridge on county road, 2 miles north of Hewitt.	-	1967-71, 1973	10-18-72 9-12-73	42.8 10.6
05244380	Wing River near Verndale, Minn.	Lat 46°23'26", long 95°03'44", in SE¼NW¼ sec.26, T.134 N., R.35 W., Wadena County, at County Highway 1, 2.5 miles west of Verndale.	-	1967-71, 1973	10-18-72 9-12-73	51.5 13.3

a Approximately.

Discharge measurements made at low-flow partial-record stations during water year 1973--Continued

Station No.	Station Name	Location	Drainage area (sq mi)	Period of record	Measurements	
					Date	Discharge
<u>Crow Wing River basin--Continued</u>						
05244390	Wing River at Verndale, Minn.	Lat 46°24'29", long 95°01'47", in SW¼NW¼ sec.19, T.134 N., R.34 W., Wadena County, at bridge on County Highway 111, 1 mile northwest of Verndale.	-	1967-71, 1973	10-18-72 9-12-73	51.5 18.2
05244400	Wing River below Verndale, Minn.	Lat 46°26'28", long 95°00'02", on line between secs.5 and 8, T.134 N., R.34 W., Wadena County, at bridge on County Highway 4, 3.1 miles north of Verndale.	a166	1964-71, 1973	10-18-72 9-12-73	55.2 20.6
05244403	Wing River near Wadena, Minn.	Lat 46°28'13", long 94°59'23", in SE¼SE¼ sec.29, T.135 N., R.34 W., Wadena County, at bridge on county road, 1 mile upstream from mouth, 5 miles north of Verndale, and 7 miles north-east of Wadena.	-	1967-71, 1973	10-18-72 9-12-73	58.6 25.0
05244410	Redeye River at Sebeka, Minn.	Lat 46°37'44", long 95°05'42", in NE¼NE¼ sec.4, T.136 N., R.35 W., Wadena County, at bridge on U.S. Highway 71, at Sebeka.	-	1968-71, 1973	8-29-73	12.6
05244420	Redeye River near Aldrich, Minn.	Lat 46°29'58", long 94°54'30", on line between secs.13 and 24, T.135 N., R.34 W., Wadena County, at County Highway 7, 1.5 miles upstream from mouth, 3.5 miles north of Central, and 8.5 miles north of Aldrich.	a198	1964-66, 1968-71, 1973	10-19-72 8-30-73 9-13-73	19.8 37.6 35.8
*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.	-	1965, 1968-73	10-19-72 8-29-73 9-13-73	198 140 137
05244460	Partridge River at Aldrich, Minn.	Lat 46°22'31", long 94°56'28", in NW¼SW¼ sec.35, T.134 N., R.34 W., Wadena County, at bridge on U.S. Highway 10, at Aldrich.	-	1967-68, 1970, 1973	8-29-73	8.84
05244470	Partridge River near Aldrich, Minn.	Lat 46°25'02", long 94°50'28", in NW¼SW¼ sec.15, T.134 N., R.33 W., Wadena County, on County Highway 29, about 0.7 mile upstream from mouth, and 5.5 miles northeast of Aldrich.	a97	1964-66, 1969-71, 1973	10-19-72 8-29-73 9-13-73	12.6 12.4 8.05
05244540	Mosquito Creek at Motley, Minn.	Lat 46°20'39", long 94°38'18", in SE¼SW¼ sec.7, T.133 N., R.31 W., Cass County, at U.S. Highway 210, and about 0.2 mile upstream from mouth, at Motley.	a43	1964-66, 1970-71, 1973	8-29-73	11.9
05245200	Eagle Creek at Browerville, Minn.	Lat 46°05'35", long 94°51'53", in SE¼SW¼ sec.5, T.130 N., R.33 W., Todd County, at bridge on County Highway 21, at Browerville, and 0.5 mile upstream from mouth.	-	1970-71, 1973	8-29-73	7.32
<u>Elk River basin</u>						
05263000	Elk River near Little Falls, Minn.	Lat 46°01'13", long 94°22'38", in NW¼NE¼ sec.6, T.129 N., R.29 W., Morrison County, at bridge on County Highway 13, 1 mile upstream from mouth, and 3 miles north of Little Falls.	a135	1968-70, 1973	10-17-72 9-12-73	51.9 24.6
<u>North Branch Two Rivers basin</u>						
05267200	North Branch Two Rivers near Bowlus, Minn.	Lat 45°49'56", long 94°21'38", in NE¼NW¼ sec.8, T.127 N., R.29 W., Morrison County, at bridge on County Highway 224, 0.3 mile upstream from mouth, and 2.2 miles northeast of Bowlus.	-	1969, 1973	10-17-72 9-12-73	5.24 1.94
<u>Spunk Creek basin</u>						
05267580	Spunk Creek near Royalton, Minn.	Lat 45°47'04", long 94°18'54", in SW¼NE¼ sec.27, T.127 N., R.29 W., Morrison County, at bridge on County Highway 21, about 1.5 miles upstream from mouth, and 3.5 miles southwest of Royalton.	-	1968-70, 1973	10-17-72 9-12-73	22.9 7.24

\* Also a crest-stage partial-record station.

a Approximately.



Discharge measurements made at low-flow partial-record stations during water year 1973--Continued

Station No.	Station Name	Location	Drainage area (sq mi)	Period of record	Measurements	
					Date	Discharge
<u>Platte River basin</u>						
05267890	Skunk River near Pierz, Minn.	Lat 45°59'00", long 94°04'52", on line between sec.9, T.40 N., R.30 W., and sec.36, T.41 N., R.30 W., Morrison County, at double box culvert on County Highway 39, 1.1 miles east of Pierz, Minn.	-	1969, 1973	10-19-72 9-13-73	16.9 9.11
05267930	Skunk River near Buckman, Minn.	Lat 45°55'36", long 94°10'41", on line between secs.26 and 27, T.40 N., R.31 W., Morrison County, at bridge on county road, 4.6 miles northwest of Buckman, Minn.	a148	1969, 1973	10-18-72 9-13-73	33.4 12.9
<u>Little Rock Creek basin</u>						
05268500	Little Rock Creek near Royalton, Minn.	Lat 46°49'50", long 94°12'02", SE¼NE¼ sec.33, T.39 N., R.31 W., Morrison County, at triple box culvert on County Highway 26, 4.5 miles east of Royalton.	-	1969, 1973	10-18-72 9-12-73	9.96 6.01
<u>Sauk River basin</u>						
05270130	Ashley Creek at Westport, Minn.	Lat 45°43'10", long 95°10'50", on line between secs.14 and 15, T.126 N., R.36 W., Pope County, at bridge on county road, 0.7 mile northwest of Westport.	-	1970-71, 1973	11-13-72	21.6
<u>Crow River basin</u>						
05275970	North Fork Crow River near Georgeville, Minn.	Lat 45°29'06", long 94°55'37", on line between secs.3 and 10, T.123 N., R.34 W., Stearns County, at bridge on County Highway 32, 2 miles east of U.S. Highway 71, and 4 miles north of Georgeville.	-	1970-71, 1973	11-13-72	74.6
<u>Minnesota River basin</u>						
05292400	Stony Run at Odessa, Minn.	Lat 45°16'09", long 96°20'36", on line between secs.20 and 29, T.121 N., R.45 W., Big Stone County, at culvert on U.S. Highway 75, 1 mile upstream from mouth, and 0.8 mile northwest of Odessa.	a45	1963-64, 1970, 1973	8-23-73	.78
05292900	South Fork Yellow Bank River near Bellingham, Minn.	Lat 45°10'31", long 96°21'14", in NE¼SE¼ sec.25, T.120 N., R.46 W., Lac qui Parle County, at bridge on county road, 0.7 mile upstream from North Fork, and 4.4 miles northwest of Bellingham.	-	1963-64, 1970, 1973	8-28-73	1.03
05293003	Lac qui Parle County ditch No. 13 near Bellingham, Minn.	Lat 45°11'21", long 96°14'21", near center of sec.24, T.120 N., R.45 W., Lac qui Parle County, at bridge on county road, 3 miles upstream from mouth, and 4 miles northeast of Bellingham.	-	1963-64, 1970, 1973	8-28-73	1.21
05293006	Five Mile Creek near Correll, Minn.	Lat 45°13'21", long 96°06'56", in NE¼NW¼ sec.12, T.120 N., R.44 W., Big Stone County, at culvert on State Highway 7, 3.5 miles upstream from mouth, and 2.3 miles east of Correll.	-	1963-64, 1970, 1973	8-28-73	2.72
05293370	Pomme de Terre River near Elbow Lake, Minn.	Lat 45°59'06", long 95°53'37", in NE¼SE¼ sec.13, T.129 N., R.42 W., Grant County, at bridge on county road, 1 mile downstream from Pomme de Terre Lake, and 4 miles east of Elbow Lake.	a334	1963-65, 1970, 1973	8-31-73	.53
05293600	Mud Creek near Morris, Minn.	Lat 45°32'26", long 95°54'44", on line between secs.22 and 23, T.124 N., R.42 W., Stevens County, at culvert on U.S. Highway 59, 1 mile upstream from mouth, and 3 miles south of Morris.	a137	1963-65, 1970, 1973	9- 4-73	.15

a Approximately.

## Discharge measurements made at low-flow partial-record stations during water year 1973--Continued

Station No.	Station Name	Location	Drainage area (sq mi)	Period of record	Measurements	
					Date	Discharge
<u>Minnesota River basin--Continued</u>						
05294500	Emily Creek near Louisborg, Minn.	Lat 45°05'38", long 96°00'02", in NE¼NE¼ sec.26, T.119 N., R.43 W., Lac qui Parle County, at twin culverts on county road, 1 mile upstream of mouth, and 9.7 miles southeast of Louisborg.	-	1963-64, 1970, 1973	8-28-73	2.04
05298500	Lac qui Parle River near Canby, Minn.	Lat 44°47'25", long 96°09'04", on line between secs.3 and 10, T.115 N., R.44 W., Yellow Medicine County, at bridge on State Highway 67, 0.5 mile upstream from Lazarus Creek, and 8 miles north-east of Canby.	a180	1963-66, 1969-70, 1973	8-28-73	0
05299600	Lazarus (Canby) Creek near Canby, Minn.	Lat 44°49'16", long 96°11'43", on line between secs.29 and 30, T.116 N., R.44 W., Lac qui Parle County, at bridge on U.S. Highway 75, 8.5 miles northeast of Canby.	a120	1964-66, 1970, 1973	8-28-73	.54
05299800	West Branch Lac qui Parle River at Dawson, Minn.	Lat 44°55'47", long 96°03'01", in S¼NE¼ sec.21, T.117 N., R.43 W., Lac qui Parle County, at dam, about 400 ft downstream from railroad and highway bridge in Dawson.	a485	1963-66, 1968-70, 1973	8-28-73	.82
05301950	Chippewa River near Cyrus, Minn.	Lat 45°37'54", long 95°44'16", on line between secs.17 and 18, T.125 N., R.40 W., Pope County, at bridge on County Highway 3, 1.2 miles north of Cyrus.	a400	1963-66, 1969-70, 1973	9- 4-73	5.72
05302700	Little Chippewa River near Cyrus, Minn.	Lat 45°35'46", long 95°40'32", on line between secs.34 and 35, T.125 N., R.40 W., Pope County, at bridge on County Highway 73, 3.2 miles southeast of Cyrus.	-	1969-70, 1973	9- 4-73	0
05302980	Emily Lake outlet near Hancock, Minn.	Lat 45°30'56", long 95°41'45", in S¼S¼ sec.28, T.124 N., R.40 W., Pope County, at bridge on county road, 5 miles east of Hancock.	-	1969-70, 1973	9- 4-73	15.4
05303280	East Branch Chippewa River at Terrace, Minn.	Lat 45°30'34", long 95°19'24", in SW¼NE¼ sec.33, T.124 N., R.37 W., Pope County, at bridge on State Highway 104, at west edge of Terrace.	94.4	1970-71, 1973	11-13-72 9- 4-73	33.6 13.7
05303350	East Branch Chippewa River near Swift Falls, Minn.	Lat 45°22'35", long 95°24'51", in SW¼NW¼ sec.14, T.122 N., R.38 W., Swift County, at bridge on County Highway 28, 1.7 miles southeast of Swift Falls.	-	1969-70, 1973	9- 4-73	29.3
05303400	Mud Creek near Swift Falls, Minn.	Lat 45°21'54", long 95°22'34", in SW¼NW¼ sec.19, T.122 N., R.37 W., Swift County, at bridge on County Highway 87, 3.4 miles southeast of Swift Falls.	-	1969-70, 1973	9- 4-73	4.85
05303430	Mud Creek near Benson, Minn.	Lat 45°18'46", long 95°32'29", on line between secs.2 and 3, T.121 N., R.39 W., Swift County, at bridge on county road, 2.9 miles east of Benson.	a90	1969-70, 1973	9- 4-73	4.02
05303470	East Branch Chippewa River near Benson, Minn.	Lat 45°20'53", long 95°35'37", in SE¼NW¼ sec.29, T.122 N., R.39 W., Swift County, at bridge on county road, 2.2 miles north of Benson.	a520	1964-66, 1969-70, 1973	9- 4-73	36.1
05304000	Shakopee Creek near Benson, Minn.	Lat 45°12'50", long 95°38'10", in SE¼ sec.11, T.120 N., R.40 W., at bridge on county road, 1.5 miles upstream from mouth, and 7 miles southwest of Benson	352	1949-54 <sup>a</sup> , 1957, 1969-70, 1973	9- 4-73	14.7
05304800	Dry Weather Creek near Montevideo, Minn.	Lat 45°03'00", long 95°46'00", in NE¼NW¼ sec.11, T.118 N., R.41 W., Chippewa County, at bridge on county road, 7.4 miles northwest of Montevideo.	a105	1969-70, 1973	9- 4-73	1.07

≠ Operated as a continuous-record station.  
a Approximately.

Discharge measurements made at low-flow partial-record stations during water year 1973--Continued

Station No.	Station Name	Location	Drainage area (sq mi)	Period of record	Measurements	
					Date	Discharge
Minnesota River basin--Continued						
*05305200	Spring Creek near Montevideo, Minn.	Lat 45°58'41", long 95°42'57", in NW¼NW¼ sec.5, T.117 N., R.40 W., Chippewa County, at culvert on State Highway 29, 1.2 miles upstream from mouth, and 2.0 miles north of Montevideo.	16.0	1960-62, 1964-65, 1967-73	9- 5-73	.77
05311350	North Branch Yellow Medicine River near Minneota, Minn.	Lat 44°37'25", long 95°59'30", on line between secs.1 and 2, T.113 N., R.43 W., Lyon County, at bridge on County Highway 3, 3 miles upstream from South Branch Yellow Medicine River, and 4.4 miles north of Minneota.	-	1963-66, 1969, 1973	8-29-73	.27
05314600	Boiling Springs Creek near Belview, Minn.	Lat 44°40'02", long 95°19'10", on line between secs.20 and 21, T.114 N., R.37 W., Redwood County, at bridge on county road, 1 mile upstream from mouth, and 3.6 miles north of Belview.	-	1969, 1973	8-29-73	.78
05314650	Echo Creek near Belview, Minn.	Lat 44°38'02", long 95°16'44", on line between secs.34 and 35, T.114 N., R.37 W., Redwood County, at bridge on county road, 2.2 miles northeast of Belview.	-	1969, 1973	8-30-73	0
05314950	Redwood River near Russell, Minn.	Lat 44°17'52", long 95°58'25", on line between secs.25 and 36, T.110 N., R.43 W., Lyon County, at bridge on county road, 1.2 miles southwest of Russell.	-	1966-69, 1973	8-29-73	.11
05314970	Coon Creek near Russell, Minn.	Lat 44°19'22", long 95°58'42", on line between secs.23 and 24, T.110 N., R.43 W., Lyon County, at bridge on county road, 1.3 miles west of Russell.	-	1966-69, 1973	8-29-73	0
05315300	Three Mile Creek near Ghent, Minn.	Lat 44°31'30", long 95°50'12", on line between sec.7, T.112 N., R.41 W., and sec.12, T.112 N., R.42 W., Lyon County, at bridge on County Highway 65, 2.9 miles northeast of Ghent.	-	1969, 1973	8-29-73	.95
05316630	Wabasha Creek near Morton, Minn.	Lat 44°29'45", long 94°54'23", in NE¼NE¼ sec.22, T.112 N., R.34 W., Redwood County, at bridge on county road, 5.4 miles southeast of Morton.	-	1969, 1973	8-30-73	.67
05316840	Cottonwood River near Tracy, Minn.	Lat 44°20'41", long 95°36'50", on line between secs.11 and 12, T.110 N., R.40 W., Lyon County, at bridge on County Highway 11, 7.2 miles north of Tracy.	-	1968-69, 1973	8-29-73	.03
05316855	Meadow Creek near Tracy, Minn.	Lat 44°21'16", long 95°36'50", on line between secs.11 and 12, T.110 N., R.40 W., Lyon County, at bridge on County Highway 11, 7.9 miles north of Tracy.	-	1969, 1973	8-29-73	0
05316870	Plum Creek near Walnut Grove, Minn.	Lat 44°16'90", long 95°25'39", on line between secs.4 and 9, T.109 N., R.38 W., Redwood County, at bridge on county road, 3.8 miles northeast of Walnut Grove.	-	1969, 1973	8-29-73	0
05316879	Pell Creek near Lamberton, Minn.	Lat 44°14'47", long 95°19'56", in SE¼NE¼ sec.18, T.109 N., R.37 W., Redwood County, at bridge on county road, 3 miles west of Lamberton.	-	1969, 1973	8-29-73	0
05316880	Cottonwood River near Lamberton, Minn.	Lat 44°15'17", long 95°18'40", in SE¼SE¼ sec.8, T.109 N., R.37 W., Redwood County, 0.5 mile downstream from Pell Creek, 2.2 miles upstream from dam, 500 ft upstream from county road, and 2.5 miles northwest of Lamberton.	a430	1966-69, 1973	8-29-73	.08
05316890	Dutch Charley Creek near Lamberton, Minn.	Lat 44°12'58", long 95°16'12", on line between secs.26 and 27, T.109 N., R.37 W., Redwood County, at bridge on County Highway 6, 1.2 miles south of Lamberton.	-	1969, 1973	8-29-73	0

\* Also a crest-stage partial-record station.  
a Approximately.

Discharge measurements made at low-flow partial-record stations during water year 1973--Continued

Station No.	Station Name	Location	Drainage area (sq mi)	Period of record	Measurements	
					Date	Discharge
<u>Minnesota River basin--Continued</u>						
05316895	Highwater Creek near Lamberton, Minn.	Lat 44°12'36", long 95°14'45", on line between secs.25 and 36, T.109 N., R.37 W., Redwood County, at bridge on County Highway 15, 1.9 miles southeast of Lamberton.	-	1969, 1973	8-29-73	.60
05316910	Dry Creek at Sanborn, Minn.	Lat 44°11'43", long 95°08'15", on line between sec.35, T.109 N., R.36 W., Redwood County and sec.2, T.108 N., R.36 W., Cottonwood County, at bridge on County Highway 41, 1.5 miles upstream from mouth, and at the southwest limits of Sanborn.	-	1969, 1973	8-29-73	.07
05316940	Mound Creek near Springfield, Minn.	Lat 44°11'40", long 95°03'34", in NW¼NW¼ sec.4, T.108 N., R.35 W., Brown County, at bridge on County Highway 2, 0.9 mile upstream from mouth, and 5 miles southwest of Springfield.	-	1968-69, 1973	8-29-73	.61
05316960	Coal Mine Creek near Springfield, Minn.	Lat 44°13'28", long 95°01'55", on line between secs.22 and 27, T.109 N., R.35 W., Brown County, at bridge on county road, 1.2 miles upstream from mouth, and 3 miles southwest of Springfield.	-	1968-69, 1973	8-30-73	0
05316970	Cottonwood River at Leavenworth, Minn.	Lat 44°13'39", long 94°48'22", on line between secs.21 and 22, T.109 N., R.33 W., Brown County, at bridge on County Highway 8, 0.2 mile north of Leavenworth.	a850	1966-70, 1973	8-29-73	3.64
05316990	Sleepy Eye Creek near Cobden, Minn.	Lat 44°15'41", long 94°49'35", on line between secs.8 and 9, T.109 N., R.33 W., Brown County, at bridge on county road, 1.8 miles southeast of Cobden.	a290	1966-70, 1973	8-29-73	3.25
05317300	Morgan Creek at Cambria, Minn.	Lat 44°14'32", long 94°19'36", in SW¼SW¼ sec.16, T.109 N., R.29 W., Blue Earth County, at culvert on State Highway 68, 0.5 mile upstream from mouth, and 0.6 mile northwest of Cambria.	-	1969-70, 1973	8-30-73	.80
<u>Des Moines River basin</u>						
05474770	Beaver Creek near Currie, Minn.	Lat 44°03'30", long 95°43'08", in NW¼SW¼ sec.24, T.107 N., R.41 W., Murray County, at bridge on county road, 2.8 miles southwest of Currie.	-	1969-70, 1972-73	10-10-72 8-31-73	6.85 .90
05474800	Lime Creek near Avoca, Minn.	Lat 43°56'58", long 95°31'71", at Common Corner of secs.27, 28, and 33, 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, 1972-73	10-10-72 8-31-73	3.84 0
05474920	Okabena Creek at Okabena, Minn.	Lat 43°44'38", long 95°18'54", on line between secs.7 and 8, T.103 N., R.37 W., Jackson County, at bridge on County Highway 9, 0.3 mile north of Okabena.	-	1969-70, 1973	10-11-72 8-31-73	5.89 2.97
05474980	Jack Creek near Heron Lake, Minn.	Lat 43°46'10", long 95°18'54", on line between secs.31 and 32, T.104 N., R.37 W., Jackson County, at bridge on County Highway 9, 1.8 miles south of Heron Lake.	-	1969-70, 1973	10-11-72 8-31-73	4.80 0
05475000	Heron Lake Outlet near Heron Lake, Minn.	Lat 43°48'10", long 95°16'30", on line between secs.21 and 22, T.104 N., R.37 W., Jackson County, 0.5 mile downstream from outlet dam, 12 miles upstream from Des Moines River, and 2 miles east of Heron Lake.	457	1930-43, 1973	10-11-72	8.37
05476990	East Fork Des Moines River near Ceylon, Minn.	Lat 43°34'08", long 94°38'04", on line between secs.11 and 12, T.101 N., R.32 W., Martin County, at bridge on County Highway 67, 2.4 miles north of Ceylon.	a155	1971-73	10-12-72 8-31-73	2.97 .03

\* Operated as a continuous-record station.

a Approximately.

Discharge measurements made at low-flow partial-record stations during water year 1973--Continued

Station No.	Station Name	Location	Drainage area (sq mi)	Period of record	Measurements	
					Date	Discharge
Big Sioux River basin						
06480600	Flandreau Creek near Cazenovia, Minn.	Lat 44°04'54", long 96°26'27", in NE¼NW¼ sec.13, T.107 N., R.47 W., Pipestone County, at bridge on County Highway 13, 3.5 miles northwest of Cazenovia.	92.2	1971, 1973	10-14-72 8-30-73	3.74 0
06482520	Pipestone Creek near Pipestone, Minn.	Lat 43°58'49", long 96°26'08", on line between secs.13 and 24, T.106 N., R.47 W., Pipestone County, at bridge on County Highway 55, 6.1 miles southwest of Pipestone.	113	1971, 1973	10-14-72 8-30-73	4.10 .35
06482540	Split Rock Creek near Jasper, Minn.	Lat 43°46'36", long 96°26'13", on line between secs.26 and 35, T.104 N., R.47 W., Rock County, at bridge on county road, 5.4 miles southwest of Jasper.	310	1969-70, 1973	10-13-72 8-30-73	11.6 2.22
06482710	Beaver Creek near Luverne, Minn.	Lat 43°39'35", long 96°18'51", on line between secs.2 and 11, T.102 N., R.46 W., Rock County, at bridge on County Highway 5, 5.4 miles west of Luverne.	35.5	1969-70, 1973	10-13-72 8-30-73	.31 0
06482720	Little Beaver Creek near Luverne, Minn. (Formerly published as Beaver Creek tributary)	Lat 43°39'36", long 96°16'50", on line between secs.6 and 7, T.102 N., R.45 W., Rock County, at bridge on County Highway 5, 3.8 miles west of Luverne.	12.8	1969-70, 1973	10-13-72	0
06482740	Beaver Creek near Beaver Creek, Minn.	Lat 43°35'31", long 96°25'55", on line between secs.35 and 36, T.102 N., R.47 W., Rock County, at bridge on State Highway 23, 3.8 miles southwest of Beaver Creek.	84.6	1969-70, 1973	10-13-72 8-30-73	1.50 .77
06482930	Rock River at Edgerton, Minn.	Lat 43°52'14", long 96°08'27", in SW¼NW¼ sec.28, T.105 N., R.44 W., Pipestone County, at bridge on County Highway 10, 1.7 miles upstream from Chanarambie Creek, and at west edge of Edgerton.	121	1969-70, 1973	10-14-72 8-30-73	4.42 1.07
06482935	Chanarambie Creek at Edgerton, Minn.	Lat 43°52'14", long 96°07'23", in NW¼SW¼ sec.27, T.105 N., R.44 W., Pipestone County, at bridge on County Highway 1, 1 mile upstream from mouth, and in Edgerton.	72.0	1969-70, 1973	10-14-72 8-30-73	1.80 .31
06482945	Rock River near Hardwick, Minn.	Lat 43°43'04", long 96°09'51", on line between secs.18 and 19, T.103 N., R.44 W., Rock County, at bridge on County Highway 8, 4.3 miles southeast of Hardwick.	312	1969-70, 1973	10-14-72 8-30-73	14.8 3.56
06482980	Champepadan Creek near Hardwick, Minn.	Lat 43°30'01", long 96°07'59", in NE¼SE¼ sec.20, T.103 N., R.44 W., Rock County, at bridge on County Highway 9, 1.2 miles upstream from mouth, and 5.8 miles southeast of Hardwick.	75.5	1969-70, 1973	10-13-72 8-30-73	3.94 .005
064830.30	Elk Creek near Luverne, Minn.	Lat 43°36'11", long 96°10'22", on line between sec.25, T.102 N., R.45 W., and sec.30, T.102 N., R.44 W., Rock County, at bridge on County Highway 9, 4 miles southeast of Luverne.	62.0	1969-70, 1973	10-13-72 8-31-73	2.00 .004
06483070	Ash Creek at Ash Creek, Minn.	Lat 43°32'57", long 96°11'46", in NE¼SE¼ sec.14, T.101 N., R.45 W., Rock County, at bridge on county road, 0.7 mile north of Ash Creek.	13.4	1969-70, 1973	10-13-72 8-31-73	0 0
06483240	Kanaranzi Creek near Kanaranzi, Minn.	Lat 43°30'01", long 96°07'12", on line between sec.4, T.100 N., R.44 W., and sec.33, T.101 N., R.44 W., Rock County, at bridge on county road on Iowa-Minnesota border, 5.3 miles southwest of Kanaranzi.	192	1969-70, 1973	10-13-72 8-31-73	7.02 1.66
06483310	Mud Creek near Hills, Minn.	Lat 43°30'53", long 96°20'27", on line between secs.27 and 34, T.101 N., R.46 W., Rock County, at bridge on county road, 1.2 miles southeast of Hills.	25.9	1969-70, 1973	10-13-72	0

Discharge measurements made at low-flow partial-record stations during water year 1973--Continued

Station No.	Station Name	Location	Drainage area (sq mi)	Period of record	Measurements	
					Date	Discharge
<u>Big Sioux River basin--Continued</u>						
06483355	Little Rock River near Bigelow, Minn.	Lat 43°30'00", long 95°50'57", in SE¼SW¼ sec.35, T.101 N., R.42 W., Nobles County, at bridge on county road on Iowa-Minnesota border, 8 miles west of Bigelow.	91.5	1971, 1973	10-12-72 8-31-73	1.21 .02
<u>Little Sioux River basin</u>						
*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 road, 1.6 miles downstream from Jackson County ditch No. 11, and 5.8 miles east of Spafford.	41.1	1961-70, 1972-73	10-12-72 8-31-73	.27 0
06603690	West Fork Little Sioux River near Sioux Valley, Minn.	Lat 43°30'02", long 95°16'46", in SE¼SE¼ sec.33, T.101 N., R.37 W., Jackson County, at bridge on County Highway 62, 3.3 miles southeast of Sioux Valley.	106	1971, 1973	10-12-72 8-31-73	1.49 0

\* Also a crest-stage partial-record station.

## 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 1973

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Annual maximum		
					Date	Gage height (feet)	Dis-charge (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	1961-73	5- 1-73	15.63	51
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	1966-73	9- 1-73	10.02	6.1
*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, 1972-73	5-26-73	5.17	1,000
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	1964-73	6- 4-73	7.12	32
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	1961-73	6- 4-73	12.92	463
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	1960-73	6-17-73	9.29	43
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	1960-73	6-17-73	7.90	48
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	1965-73	6-17-73	7.06	(#)
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	1960-73	8-16-73	11.31	206
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	1964-73	8-15-73	18.22	68
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	1964-73	8-15-73	14.73	260
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	1960-73	8-15-73	17.47	302
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	1960-73	5- 6-73	9.37	25
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.	-	1972-73	5-11-73	14.95	857

\* Also a low-flow partial-record station.

# Discharge not determined.

# Operated as a continuous-record gaging station.

Annual maximum discharge at crest-stage partial-record stations during water year 1973--Continued

Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Annual maximum		
					Date	Gage height (feet)	Dis-charge (cfs)
Streams tributary to Lake Superior--Continued							
*04024095	Nemadji River near Holyoke, Minn.	Lat 46°31'04", long 92°23'22", in NE¼NE¼ sec.32, T.47 N., R.16 W., Carlton County, at bridge on State Highway 23, 3.5 miles north of Holyoke.	-	1973	3-25-73	11.25	(A)
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, 1967-73	8- 8-73	15.55	318
04024110	Rock Creek tribu-tary near Black-hoof, 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	1961-73	5- 1-73	8.73	5.5
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	1961-73	5-25-73	10.97	370
Red River of the North basin							
05047700	West Branch Mustinka River tributary near Graceville, Minn.	Lat 45°36'53", long 96°19'47", in NE¼NW¼ sec.28, T.125 N., R.45 W., Traverse County, at culvert on county highway, 6.0 mile northeast of Graceville.	3.37	1964-73	3-14-73	a7.18	10
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, 1970-73	5-24-73	6.74	(A)
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	1960-73	9- 2-73	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, 1967-73	3-14-73	3.14	33
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	1961-73	4-14-73	7.39	84
05062280	Mosquito Creek near Bagley, Minn.	Lat 47°02'02", 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.	b3.98	1961-73	9- 2-73	9.35	57
05062470	Marsh Creek tribu-tary near Mahnomen, Minn.	Lat 47°19'31", long 96°04'41", in SE¼SW¼ sec.36, T.145 N., R.43 W., Norman County, at culvert on State Highway 31, 0.1 mile upstream from mouth, and 5.2 miles west of Mahnomen.	11.9	1961-73	3-14-73	a10.03	46
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	1961-73	9- 2-73	12.45	117
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	1962-73	3-14-73	10.55	290
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	1963-73	9- 2-73	6.29	36
05063500	South Branch Wild Rice River near Borup, Minn.	Lat 47°11'40", long 96°34'40", NW¼NW¼ sec.24, T.143 N., R.47 W., Norman County, at bridge on County Highway 193, 4 miles northwest of Borup.	254	1944-49, 1972-73	4-13-72, 9- 5-73	16.74, 11.09	950, 250
05073600	South Branch Battle River at Northome, Minn.	Lat 47°52'17", long 94°17'45", in NW¼NE¼ sec.25, T.151 N., R.29 W., Koochiching County, at culvert on U.S. Highway 71, 0.7 mile west of Northome, and 3.1 miles upstream from Battle Lake.	b2.80	1960-73	9- 3-73	c14.45	46

\* Also a low-flow partial-record Station.

/ Discharge not determined.

# Operated as a continuous-record gaging station.

a Backwater from ice.

b Revised.

c Affected by shifting control.



## Annual maximum discharge at crest-stage partial-record stations during water year 1973--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							
05073750	Spring Creek near Blackduck, Minn. (Formerly published as South Branch Cormorant River tributary near Blackduck)	Lat 47°46'23", long 94°31'22", in NW¼NW¼ sec.32, T.150 N., R.30 W., Beltrami County, at culvert on County Highway 304, 3.1 miles north of Blackduck, and 3.2 miles upstream from mouth.	67.96	1960-73	9- 3-73	15.86	180
05073800	Perry Creek tributary near Shooks, Minn.	Lat 47°52'00", long 94°32'52", in NW¼SW¼ sec.30, T.151 N., R.30 W., Beltrami County, at culvert on State Highway 72, 5.2 miles west of Shooks.	61.14	1960-73	9- 3-73	17.79	58
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	1962-73	5-10-73	6.28	43
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	1960-73	9- 2-73	11.51	94
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	1960-73	9- 2-73	16.11	152
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	1961-73	9-24-73	10.64	(4)
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	1966-73	5- 7-73	7.54	21
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	1961-73	7-26-73	6.65	34
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, 1966-73	7-25-73	7.66	20
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	1959-73	3-14-73	10.92	48
*05131750	Big Fork River near Bigfork, Minn.	Lat 47°45'05", long 93°46'33", in SE¼NE¼ sec.27, T. 61 N., R.27 W., Itasca County, at bridge on State Highway 6, 5.5 miles west of Bigfork.	-	1973	4-21-73	10.92	900
Mississippi River main stem							
*05200445	Mississippi River at Bemidji, Minn.	Lat 47°27'04", long 94°54'23", in NW¼NW¼ sec.20, T.146 N., R.33 W., Beltrami County, at bridge on County Highway 11, 1.5 miles southwest of intersection of U.S. Highway 2 and County Highway 7 in Bemidji.	-	1973	9- 9-73	11.71	495
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.	8.00	1961-73	3-14-73	3.75	17

\* Also a low-flow partial-record station.

X Discharge not determined.

a Backwater from ice.

b Revised.

c Affected by shifting control.

Annual maximum discharge at crest-stage partial-record stations during water year 1973--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							
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.	3.95	1961-73	5-25-73	5.15	15
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.	1.50	1961-73	3-14-73	a7.33	18
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.	-	1972-73	3- -73	11.42	1,180
Crow Wing River basin							
05244100	Kitten Creek near Sebekka, 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 Sebekka, and 3.3 miles upstream from mouth.	14.7	1961-73	3-14-73	9.06	41
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	1961-73	7-27-73	4.69	79
*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.	-	1972-73	3-27-73	13.09	1,430
Mississippi River main stem							
*05261000	Mississippi River near Fork 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- 1972-73	3-17-73	1144.47	12,200
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	1961-73	3-12-73	a9.62	11
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	1964-73	3-12-73	13.98	680
*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- 1972-73	3-16-73	3.75	2,280
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	1960-73	3-14-73	a10.36	74
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, 1962-73	3-14-73	9.04	16

\* Also a low-flow partial-record station.

≠ Operated as a continuous-record gaging station.

a Backwater from ice.

## Annual maximum discharge at crest-stage partial-record stations during water year 1973--Continued

Annual maximum discharge at crest-stage partial-record stations during water year 1973							
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	1964-73	3-11-73	a7.14	13
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	1964-73	3-11-73	a7.00	41
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	1964-73	3-11-73	a13.82	154
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.	-	1972-73	3-18-73	a15.29	17,600
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	1964-73	3-12-73	a5.25	60
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	1960-73	3-11-73	a8.03	21
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	1960-73	8-16-73	16.67	9.0
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	1962-73	3-11-73	a5.45	28
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	1961-73	3-14-73	a8.98	156
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	1962-73	3-14-73	a8.88	31
05278850	Buffalo Creek tributary near Brownton, Minn.	Lat 44°45'55", long 94°22'33", in NE¼SE¼ sec.13, T.115 N., R.30 W., McLeod County, at culvert on State Highway 15, 0.6 mile upstream from mouth, and 2.6 miles northwest of Brownton.	9.45	1961-73	1973	(d)	<25
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	1964-73	3-11-73	a8.08	20

&lt; Less than.

a Backwater from ice.

d Peak stage did not reach bottom of gage.

## Annual maximum discharge at crest-stage partial-record stations during water year 1973--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							
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	1960-73	3-11-73	14.77	42
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	1960-73	3-11-73	a7.97	31
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	1961-73	5-24-73	5.55	20
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	1960-73	3-11-73	10.51	99
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	1960-73	5-24-73	8.80	23
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	1962-73	3-11-73	7.41	9.0
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	1962-73	7-26-72 3-11-73	10.26 8.29	b110 48
*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	1959-73	3-11-73	14.14	118
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	1960-73	3-11-73	a13.90	87
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	1960-73	3-11-73	8.28	13
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	1960-73	5-28-73	14.03	66
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	1959-73	3-11-73	a14.37	109
*05315200	Prairie Ravine near Marshall, Minn.	Lat 44°29'44", long 95°47'48", in SE¼NE¼ sec.20, T.112 N., R.41 W., Lyon County, at culvert on U.S. Highway 59, 2.7 miles north of Marshall.	5.63	1959-64 1965-73	3-11-73	a6.18	26
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	1959-73	3-11-73	a5.46	30
*05316570	Beaver Creek at Beaver Falls, Minn.	Lat 44°35'10", long 95°02'49", in NE¼NW¼ sec.22, T.113 N., R.35 W., Renville County, at bridge in Beaver Falls, 2.2 miles upstream from mouth, and 3.8 miles northwest of Morton.	200	1972-73	5-30-72 1973	10.03 (d)	779 <500

\* Also a low-flow partial-record station.

\* Operated as a continuous-record gaging station.

&lt; Less than.

a Backwater from ice.

b Revised.

d Peak stage did not reach bottom of gage.

Annual maximum discharge at crest-stage partial-record stations during water year 1973--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							
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	1966-73	3-11-73	3.41	7.5
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	1959-73	3-11-73	a9.36	45
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	1959-73	3-11-73	a5.55	9.8
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	1961-73	3-11-73	a6.28	66
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	1966-73	1973	(d)	<7
05316950	Cottonwood River near Springfield, Minn.	Lat 44°12'12", long 95°02'53", on line between sec.33 and 34, T.109 N., R.35 W., Brown County, at bridge on County Highway 2, 1.3 miles downstream from Mound Creek, 1.0 mile upstream from Coal Mine Creek, and 3.5 miles southwest of Springfield.	-	1973	3-13-73	a20.05	1,940
05317190	Little Cottonwood River at Searles, Minn.	Lat 44°14'19", long 94°26'04", in NE¼NE¼ sec.21, T.109 N., R.30 W., Brown County, at bridge on State Highway 15, 0.75 mile north of Searles, and 3 miles south of New Ulm.	-	1972-73	6- 8-72 3-13-73	6.04 -	(A) e600
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	1959-73	4-16-73	5.82	85
05318000	East Branch Blue Earth River near Briceyn, Minn.	Lat 43°37'50", long 93°47'25", in NE¼NE¼ sec.23, T.102 N., R.25 W., Faribault County, at bridge on county highway, 2 miles upstream from Brush Creek, 3 miles downstream from South Walnut Lake, and 5 miles northeast of Briceyn.	132	1973	3-13-73	a9.40	524
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	1960-73	3-11-73	c4.73	73
05318300	Watowwan 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	1960-73	5-27-73	14.05	18
*05319490	Watowwan 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.	-	1972-73	1973	(d)	<3,500
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	1959-73	5- 1-73	19.44	8.0
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	1959-73	5- 1-73	15.86	135
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	1959-73	3-14-73	16.81	107

\* Also a low-flow partial-record station.

A Discharge not determined.

&lt; Less than.

a Backwater from ice.

c Affected by shifting control.

d Peak stage did not reach bottom of gage.

e Estimated; gage height unknown.

## Annual maximum discharge at crest-stage partial-record stations during water year 1973--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							
*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.	-	1972-73	3-14-73	8.07	2,760
05330150	Sand Creek tributary near Montgomery, Minn.	Lat 44°02'54", 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	1961-73	9-26-73	7.86	10
05330200	Rice Lake tributary near Montgomery, Minn.	Lat 44°02'54", 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	1960-73	9-26-73	7.68	67
05330300	Sand Creek near New Prague, Minn.	Lat 44°02'37", 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	1960-73	5- 1-73	10.06	177
05330550	Raven Stream tributary near New Prague, Minn.	Lat 44°03'41", 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	1960-73	5- 1-73	10.53	113
05330600	Sand Creek tributary No. 2 near Jordan, Minn.	Lat 44°03'45", 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	1960-73	3-14-73	12.56	29
St. Croix River basin							
*05336200	Glaishy Brook near Kettle River, Minn.	Lat 46°02'19", 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, 1971-73	3-15-73	a4.37	162
05336300	Moose River tributary at Moose Lake, Minn.	Lat 46°02'17", 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	1960-73	5-24-73	7.65	31
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	1960-73	5-24-73	15.70	33
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	1960-73	3-12-73	a7.53	7.8
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	1960-73	11-2-72	13.10	26
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	1960-73	3-11-73	16.72	70
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	1960-73	5- 1-73	9.61	47 235
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	1960-73	7- 2-73	13.82	205
05355150	Pine Creek near Cannon Falls, Minn.	Lat 44°02'27", 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	1960-73	3- 7-73	3.49	216 10

\* Also a low-flow partial-record station.

\* Operated as a continuous-record gaging station.

a Backwater from ice.

## Annual maximum discharge at crest-stage partial-record stations during water year 1973--Continued

Annual maximum discharge at crest-stage partial-record stations during water year 1973 continued							
Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Annual maximum		
					Date	Gage height (feet)	Dis-charge (cfs)
Cannon River basin--Continued							
*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 <sup>a</sup> 1930-71 <sup>a</sup> 1973	5- 3-73	10.71	10,500
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	1960-73	3- 6-73	10.33	22
Zumbro River basin							
05372800	South Fork Zumbro River on Belt Line at Rochester, Minn.	Lat 44°00'26", long 92°28'19", in SE¼SW¼ sec.2, T.106 N., R.14 W., Olmsted County, at bridge on west-bound lane of U.S. Highway 14 at Rochester, and 1.5 miles upstream from Bear Creek.	155	1969-73	1969 5-28-70 3-31-71 3-15-72 3-10-73	(d) 998.20 997.99 995.81 1001.78	<2,500 2,520 2,200 645 6,020
*05372930	Bear Creek on Belt Line at Rochester, Minn.	Lat 44°00'29", long 92°26'44", in SW¼SE¼ sec.1, T.106 N., R.14 W., Olmsted County, at bridge on west-bound lane of U.S. Highway 14 at Rochester, and 1.2 miles upstream from mouth.	80.0	1969-73	4- 4-69 1970 3-31-71 3-15-72 3-10-73	997.50 (d) 997.16 996.74 1000.11	870 e650 780 670 1,870
*05372950	Silver Creek at Rochester, Minn.	Lat 44°01'44", long 92°25'44", near center of sec.31, T.107 N., R.13 W., Olmsted County, at bridge on county highway at east edge of Rochester city limits, and 1.7 miles upstream from mouth.	17.3	1969-73	4- 4-69 6-17-70 7-12-71 3-15-72 3-10-73	10.62 10.93 12.87 - 12.91	428 510 1,210 e150 1,290
*05372990	Cascade Creek at Rochester, Minn.	Lat 44°01'51", long 92°28'18", in SE¼NW¼ sec.35, T.107 N., R.14 W., Olmsted County, at bridge on 7th Street NW at Rochester, and 0.6 mile upstream from mouth.	37.0	1969-73	4- 4-69 6-17-70 6- 7-71 3-15-72 3-10-73	979.02 978.80 980.63 (d) 982.15	450 401 880 e170 1,430
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	1962-73	3- 6-73	8.65	26
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	1960-73	5- 1-73	15.45	1,820
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	1960-73	7-24-73	6.68	71
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	1966-73	3-11-73	20.08	435
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	1962-73	3-11-73	9.13	8.2
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 Keefer Creek.	76.8	1939-71 <sup>a</sup> 1973	3-11-73	6.42	1,640

\* Also a low-flow partial-record station.  
<sup>a</sup> Operated as a continuous-record gaging station.  
 < Less than.  
 a Backwater from ice.  
 c Affected by shifting control.  
 d Peak stage did not reach bottom of gage.  
 e Estimated; gage height unknown.

Annual maximum discharge at crest-stage partial-record stations during water year 1973--Continued

Annual maximum discharge at cross-stage partial-record stations during water year 1973 continued					Annual maximum		
Station No.	Station name	Location	Drainage area (sq mi)	Period of record	Annual maximum		
					Date	Gage height (feet)	Dis-charge (cfs)
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, 1965-73	9-29-73	9.04	133
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	1959-73	3-11-73	a14.57	(A)
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	1962-73	3-11-73	13.93	1,530
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	1962-73	3-11-73	a19.43	800
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	1959-73	3-11-73	a13.00	73
05384120	South Branch Root River at Lanesboro, Minn.	Lat 43°43'19", long 91°58'43", NW¼SE¼ sec.13, T.103 N., R.10 W., Fillmore County, at bridge to ball park in Lanesboro, and 2.5 miles upstream from mouth.	297	1973	1973	-	e5,000
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	1959-73	8-23-73	6.44	20
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	1959-73	3-11-73	14.89	175
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	1959-73	3-11-73	8.64	15
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	1959-73	3-11-73	12.93	900
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	1962-73	3-11-73	9.30	135
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	1961-73	3-14-73	16.28	34
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	1961-73	3-14-73	16.90	24
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	1960-73	1973	(d)	<30

\* Also a low-flow partial-record station.

/ Discharge not determined.

# Operated as a continuous-record gaging station.

&lt; Less than.

a Backwater from ice.

d Peak stage did not reach bottom of gage.

e Estimated; gage height unknown.



## Annual maximum discharge at crest-stage partial-record stations during water year 1973--Continued

Annual maximum discharge at crest-stage partial-record stations during water year 1973--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							
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	1960-73	6-18-73	13.09	7.6
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	1960-73	6-18-73	4.90	22
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, 1964-73	1973	(d)	<100
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	1960-73	6-18-73	11.35	123
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	1959-73	3-14-73	7.73	27
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	1959-73	3- 6-73	a7.48	24
*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, 1972-73	1973	(d)	<1,800
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	1959-73	9-29-73	17.19	29
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	1966-73	3-14-73	a4.89	79
Little Sioux River basin							
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	1962-73	3-14-73	a7.65	82

\* Also a low-flow partial-record station.

\* Operated as a continuous-record gaging station.

&lt; Less than.

a Backwater from ice.

d Peak stage did not reach bottom of gage.

## DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

## 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 1973

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
Red River of the North basin						
Toad River	Otter Tail River	On line between secs.29 and 32, T.137 N., R.38 W., Otter Tail County, at bridge on County Highway 8, 4.5 miles north-east of Perham, Minn.	-	1968-69	8-30-73	10.5
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, 1965-72	9-26-73	826
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	1959-72	3-15-73 4- 4-73 9- 5-73	77.2 14.2 114
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	1959-72	3-15-73 9- 5-73	15.9 6.03
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.	-	1971-72	11- 3-72	*.05
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.	-	1971-72	11- 3-72	*.24
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.	-	1971-72	11- 3-72	0
Hay Creek	Roseau River	NW¼NE¼ sec.6, T.162 N., R.39 W., Roseau County, 150 ft upstream from mouth, and 3.1 miles northeast of Roseau, Minn.	-	-	10-26-72	*1.20
Roseau River	Red River of the North	NW¼NE¼ sec.6, T.162 N., R.39 W., Roseau County, at bridge on County Road 28, about 600 ft below Hay Creek, and 3.3 miles northeast of Roseau, Minn.	-	-	10-26-72 11-28-72 1- 4-73 2- 5-73 3-12-73 4-17-73 5-15-73 6-26-73 7-24-73 8-29-73	*4.28 *10.5 *4.54 *4.77 268 *16.9 39.6 15.8 *2.56 16.0
Lake of the Woods basin						
Pike River	Vermillion Lake	Lat 47°39'36", long 92°18'54", NE¼NW¼ sec.25, T.60 N., R.16 W., St. Louis County, at bridge on County Road 373, 8.5 miles downstream from Sandy River, and 5.4 miles west of Embarrass, Minn.	115	1954-65, 1971	8-30-73	*47.5
Mississippi River main stem						
Mississippi River	Gulf of Mexico	NE¼NE¼ sec.21, T.146 N., R.30 W., Beltrami County, 300 ft below dam at outlet of Cass Lake, and 7.5 miles northeast of Cass Lake, Minn.	-	-	8-27-73 9-19-73	124 446
Mississippi River	Gulf of Mexico	NE¼NW¼ sec.10, T.146 N., R.32 W., Beltrami County, at bridge on County Road 12, 300 ft below dam, and 7.2 miles east of Bemidji, Minn.	-	-	8-27-73 9-19-73	182 628

‡ Operated as a continuous-record gaging station.  
a Approximately.

Discharge measurements made at miscellaneous sites during water year 1973--Continued

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
Sissabagamah Creek basin						
Sissabagamah Creek	Mississippi River	NW¼NE¼ sec.20, T.47 N., R.26 W., Aitkin County, at bridge on State Highway 169, 2.0 miles upstream from mouth, and 2.7 miles northeast of Aitkin, Minn.	-	-	8-29-73	*40.8
North Branch Two Rivers basin						
North Branch Two Rivers	Mississippi River	On line between secs.3 and 4, T.127 N., R.30 W., Morrison County, on county highway, 2 miles east of Elmdale, Minn.	-	1970	10-17-72 9-12-73	*2.00 *.29
Platte River basin						
Platte River	Mississippi River	Lat 45°59'43", long 94°12'31" in NE¼NE¼ sec.35, T.41 N., R.31 W., Morrison County, at bridge on County Highway 43, 4.2 miles south of Freedhem, and 5 miles northwest of Pierz, Minn.	-	-	10-19-72 9-12-73	*60.4 *27.8
Skunk River	Platte River	On line between secs.20 and 21, T.41 N., R.29 W., Morrison County, at double box culvert on County Highway 267, 2.6 miles southeast of Lastrup, Minn.	-	1969-70	10-19-72 9- 3-73	*9.00 5.88
Skunk Creek	Skunk River	On line between secs.20 and 21, T.40 N., R.30 W., Morrison County, at County Highway 239, 1.5 miles southeast of Genola, Minn.	-	1969-70	10-18-72 7- 9-73 8-10-73 9-13-73	*.45 *.35 *.24 *.12
Platte River	Mississippi River	NW¼NW¼ sec.31, T.40 N., R.31 W., Morrison County, at bridge on County Highway 35, downstream from Rice Lake, and 6 miles southeast of Little Falls, Minn.	-	1938, 1963-65, 1969-70	10-18-72 9-12-73	*164 *99.3
Platte River	Mississippi River	NE¼NW¼ sec.12, T.39 N., R.32 W., Morrison County, at bridge on County Highway 34, 4.7 miles north of Royalton, Minn.	-	1969-70	10-18-72 9-12-73	*186 *106
Crow River basin						
South Fork Crow River	Crow River	Lat 44°53'44", long 94°22'08", in SE¼SW¼ sec.31, T.117 N., R.29 W., McLeod County, at bridge on State Highways 15 and 22, at Otter Lake outlet in Hutchinson, Minn.	-	1947, 1965, 1967, 1969, 1971	3-15-73	736
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	3-16-73	2,310
Mississippi River main stem						
Mississippi River	Gulf of Mexico	Lat 45°11'30", long 93°23'40", in NW¼NW¼ sec.19, T.120 N., R.22 W., Hennepin County, at bridge on U.S. Highways 52 and 169, at Anoka, and at mile 871.3 upstream from Ohio River.	-	-	5-17-73	12,000
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, 1972	10-11-72 11- 8-72 12- 5-72 2- 6-73 4-10-73	454 456 *413 *359 *430
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, 1972	10-11-72 11- 8-72 12- 5-72 2- 6-73 4-10-73	506 494 *464 *398 *478

≠ Operated as a continuous-record gaging station.  
a Approximately.

Discharge measurements made at miscellaneous sites during water year 1973--Continued

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
Rum River basin--Continued						
Rum River	Mississippi River	Lat 45°11'54", long 93°23'28", SE½SE½ sec.1, T.31 N., R.25 W., Anoka County, at bridge on Main Street in Anoka, 450 ft downstream from dam, and 0.6 mile upstream from mouth.	1,580	1952, 1965, 1970	10-18-72 11-27-72 12-18-72 1-18-73 2-14-73 3-20-73 4-12-73 5-17-73 7-10-73 8- 2-73 8-30-73	1,020 1,090 719 780 694 5,750 1,480 1,540 *585 *573 *666
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.	-	1969-72	10-18-72 11-24-72 12-14-72 1-17-73 2-13-73 3-16-73 4-11-73 5-11-73 7- 3-73 8- 1-73 8-31-73	*21.5 *56.5 *25.6 *14.2 *10.3 138 135 95.0 *56.0 *20.7 *8.21
Mississippi River main stem						
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, 1972	8- 3-73 9-25-73	5,430 4,180
Minnesota River basin						
Eagle Lake tributary	Eagle Lake	SE½ sec.24, T.120 N., R.35 W., Kandiyohi County, at culvert on Eagle Lake Road, 5.1 miles northeast of Willmar, Minn.	-	1972	10- 6-72 10-30-72 11-17-72 1- 3-73 2- 2-73 3- 2-73 3-14-73 4- 6-73 5- 8-73 5-25-73 6-29-73 8- 3-73 9- 7-73	*.01 *.01 *.01 0 0 *.07 *.87 *.06 *.06 *.68 0 0 *.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	1972	10- 6-72 10-30-72 11-17-72 1- 3-73 2- 2-73 3- 2-73 3-14-73 4- 6-73 5- 8-73 5-25-73 6-29-73 8- 3-73 9- 7-73	*.01 0 0 0 0 0 *.24 *.01 *.01 *.01 0 0 0
Eagle Lake tributary	Eagle Lake	SW½SW½ sec.18, T.120 N., R.34 W., Kandiyohi County, at culvert on County Highway 93, 6 miles northeast of Willmar, Minn.	90.01	1972	10- 6-72 10-30-72 11-17-72 1- 3-73 2- 2-73 3- 2-73 3-14-73 4- 6-73 5- 8-73 5-25-73 6-29-73 8- 3-73 9- 7-73	*.03 *.01 0 0 0 0 *.05 0 *.05 0 0 0 0

Discharge measurements made at miscellaneous sites during water year 1973--Continued

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	SE¼SE¼ sec.18, T.120 N., R.34 W., Kandiyohi County, at culvert on County Highway 93, 6 miles northeast of Willmar, Minn.	90.03	1972	10- 6-72 10-30-73 11-17-72 1- 3-73 2- 2-73 3- 2-73 3-14-73 4- 6-73 5- 8-73 5-25-73 6-29-73 8- 3-73 9- 7-73	*.06 *.10 *.09 *.03 *.02 *.06 *.15 *.06 *.03 *.13 *.03 *.05 *.04
Eagle Lake tributary	Eagle Lake	NW¼NE¼ sec.19, T.120 N., R.34 W., Kandiyohi County, at corrugated pipe culvert on County Highway 93, 6 miles northeast of Willmar, Minn.	-	1972	10- 6-72 10-30-72 11-17-72 1- 3-73 2- 2-73 3- 2-73 3-14-73 4- 6-73 5- 8-73 5-25-73 6-29-73 8- 3-73 9- 7-73	0 0 0 0 0 0 *.01 0 0 0 0 0 0
Eagle Lake tributary	Eagle Lake	NE¼SE¼ 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.	-	1972	10- 6-72 10-30-72 11-17-72 1- 3-73 2- 2-73 3- 2-73 3-14-73 4- 6-73 5- 8-73 5-25-73 6-29-73 8-13-73 9- 7-73	*.02 *.02 *.02 0 0 0 *.02 *.13 *.03 *.01 *.17 0 0 0
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.	-	1972	10- 6-72 10-30-72 11-17-72 1- 3-73 2- 2-73 3- 2-73 3-14-73 4- 6-73 5- 8-73 5-25-73 6-29-73 8- 3-73 9- 7-73	*.03 *.02 *.02 0 0 *.07 *.51 *.02 *.02 *.27 0 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.	-	1972	10- 6-72 10-30-72 11-17-72 1- 3-73 2- 2-73 3- 2-73 3-14-73 4- 6-73 5- 8-73 5-25-73 6-29-73 8- 3-73 9- 7-73	*.01 *.01 *.01 0 0 0 *.82 *.06 *.08 *.02 0 0 0
Minnesota River	Mississippi River	NE¼NE¼ sec.21, T.110 N., R.26 W., Nicollet County, at bridge on State Highway 99, in St. Peter, Minn.	-	-	3-14-73	18,800
St. Croix River basin						
Knife River	Snake River	On line between secs.9 and 10, T.40 N., R.24 W., Kanabec County, at County Highway 8, 0.7 mile upstream from Knife Lake, and 6 miles southwest of Warman, Minn.	-	1969	11-14-72	46.7

## Discharge measurements made at miscellaneous sites during water year 1973--Continued

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
St. Croix River basin--Continued						
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	1972	11-14-72	20.3
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, 1959-72	3-30-73	13,800
Vermillion River basin						
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, 1965-72	10-16-72, 11-16-72, 12-14-72, 1-16-73, 2-12-73, 3-9-73, 4-9-73, 5-14-73, 7-2-73, 7-30-73, 9-4-73	*47.4, 60.7, 33.2, 32.4, 34.3, 600, *90.3, 109, *47.5, *57.1, *40.6
Cannon River basin						
Cannon River	Mississippi River	Lat 44°18'28", long 93°16'22", in 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	1965-72	3-20-73, 3-30-73	890, 680
Cannon River	Mississippi River	NE¼NE¼ sec.1, T.111 N., R.20 W., Rice County, at 6th Street bridge in Northfield, Minn.	-	1972	5-2-73	7,510
Mississippi River main stem						
Mississippi River	Gulf of Mexico	S¼SE¼ 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, 1972	3-19-73, 3-26-73	137,000, 89,200
Mississippi River	Gulf of Mexico	At lock and dam No. 5, Winona County, near Whitman, Minn.	58,800	1935-36, 1938, 1941, 1945, 1946, 1965-66	3-20-73, 3-27-73	138,000, 93,900
Mississippi River	Gulf of Mexico	In sec.8, T.106 N., R.5 W., Trempeleau County, at lock and dam No. 6 at Trempeleau, Wis.	-	1936-37, 1945, 1952, 1970	5-9-73, 5-15-73	80,600, 73,900
Mississippi River	Gulf of Mexico	At lock and dam No. 8, Vernon County, near Genoa, Wis.	-	1966-68	3-29-73	97,600

≠ Operated as a continuous-record gaging station.

a Approximately.

## Discharge measurements made at miscellaneous sites during water year 1973--Continued

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.	-	1963-72	10-17-72 11-20-72 3-22-73 5-10-73 6- 7-73 7-13-73 8-16-73 9-21-73	*6.00 *9.07 34.6 23.7 *15.6 *7.05 11.3 *6.10
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.	-	1963-72	10-17-72 11-20-72 3-22-73 5-10-73 6- 7-73 7-13-73 8-16-73 9-21-73	*.41 *.47 1.07 1.35 *.26 *.05 2.64 0
South Fork Bassett Creek	Bassett Creek	Near center of W½ sec.19, T.29 N., R.24 W., Hennepin County, at culvert on Olsen Memorial Highway, 0.25 mile east of State Highway 100, in Golden Valley, Minn.	-	1963-69, 1971-72	10-17-72 11-20-72 3-22-73 5-10-73 6- 7-73 7-13-73 8-16-73 9-21-73	*1.11 *.95 1.55 1.70 *.90 *.81 1.52 *.91
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, 1963-72	10-17-72 11-20-72 3-22-73 5-10-73 6- 7-73 7-13-73 8-16-73 9-21-73	*5.59 *10.6 42.1 11.0 23.1 *6.27 20.6 *6.44

## Low-flow investigations in the Little Fork River basin

Two series of discharge measurements were made to determine variations of base flow in the Little Fork River basin. The first series of measurements, made October 16-20, 1972, should be near base flow. The only precipitation for the ten days preceeding the measurements was 0.2 to 0.6 inch of rain on Oct. 10 and 11. The second series of measurements, made September 19-21, 1973, are base flow because less than 0.1 inch of rain fell in the basin for the 12 days preceeding the measurements.

Discharge measurements made in the Little Fork River basin, Minn., during water year 1973

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
Little Fork River	Rainy River	NE½NE¼ sec.19, T.62 N., R.17 W., St. Louis County, at bridge on County Road 420, 7 miles east of Cook, Minn.		1972	10-17-72 9-20-73	18.6 8.80
Little Fork River	Rainy River	SE½NE¼ 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, 1958-72	*10-17-72 9-20-73	28.2 9.33
Rice River	Little Fork River	NE½SE¼ sec.12, T.60 N., R.18 W., St. Louis County, at bridge on County Road 405, 4 miles northwest of Britt, Minn.			10-16-72 9-19-73	.24 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, 5 miles south of Angora, Minn.		1958-62, 1971-72	10-17-72 9-19-73	22.7 24.1
Johnson Creek	Rice River	SE½SE¼ 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.		1971-72	10-16-72 9-19-73	9.52 5.29
Rice River	Little Fork River	NE½SE¼ sec.30, T.61 N., R.18 W., St. Louis County, at bridge on County Highway 779, 1.1 miles west of Idington, Minn.		1971-72	10-18-72 9-19-73	37.2 26.0
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.		1971-72	10-18-72 9-19-73	34.5 28.7
Rice River	Little Fork River	SE½SW¼ sec.9, T.61 N., R.18 W., St. Louis County, at bridge on County Highway 22, 0.6 mile west of Angora, Minn.		1971-72	10-18-72 9-19-73	38.6 29.7
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, 1971-72	10-18-72 9-19-73	43.5 33.4
Rice River	Little Fork River	NW¼NE¼ sec.28, T.62 N., R.19 W., St. Louis County, at bridge on County Highway 25, 0.6 mile upstream from mouth, and 9 miles southeast of Meadow Brook, Minn.			9-20-73	43.3
Flint Creek	Little Fork River	SE½SW¼ sec.18, T.62 N., R.19 W., St. Louis County, at bridge on County Road 500, 6 miles west of Cook, Minn.		1972	10-19-72 9-20-73	9.57 5.44
Little Fork River	Rainy River	NE½NW¼ sec.16, T.62 N., R.20 W., St. Louis County, at bridge on State Highway 1, 2.5 miles east of Meadow Brook, and 8.5 miles southwest of Gheen, Minn.		1970-72	*10-19-72 9-20-73	110 52.8
Sturgeon River	Little Fork River	SW¼NE¼ sec.25, T.60 N., R.21 W., St. Louis County, 0.3 mile west of County Highway 766, above mouth of Shannon River, and 3.7 miles east of Side Lake, Minn.			10-19-72 9-20-73	57.2 39.2
Shannon River	Sturgeon River	NW¼SE¼ sec.25, T.60 N., R.21 W., St. Louis County, 0.3 mile west of County Highway 766, at mouth, and 3.8 miles east of Side Lake, Minn.			10-19-72 9-20-73	26.9 15.5
East Branch Sturgeon River	Sturgeon River	SE½SE¼ sec.1, T.59 N., R.20 W., St. Louis County, at bridge on County Highway 445, 11 miles northwest of Mountain Iron, Minn.			10-19-72 9-19-73	8.61 3.99

\* Also published under measurements made at low-flow partial-record stations.



Discharge measurements made in the Little Fork River basin, Minn., during water year 1973--Continued

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
Borlin Creek	East Branch Sturgeon River	SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec.9, T.59 N., R.20 W., St. Louis County, at bridge on State Highway 73, 7 miles north of Chisholm, Minn.			10-19-72 9-19-73	2.60 1.49
East Branch Sturgeon River	Sturgeon River	SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec.34, T.60 N., R.20 W., St. Louis County, at bridge on State Highway 73, 7.5 miles southeast of Side Lake, Minn.			10-19-72 9-19-73	13.8 9.38
Sturgeon River	Little Fork River	Lat 47°40'25", long 92°54'00", in NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec.20, T.60 N., R.20 W., St. Louis County, 1000 feet upstream from County Highway 65, and 11.5 miles north of Chisholm, Minn.	187	1942-73 <sup>*</sup>	10-18-72 9-20-73	109 66.6
Dark River	Sturgeon River	SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec.33, T.60 N., R.19 W., St. Louis County, at bridge on County Highway 25, 0.6 mile upstream from Dark Lake, and 10.5 miles northwest of Mountain Iron, Minn.			10-19-72 9-19-73	9.48 9.19
Dark River	Sturgeon River	N $\frac{1}{4}$ sec.30, T.60 N., R.19 W., St. Louis County, at bridge on County Highway 65, 1.9 miles downstream from Dark Lake, and 10 miles east of Side Lake, Minn.			10-18-72 9-19-73	15.0 11.8
Dark River	Sturgeon River	Lat 47°41'27", long 92°49'15", SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec.12, T.60 N., R.20 W., St. Louis County, on right bank 50 feet downstream from remains of abandoned highway bridge, and 12.2 miles northeast of Chisholm, Minn.	50.6	1942-61 <sup>*</sup> 1966-72	10-18-72 9-19-73	21.7 18.6
Sturgeon River	Little Fork River	NW $\frac{1}{4}$ NE $\frac{1}{4}$ sec.3, T.61 N., R.20 W., St. Louis County, at bridge on County Highway 111, 0.5 mile downstream from Dark River, and 9.8 miles west of Idington, Minn.			10-18-72 9-20-73	148 90.8
Sturgeon River	Little Fork River	SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec.35, T.62 N., R.21 W., St. Louis County, at bridge on County Road 87, 6 miles southwest of Meadow Brook, Minn.		1972	10-18-72 9-20-73	169 100
Sand Creek	Sturgeon River	NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec.3, T.61 N., R.21 W., St. Louis County, at bridge on County Road 87, 5 miles southwest of Meadow Brook, Minn.		1972	10-18-72 9-20-73	9.54 4.61
Bear River	Sturgeon River	SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec.3, T.60 N., R.23 W., Itasca County, at culvert on County Highway 52, 11.5 miles northwest of Side Lake, Minn.		1972	10-16-72 9-21-73	11.9 7.19
Bear River tributary	Bear River	SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec.6, T.60 N., R.23 W., Itasca County, at culvert on County Road 544, 13.5 miles northwest of Side Lake, Minn.		1972	10-16-72 9-21-73	4.89 3.25
Bear River tributary No. 2	Bear River	NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec.6, T.60 N., R.23 W., Itasca County, at culverts on County Road 544, 14 miles northwest of Side Lake, Minn.		1972	10-16-72 9-21-73	2.47 1.74
Bear River tributary	Bear River	NW $\frac{1}{4}$ SE $\frac{1}{4}$ sec.22, T.61 N., R.23 W., Itasca County, at bridge on the Dahlberg Road, 7 miles southwest of Togo, Minn.		1972	10-16-72 9-21-73	6.63 1.90
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.		1972	10-17-72 9-21-73	41.6 24.0
Bear River	Sturgeon River	SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec.14, T.61 N., R.22 W., Itasca County, at bridge on County Highway 528, 1.2 miles southwest of Bear River, Minn.			10-17-72 9-21-73	55.8 35.1
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.		1972	10-17-72 9-21-73	7.48 3.80

<sup>\*</sup> Continuous-record gaging station.

Discharge measurements made in the Little Fork River basin, Minn., during water year 1973--Continued

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Data	Discharge (cfs)
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.		1970-72	*10-17-72 9-21-73	68.6 40.2
Sturgeon River	Little Fork River	On line between sec.9 and 16, T.62 N., R.21 W., St. Louis County, at bridge on State Highway 1, 6 miles northeast of Togo, Minn.		1970-72	*10-19-72 9-20-73	146 168
Little Fork River	Rainy River	SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec.33, T.63 N., R.21 W., St. Louis County, at bridge on County Highway 114, 4.7 miles northwest of Meadow Brook, Minn.			10-20-72 9-21-73	268 240
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.		1972	10-20-72 9-21-73	5.22 2.72
Willow River	Little Fork River	SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec.2, T.63 N., R.22 W., Koochiching County, 0.5 mile upstream from mouth, and 1.2 miles south of Silverdale, Minn.			10-20-72 9-21-73	15.8 3.40
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.		1972	10-18-72 9-19-73	412 237
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.		1972	10-17-72 9-21-73	5.38 1.13
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.		1970-72	*10-20-72 9-21-73	12.9 6.19
Prairie Creek	Little Fork River	N $\frac{1}{4}$ sec.30, T.64 N., R.22 W., Koochiching County, about 1.5 miles upstream from mouth, and 4 miles northwest of Rauch, Minn.			10-20-72	10.3
Little Fork River	Rainy River	SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec.31, T.65 N., R.23 W., Koochiching County, 1.5 miles downstream from Gardner Brook, and 12 miles southwest of Nett Lake, Minn.			10-18-72 9-19-73	481 229
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.		1972	10-18-72 9-19-73	532 269
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.		1972	10-18-72 9-19-73	73.1 .54
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.		1970-72	*10-17-72 9-20-73	71.5 2.35
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.		1972	10-18-72 9-20-73	2.90 .54
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.		1972	10-17-72 9-20-73	14.0 8.38
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.		1972	10-17-72 9-20-73	17.8 3.21

\* Also published under measurements made at low-flow partial-record stations.

Discharge measurements made in the Little Fork River basin, Minn., during water year 1973--Continued

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
Beaver Brook	Little Fork River	On line between secs.2 and 11, T.68 N., R.25 W., Koochiching County, at bridge on State Highway 217, 1.5 miles east of Littlefork, Minn., and 1.6 miles upstream from mouth.		1970-72	*10-16-72 9-20-73	30.4 5.44
Little Fork River	Rainy River	NW¼NW¼ sec.6, T.69 N., R.25 W., Koochiching County, 2.3 miles southwest of Pelland, Minn., and about 4 river miles upstream from mouth.			10-17-72	764

\* Also published under measurements made at low-flow partial-record stations.

## LOW-FLOW INVESTIGATIONS

## Low-flow investigations in the Des Moines River basin

Nine discharge measurements were made in the Des Moines River basin during Oct. 10-12, 1972 to study variations of base flow. No measurable precipitation was recorded in the area following Oct. 6, when rainfall averaged about 1.4 inches. There was sufficient time after the Oct. 6 rain for most surface runoff to be drained, therefore all discharges should represent base flow.

## Discharge measurements made in the Des Moines River basin, Minn., Oct. 10-12, 1972

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
Beaver Creek	Des Moines River	Lat 44°03'30", long 95°43'08", in NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec.24, T.107 N., R.41 W., Murray County, at bridge on county road, 2.8 miles southwest of Currie, Minn.		1969-70, 1972	*10-10-72	6.85
Lime Creek	Des Moines River	Lat 43°56'58", long 95°31'71", at Common Corner of secs.27, 28, and 33, 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, Minn.		1969-70, 1972	*10-10-72	3.84
Des Moines River	Mississippi River	Lat 44°03'30", long 95°43'08", 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, 1972	10-10-72	16.0
Okabena Creek	Heron Lake Outlet	Lat 43°44'38", long 95°18'54", on line between secs.7 and 8, T.103 N., R.37 W., Jackson County, at bridge on County Highway 9, 0.3 mile north of Okabena, Minn.		1969-70	*10-11-72	5.89
Jack Creek	Heron Lake Outlet	Lat 43°46'10", long 95°18'54", on line between secs.31 and 32, T.104 N., R.37 W., Jackson County, at bridge on County Highway 9, 1.8 miles south of Heron Lake, Minn.		1969-70	*10-11-72	4.80
Heron Lake Outlet	Des Moines River	Lat 43°48'10", long 95°16'30", on line between secs.21 and 22, T.104 N., R.37 W., Jackson County, 0.5 mile downstream from outlet dam, 12 miles upstream from Des Moines River, and 2 miles east of Heron Lake, Minn.	457	1930-43	*10-11-72	8.37
Des Moines River	Mississippi River	Lat 43°51'30", long 95°06'55", in NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec.36, T.105 N., R.36 W., Cottonwood County, at bridge on State Highway 60, and at Windom, Minn.		1946, 1961, 1969	10-11-72	34.8
East Fork Des Moines River	Des Moines River	Lat 43°34'08", long 94°38'04", on line between secs.11 and 12, T.101 N., R.32 W., Martin County, at bridge on County Highway 67, 2.4 miles north of Ceylon, Minn.	a155	1971-72	*10-12-72	2.97
Des Moines River	Mississippi River	Lat 43°33'42", long 94°57'14", on line between secs.7 and 8, T.101 N., R.35 W., Jackson County, at bridge on County Highway 25, 0.2 mile downstream from Stony Brook, and 4.4 miles southwest of Jackson, Minn.	a1270		10-12-72	48.8

\* Also published under measurements made at low-flow partial-record stations.  
 ≠ Continuous-record gaging station.

## Low-flow investigations in the Big Sioux and Little Sioux River basins

Seventeen discharge measurements were made in the Big Sioux and Little Sioux River basins during Oct. 12-14, 1972. The measurements were made to further define how base flow varies in southwestern Minnesota. No measurable precipitation was recorded in the area following Oct. 6, when rainfall averaged about 1 inch. There was sufficient time after the Oct. 6 rain for any surface runoff to be drained before the small streams were measured, therefore all flows are considered ground-water effluent.

Discharge measurements made in the Big Sioux and Little Sioux River basins, Minn., Oct. 12-14, 1972

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
Flandreau Creek	Big Sioux River	Lat 44°04'54", long 96°26'27", in NE¼NW¼ sec.13, T.107 N., R.47 W., Pipestone County, at bridge on County Highway 13, 3.5 miles northwest of Cazenovia, Minn.	92.2	1971	*10-14-72	3.74
Pipestone Creek	Split Rock Creek	Lat 43°58'49", long 96°26'08", on line between secs.13 and 24, T.106 N., R.47 W., Pipestone County, at bridge on County Highway 55, 6.1 miles southwest of Pipestone, Minn.	113	1971	*10-14-72	4.10
Split Rock Creek	Big Sioux River	Lat 43°46'36", long 96°26'13", on line between secs.26 and 35, T.104 N., R.47 W., Rock County, at bridge on county road, 5.4 miles southwest of Jasper, Minn.	310	1969-70	*10-13-72	11.6
Beaver Creek	Big Sioux River	Lat 43°39'35", long 96°18'51", on line between secs.2 and 11, T.102 N., R.46 W., Rock County, at bridge on County Highway 5, 5.4 miles west of Luverne, Minn.	35.5	1969-70	*10-13-72	0.31
Little Beaver Creek	Beaver Creek	Lat 43°39'36", long 96°16'50", on line between secs.6 and 7, T.102 N., R.45 W., Rock County, at bridge on County Highway 5, 3.8 miles west of Luverne, Minn.	12.8	1969-70	*10-13-72	0
Beaver Creek	Big Sioux River	Lat 43°35'31", long 96°25'55", on line between secs.35 and 36, T.102 N., R.47 W., Rock County, at bridge on State Highway 23, 3.8 miles southwest of Beaver Creek, Minn.	84.6	1969-70	*10-13-72	1.50
Rock River	Big Sioux River	Lat 43°52'14", long 96°08'27", in SW¼NW¼ sec.28, T.105 N., R.44 W., Pipestone County, at bridge on County Highway 10, 1.7 miles upstream from Chanarambie Creek, and at west edge of Edgerton, Minn.	121	1969-70	*10-14-72	4.42
Chanarambie Creek	Rock River	Lat 43°52'14", long 96°07'23", in NW¼SW¼ sec.27, T.105 N., R.44 W., Pipestone County, at bridge on County Highway 1, 1 mile upstream from mouth, and in Edgerton, Minn.	72.0	1969-70	*10-14-72	1.80
Rock River	Big Sioux River	Lat 43°43'04", long 96°09'51", on line between secs.18 and 19, T.103 N., R.44 W., Rock County, at bridge on County Highway 8, 4.3 miles southeast of Hardwick, Minn.	312	1969-70	*10-14-72	14.8
Champepadan Creek	Rock River	Lat 43°30'01", long 96°07'59", in NE¼SE¼ sec.20, T.103 N., R.44 W., Rock County, at bridge on County Highway 9, 1.2 miles upstream from mouth, and 5.8 miles southeast of Hardwick, Minn.	75.5	1969-70	*10-13-72	3.94
Elk Creek	Rock River	Lat 43°36'11", long 96°10'22", on line between sec.25, T.102 N., R.45 W., and sec.30, T.102 N., R.44 W., Rock County, at bridge on County Highway 9, 4 miles southeast of Luverne, Minn.	62.0	1969-70	*10-13-72	2.00
Ash Creek	Rock River	Lat 43°32'57", long 96°11'46", in NE¼SE¼ sec.14, T.101 N., R.45 W., Rock County, at bridge on county road, 0.7 mile north of Ash Creek, Minn.	13.4	1969-70	*10-13-72	0

\* Also published under measurements made at low-flow partial-record stations.

Discharge measurements made in the Big Sioux and Little Sioux River basins, Minn., Oct. 12-14, 1972--Continued

Stream	Tributary to	Location	Drainage area (sq mi)	Measured previously (water years)	Measurements	
					Date	Discharge (cfs)
Kanaranzi Creek	Rock River	Lat 43°30'01", long 96°07'12", on line between sec.4, T.100 N., R.44 W., and sec.33, T.101 N., R.44 W., Rock County, at bridge on county road on Iowa-Minnesota border, 5.3 miles southwest of Kanaranzi, Minn.	192	1969-70	*10-13-72	7.02
Mud Creek	Rock River	Lat 43°30'53", long 96°20'27", on line between secs.27 and 34, T.101 N., R.46 W., Rock County, at bridge on county road, 1.2 miles southeast of Hills, Minn.	25.9	1969-70	*10-13-72	0
Little Rock River	Rock River	Lat 43°30'00", long 95°50'57", in SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec.35, T.101 N., R.42 W., Nobles County, at bridge on county road on Iowa-Minnesota border, 8 miles west of Bigelow, Minn.	91.5	1971	*10-12-72	1.21
Little Sioux River	Big Sioux River	Lat 43°36'08", long 95°15'27", in NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec.34, T.102 N., R.37 W., Jackson County, at bridge on county road, 1.6 miles downstream from Jackson County ditch No. 11, and 5.8 miles east of Spafford, Minn.	41.1	1962-67 1969-70	*10-12-72	0.27
West Fork Little Sioux River	Little Sioux River	Lat 43°30'02", long 95°16'46", in SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec.33, T.101 N., R.37 W., Jackson County, at bridge on County Highway 62, 3.3 miles southeast of Sioux Valley, Minn.	106	1971	*10-12-72	1.49

\* Also published under measurements made at low-flow partial-record stations.

## PART 2. WATER QUALITY RECORDS

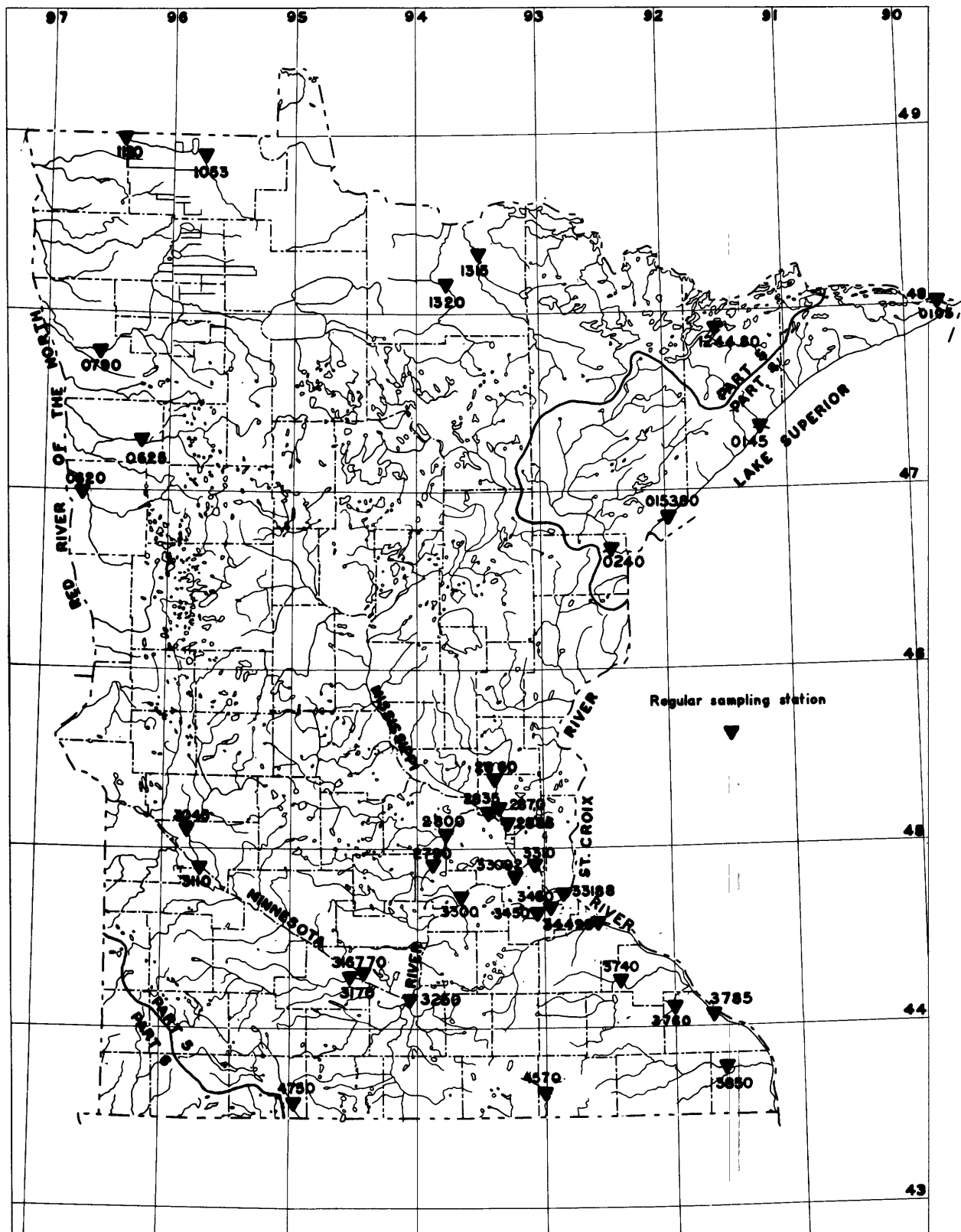


Figure 3.-- Map showing location of water-quality stations.



## 04010500 PIGEON RIVER AT MIDDLE FALLS, NEAR GRAND PORTAGE, MINN.

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 (122 m) upstream from Middle Falls, 2.5 mi (4.0 km) upstream from Grand Portage Port of Entry, 3.5 mi (5.6 km) upstream from mouth, and 4.7 mi (7.6 km) northeast of village of Grand Portage.

DRAINAGE AREA.--600 mi<sup>2</sup> (1,554 km<sup>2</sup>).

PERIOD OF RECORD.--Water temperatures: October 1970 to September 1973.

EXTREMES, current year.--Water temperatures: Maximum, 21.5°C July 9; minimum, freezing point on many days during winter period.

Period of record.--Water temperatures: Maximum, 22.0°C Aug. 20, 1972; minimum, freezing point on many days during winter period.

TEMPERATURE (DEG. C) OF WATER , WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973  
INSTANTANEOUS OBSERVATIONS AT 9:00 AM

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	3.5	---	---	---	---	---	7.0	13.5	---	17.5	---
2	8.0	4.5	---	---	---	---	0.5	4.5	---	17.0	17.5	---
3	8.5	0.5	---	1.0	---	---	0.5	2.5	---	18.5	17.5	---
4	10.5	---	---	---	---	---	0.5	3.5	13.5	---	---	---
5	10.5	---	---	---	---	---	0.5	---	15.0	18.5	---	19.0
6	9.0	3.0	---	---	0.0	---	0.5	---	16.5	19.0	---	---
7	---	3.5	---	---	---	---	---	8.5	16.0	---	---	---
8	---	1.5	---	---	---	---	---	8.0	14.5	---	---	---
9	---	1.5	---	---	---	---	0.0	8.0	---	21.5	---	---
10	5.5	2.0	---	---	---	---	0.0	9.5	---	20.5	---	---
11	7.5	---	---	---	---	---	0.5	10.0	17.0	---	---	---
12	6.0	---	---	---	---	---	0.5	---	16.0	20.0	---	---
13	6.5	0.0	---	---	---	0.5	1.0	---	16.5	19.0	---	---
14	---	0.0	---	---	---	---	---	6.5	17.0	---	---	---
15	---	---	---	---	---	---	---	7.5	16.0	---	---	---
16	5.0	---	---	---	---	---	2.5	7.5	---	18.5	---	---
17	2.5	---	---	---	---	---	1.0	7.5	---	18.5	---	---
18	0.5	---	---	---	---	---	2.5	8.5	13.5	20.0	---	---
19	0.5	---	---	---	---	---	4.5	---	14.5	20.5	---	---
20	1.0	---	---	---	---	---	5.5	---	16.0	20.5	---	---
21	---	---	---	---	---	---	---	11.5	17.0	---	---	---
22	---	---	---	---	---	---	---	12.5	17.0	---	---	---
23	---	---	---	---	---	---	5.0	12.5	---	19.5	---	---
24	1.0	---	---	---	---	---	4.5	13.5	---	19.5	---	---
25	1.5	---	---	---	---	---	4.5	12.5	17.5	18.5	---	---
26	3.5	---	---	---	---	---	5.5	---	17.5	19.5	---	---
27	6.0	---	---	---	---	---	5.5	---	17.5	17.5	---	---
28	---	0.0	---	---	---	---	---	---	16.5	---	---	---
29	---	---	---	---	---	---	---	13.0	15.5	---	---	---
30	1.5	---	---	---	---	---	6.5	13.0	---	17.0	---	---
31	2.5	---	---	---	---	---	---	14.5	---	16.5	---	---

## STREAMS TRIBUTARY TO LAKE SUPERIOR

04014500 BAPTISM RIVER NEAR BEAVER BAY, MINN.

LOCATION.--Lat 47°20'15", long 91°12'00", in SE¼NE¼ sec.15, T.56 N., R.7 W., Lake County, at gaging station on right bank 30 ft (9 m) upstream from bridge on U.S. Highway 61, 0.2 mi (0.3 km) upstream from mouth, 4 mi (6 km) northeast of Silver Bay, and 7 mi (11 km) northeast of village of Beaver Bay.

DRAINAGE AREA.--140 mi<sup>2</sup> (363 km<sup>2</sup>).

PERIOD OF RECORD.--Water temperatures: October 1970 to September 1973.

EXTREMES, current year.--Water temperatures: Maximum, 23.5°C July 7, 8; minimum, freezing point on many days during winter period.

Period of record.--Water temperatures: Maximum, 23.5°C July 7, 8, 1973; minimum, freezing point on many days during winter period.

TEMPERATURE (°C) OF WATER, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973  
(ONCE-DAILY MEASUREMENT AT ABOUT 0800)

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.5	4.5	1.5	---	---	---	3.0	6.0	15.0	16.5	20.0	---
2	6.5	3.0	1.0	1.0	---	---	3.0	4.5	14.5	18.0	20.0	---
3	6.5	2.5	1.0	---	---	---	3.0	4.0	12.5	20.0	20.0	---
4	7.0	2.5	1.0	---	---	---	3.0	5.0	13.0	20.0	21.0	---
5	7.0	2.5	1.0	---	0.5	---	3.0	5.5	13.0	21.5	21.0	---
6	9.0	3.0	1.0	---	---	---	3.5	6.5	13.5	22.0	21.0	18.0
7	10.0	3.5	2.0	---	---	---	2.0	8.5	---	23.5	---	---
8	10.0	3.0	2.0	---	---	---	1.0	9.5	---	23.5	---	---
9	9.0	2.5	2.0	---	---	---	1.0	10.0	---	20.5	---	---
10	9.0	2.5	2.0	---	---	---	2.0	10.0	---	22.5	---	---
11	10.0	2.5	1.0	---	---	0.5	3.0	10.0	---	23.0	---	---
12	9.0	2.5	1.0	---	---	0.5	4.0	9.5	---	19.5	---	---
13	8.0	2.5	2.0	---	---	0.5	5.0	6.0	18.5	21.5	---	---
14	6.0	2.0	2.0	---	---	0.5	5.5	10.0	19.0	23.0	---	---
15	6.0	2.0	2.0	---	---	1.5	5.0	11.5	19.5	22.0	---	---
16	5.5	2.0	2.0	---	---	1.5	3.5	11.0	17.5	22.5	---	---
17	3.5	2.0	---	---	---	1.0	4.0	11.5	12.5	22.5	---	---
18	3.5	1.0	---	---	---	1.5	5.5	11.5	14.5	22.5	---	---
19	3.5	1.0	---	---	---	1.5	5.5	12.0	15.5	22.5	---	---
20	3.5	1.0	---	---	---	2.0	5.5	13.0	15.5	20.0	---	---
21	3.5	1.0	---	---	---	2.5	5.5	14.5	15.5	21.0	---	---
22	4.5	1.5	---	---	---	2.5	5.5	12.5	15.0	21.0	---	---
23	3.5	1.5	---	---	---	2.0	5.0	11.5	15.0	19.0	---	---
24	4.5	2.0	---	---	---	2.0	6.0	10.0	16.0	15.5	---	---
25	5.0	2.0	---	---	---	2.0	8.0	8.0	15.0	21.5	---	---
26	5.5	2.0	---	---	---	2.0	8.5	9.0	14.0	19.5	---	---
27	5.0	1.0	---	---	---	2.5	8.5	9.5	16.0	17.0	---	---
28	5.0	1.0	---	---	---	2.5	7.5	12.0	16.0	16.0	---	---
29	5.0	2.0	---	---	---	2.0	5.0	14.5	16.5	17.5	---	---
30	4.5	1.5	---	---	---	2.5	5.0	15.0	16.0	18.5	---	---
31	4.5	---	---	---	---	2.5	---	15.0	---	20.0	---	---



## 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 mi (6.1 km) northeast of the Lester River and 10 mi (16 km) northeast of Duluth post office.

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	DATE ILLEGAL CODE	TIME	TEMPER- ATURE (DEG C)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHMS)	TUR- BID- ITY (JTU)	COLOR (PLAT- INUM- COBALT UNITS)	DIS- SOLVED OXYGEN (MG/L)	PER- CENT SATUR- ATION	BIO- CHEM- ICAL OXYGEN DEMAND (MG/L)	PH (UNITS)	ALKA- LITY AS CACU3 (MG/L)	HARD- NESS (CA, MG) (MG/L)
OCT., 1972												
02...	--	0845	7.2	90	2	0	12.0	101	.3	7.8	43	44
10...	--	0815	8.0	90	1	<5	11.8	102	.3	7.9	43	44
16...	--	0900	6.7	92	1	0	11.8	0	.3	7.8	43	44
24...	--	0830	5.6	92	4	0	12.4	100	.3	7.9	43	44
24...	--	1400	--	--	--	--	--	--	--	--	--	--
30...	--	0825	5.6	92	1	0	12.3	99	.4	7.9	43	44
NOV.												
06...	--	0815	5.5	90	3	0	12.5	101	.5	7.9	43	44
11...	--	0815	5.0	95	3	5	12.4	100	.3	7.9	43	44
13...	--	0815	5.0	100	2	5	12.4	100	.4	7.9	43	44
27...	--	0810	4.4	90	1	0	12.6	--	.2	7.9	43	44
27...	--	1145	4.5	--	--	--	--	--	--	--	--	--
DEC.												
04...	--	0820	3.9	90	0	0	12.8	99	.2	7.9	43	44
12...	--	0815	3.3	92	0	0	12.8	98	.2	7.9	43	44
18...	--	0810	2.8	90	0	0	13.1	98	.3	7.9	43	44
26...	--	0810	1.7	95	1	0	13.5	98	.2	7.9	43	44
JAN., 1973												
02...	--	0830	1.7	92	3	0	13.4	--	.3	7.9	43	44
02...	--	1030	1.5	--	--	--	--	--	--	--	--	--
08...	--	0820	1.5	92	3	0	13.4	98	.2	8.0	43	44
15...	--	0815	1.7	92	3	0	13.2	96	.2	7.8	43	44
22...	--	0810	1.1	90	3	0	13.8	99	.1	8.0	44	44
29...	--	0830	1.1	90	2	0	13.6	98	.2	7.9	43	44
FEB.												
05...	--	0810	1.1	90	2	0	14.0	--	.1	8.0	43	44
05...	--	1020	1.1	--	--	--	--	--	--	--	--	--
12...	--	0830	1.1	92	1	0	14.2	102	.2	7.9	43	44
26...	--	0815	1.1	90	0	0	14.0	101	.2	7.9	43	44
MAR.												
05...	--	0810	1.1	90	0	0	14.1	101	.2	8.0	43	44
12...	--	0815	1.1	95	0	0	13.8	--	.1	8.0	43	44
12...	--	1120	1.0	97	--	--	--	--	--	--	--	--
19...	--	0805	1.1	90	0	0	14.0	101	.3	8.0	43	44
26...	--	0815	1.1	92	0	0	13.9	100	.1	7.8	43	44
APR.												
02...	--	0810	1.1	98	2	0	13.8	99	.1	7.8	43	44
09...	--	0830	1.1	95	2	0	13.9	0	.3	7.9	43	44
16...	--	0815	1.1	90	1	0	13.6	--	.3	7.9	43	44
16...	--	1314	1.0	93	--	--	--	--	--	--	--	--
23...	--	0840	1.7	90	0	0	13.7	100	.2	7.9	43	44
30...	--	0810	2.0	90	0	<5	13.6	100	.4	8.0	43	44
MAY												
07...	--	0900	2.0	93	1	<5	13.5	99	.2	8.0	44	44
14...	--	0830	2.8	90	1	0	13.6	102	.2	8.0	43	44
21...	--	0830	3.3	92	0	0	13.5	--	.2	7.8	43	44
21...	--	1400	3.5	96	--	--	--	--	--	--	--	--
29...	--	0930	3.3	100	2	0	13.4	102	.2	7.9	43	44
JUNE												
04...	--	0830	3.9	92	2	0	13.2	102	.3	7.8	43	44
11...	--	0810	4.4	92	1	5	13.3	105	.2	8.0	43	44
18...	--	0830	5.0	95	2	0	13.1	105	.3	8.1	43	44
25...	--	0930	5.0	92	1	5	13.1	105	.2	7.9	43	44
JULY												
02...	--	0830	5.0	98	1	5	13.0	104	.2	7.9	45	45
09...	--	0845	6.0	90	1	5	13.0	107	.2	8.0	43	44
16...	--	0800	6.1	100	1	5	12.8	105	.3	8.0	4	44
23...	--	0815	15.6	95	1	5	10.5	106	.4	8.1	43	44
30...	--	0830	9.0	100	0	<5	12.1	106	.2	8.0	43	44
30...	--	1400	9.4	94	--	--	--	--	--	--	--	--
AUG.												
06...	--	0915	12.2	90	1	0	11.5	108	.4	8.2	43	44
13...	--	0845	--	90	1	5	--	106	.3	8.0	43	44
20...	--	0820	15.0	--	1	5	11.0	110	.3	8.1	43	43
27...	--	0830	16.0	95	0	5	10.3	0	.3	7.9	43	44
SEP.												
11...	--	0845	7.0	95	0	--	12.4	104	.3	7.8	43	44
17...	--	0830	8.3	90	1	5	12.1	105	.4	7.9	43	44
24...	--	0900	11.0	92	0	<5	11.5	106	.1	8.0	43	44

## 04015380 LAKE SUPERIOR AT DULUTH, MINN.--Continued

PERIOD OF RECORD.--Chemical analyses: August 1969 to current year.

REMARKS.--Some analyses furnished by City of Duluth, Water, Gas, and Sewage Treatment Department and Water Quality office, Environmental Protection Agency.

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	DIS- SOLVED SODIUM (NA) (MG/L)	DIS- SOLVED POT- TAS- SIUM (K) (MG/L)	DIS- SOLVED CHLOR- IDE (CL) (MG/L)	DIS- SOLVED SULFATE (SO4) (MG/L)	DIS- SOLVED FLUOR- IDE (F) (MG/L)	AMMONIA NITRO- GEN (N) (MG/L)	ORGANIC NITRO- GEN (N) (MG/L)	DIS- SOLVED NITRITE (N) (MG/L)	DIS- SOLVED NITRATE (N) (MG/L)	TOTAL PHOS- PHORUS (P) (MG/L)	DIS- SOL- VED- PHOS- PHORUS (P) (MG/L)	IMME- DIATE COLI- FORM (COL, PER 100 ML)
OCT., 1972												
02...	--	--	1.5	4.7	--	--	--	--	--	--	--	23
10...	--	--	1.3	4.3	--	--	--	--	--	--	--	22
16...	--	--	1.5	3.8	--	--	--	--	--	--	--	3
24...	--	--	1.3	4.2	--	--	--	--	--	--	--	15
24...	--	--	--	--	.2	--	.13	.00	.28	.04	.02	--
30...	--	--	1.3	3.8	--	--	--	--	--	--	--	3
NOV.												
06...	--	--	1.5	4.2	--	--	--	--	--	--	--	76
11...	--	--	1.3	4.3	--	--	--	--	--	--	--	14
13...	--	--	1.3	3.1	--	--	--	--	--	--	--	15
27...	--	--	1.3	4.3	--	--	--	--	--	--	--	14
27...	--	--	--	--	--	--	.77	.00	.28	.03	.02	--
DEC.												
04...	--	--	1.3	3.2	--	--	--	--	--	--	--	11
12...	--	--	1.3	4.2	--	--	--	--	--	--	--	0
18...	--	--	1.3	3.4	--	--	--	--	--	--	--	2
26...	--	--	1.3	2.9	--	--	--	--	--	--	--	3
JAN., 1973												
02...	--	--	1.3	3.8	--	--	--	--	--	--	--	2
02...	--	--	--	--	--	.01	.17	.00	.30	.04	.04	--
08...	--	--	1.3	3.8	--	--	--	--	--	--	--	1
15...	--	--	1.5	2.8	--	--	--	--	--	--	--	1
22...	--	--	1.3	3.2	--	--	--	--	--	--	--	1
29...	--	--	1.3	2.9	--	--	--	--	--	--	--	1
FEB.												
05...	--	--	1.2	3.6	--	--	--	--	--	--	--	0
05...	--	--	--	--	.5	.00	.11	.01	.30	.03	.03	--
12...	--	--	1.3	3.8	--	--	--	--	--	--	--	0
26...	--	--	1.3	3.6	--	--	--	--	--	--	--	0
MAR.												
05...	--	--	1.0	4.3	--	--	--	--	--	--	--	0
12...	--	--	1.3	3.6	--	--	--	--	--	--	--	2
12...	--	--	--	--	.1	.01	.20	.01	.26	.06	.06	--
19...	--	--	1.3	4.2	--	--	--	--	--	--	--	19
26...	--	--	1.5	4.3	--	--	--	--	--	--	--	5
APR.												
02...	--	--	1.3	3.2	--	--	--	--	--	--	--	2
04...	--	--	1.5	3.4	--	--	--	--	--	--	--	1
16...	--	--	1.5	4.1	--	--	--	--	--	--	--	3
16...	--	--	--	--	--	.01	.13	.02	.25	.66	.66	--
23...	--	--	1.5	3.2	--	--	--	--	--	--	--	0
30...	--	--	1.5	4.0	--	--	--	--	--	--	--	0
MAY												
07...	--	--	1.5	3.4	--	--	--	--	--	--	--	0
14...	--	--	1.5	4.3	--	--	--	--	--	--	--	0
21...	--	--	1.3	3.8	--	--	--	--	--	--	--	0
21...	1.2	.5	--	--	.0	.01	.04	.00	.26	.03	.03	--
29...	--	--	1.3	4.2	--	--	--	--	--	--	--	0
JUNE												
04...	--	--	1.5	4.8	--	--	--	--	--	--	--	24
11...	--	--	1.5	3.6	--	--	--	--	--	--	--	0
18...	--	--	1.5	3.8	--	--	--	--	--	--	--	0
25...	--	--	1.5	3.8	--	--	--	--	--	--	--	0
JULY												
02...	--	--	1.5	2.7	--	--	--	--	--	--	--	4
09...	--	--	1.5	2.5	--	--	--	--	--	--	--	0
16...	--	--	1.5	4.6	--	--	--	--	--	--	--	1
23...	--	--	1.5	4.0	--	--	--	--	--	--	--	0
30...	--	--	1.5	4.2	--	.02	.11	--	--	--	--	0
30...	--	--	--	--	.0	.02	.11	.00	.23	.02	.01	--
AUG.												
06...	--	--	1.5	5.7	--	--	--	--	--	--	--	1
13...	--	--	1.5	3.2	--	--	--	--	--	--	--	6
20...	--	--	1.0	3.5	--	--	--	--	--	--	--	8
27...	--	--	1.5	4.7	--	--	--	--	--	--	--	11
SEP.												
11...	--	--	1.5	3.8	--	--	--	--	--	--	--	52
17...	--	--	1.5	4.0	--	--	--	--	--	--	--	40
24...	--	--	1.5	4.0	--	--	--	--	--	--	--	21

## RED RIVER OF THE NORTH BASIN

05105300 ROSEAU RIVER BELOW ROSEAU, MINN.

LOCATION.--Lat 48°53'28", long 95°43'50", in SW¼SE¼ sec.31, T.163 N., R.39 W., Roseau County, at bridge on County Highway 28, 900 ft (2.74 m) downstream from Hay Creek and 3.2 mi (5.1 km) northeast of Roseau.

PERIOD OF RECORD.--Chemical analyses: October 1972 to September 1973.

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	TEMPER- ATURE (DEG C)	DIS- CHARGE (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	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)	COLOR (PLAT- INUM- CUBALT UNITS)	PH (UNITS)	CAR- BONATE (CO3) (MG/L)	BICAR- BONATE (HCO3) (MG/L)	ALKA- LITY AS CaCO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)
OCT. 26...	6.5	4.3	612	352	360	4.09	40	8.1	0	304	249	3.9
NOV. 28...	4.0	11	488	264	277	8.74	40	7.5	0	285	234	14
JAN. 04...	--	4.5	690	400	382	4.86	40	7.2	0	370	303	37
FEB. 05...	.0	4.7	724	438	418	5.64	30	6.9	0	361	296	73
MAR. 12...	1.5	268	268	203	153	147	90	7.8	0	143	117	3.6
APR. 17...	5.0	16	469	273	260	12.5	30	8.6	0	259	212	1.0
MAY 15...	13.0	39	425	264	234	28.2	30	7.5	0	252	207	13
JUNE 26...	22.0	15	414	270	237	11.5	40	9.1	0	257	211	.3
JULY 24...	19.8	2.5	505	327	296	2.27	30	8.3	0	301	247	2.4
AUG. 29...	20.5	16	476	296	272	12.8	30	8.8	0	276	226	.7

DATE	DIS- SOLVED CAL- CIUM (CA) (MG/L)	DIS- SOLVED MAG- NE- SIUM (MG) (MG/L)	HARD- NESS (CA,MG) (MG/L)	NON- CAR- BONATE HARD- NESS (MG/L)	DIS- SOLVED SODIUM (NA) (MG/L)	SODIUM AD- SORP- TION RATIO	PERCENT SODIUM	DIS- SOLVED PO- TAS- SIUM (K) (MG/L)	DIS- SOLVED CHLO- RIDE (CL) (MG/L)	DIS- SOLVED SULFATE (SO4) (MG/L)	DIS- SOLVED FLUO- RIDE (F) (MG/L)
OCT. 26...	66	26	270	22	34	.9	21	3.8	30	36	.5
NOV. 28...	57	22	230	0	16	.5	13	.8	11	13	.3
JAN. 04...	72	27	290	0	31	.8	19	2.9	25	20	.4
FEB. 05...	67	27	280	0	43	1.1	25	3.7	42	35	.1
MAR. 12...	27	11	110	0	3.9	.2	6	8.5	5.6	13	.4
APR. 17...	53	20	210	2	16	.5	14	3.1	12	19	.3
MAY 15...	53	19	210	4	9.3	.3	9	2.0	7.4	14	.0
JUNE 26...	49	19	200	0	11	.3	11	1.6	5.2	11	.3
JULY 24...	58	25	250	1	18	.5	14	1.9	13	20	.3
AUG. 29...	53	22	220	0	17	.5	14	3.3	9.8	14	.3

05105300 ROSEAU RIVER BELOW ROSEAU, MINN.--Continued

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	DIS- SOLVED BORON (B) (UG/L)	DIS- SOLVED IRON (FE) (UG/L)	DIS- SOLVED MANG- NESE (MN) (UG/L)	DIS- SOLVED SILICA (SIO2) (MG/L)	DIS- SOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL PHOS- PHORUS (P) (MG/L)	DIS- SOLVED OXYGEN (MG/L)	HIU- CHEM- ICAL OXYGEN DEMAND (MG/L)	IMME- DIATE COLI- FORM (COL. PER 100 ML)	FECAL COLI- FORM (COL. PER 100 ML)	STREP- TOCOCOCCI (COL- ONIES PER 100 ML)
OCT. 26...	550	120	20	12	.27	1.4	11.9	4.4	1600	--	--
NOV. 28...	60	30	0	16	.08	.36	9.2	2.7	7400	--	--
JAN. 04...	100	390	630	21	.00	1.4	.8	7.8	98000	--	--
FEB. 05...	170	200	280	22	.01	1.3	2.4	16	460000	--	--
MAR. 12...	120	190	80	9.4	.66	.81	10.0	10	6600	--	--
APR. 17...	90	70	20	8.2	.03	.50	13.8	>16	2600	1800	900
MAY 15...	80	40	50	5.2	.01	.24	11.3	2.7	2200	420	560
JUNE 26...	60	50	30	11	.39	.53	10.2	2.9	1500	540	1600
JULY 24...	80	70	110	9.9	.14	1.2	6.9	4.0	160	110	66
AUG. 29...	80	0	58	15	.30	1.2	4.3	4.2	700	190	36

## RED RIVER OF THE NORTH BASIN

05112000 ROSEAU RIVER BELOW STATE DITCH 51, NEAR CARIBOU, MINN.

LOCATION.--Lat 48°58'54", long 96°27'46", in SE¼SW¼ sec.34, T.164 N., R.45 W., Kittson County, at gaging station, on left bank 400 ft (122 m) downstream from State ditch 51 (known locally as Caribou cutoff ditch) and 0.6 mi (1.0 km) west of Caribou.

DRAINAGE AREA.--1,570 mi<sup>2</sup> (4,070 km<sup>2</sup>), approximately.

PERIOD OF RECORD.--Chemical analysis: October 1972 to September 1973.

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	TEMPER- ATURE (DEG C)	DIS- CHARGE (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHQS)	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)	COLOR (PLAT- INUM- COBALT UNITS)	PH (UNITS)	CAR- BONATE (CO3) (MG/L)	BICAR- BONATE (HCO3) (MG/L)	ALKA- LITY AS CACU3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)
OCT. 25...	4.5	28	405	244	217	18.4	80	7.6	0	221	181	8.9
NOV. 29...	.0	30	557	356	322	29.0	50	7.1	0	341	280	43
JAN. 03...	.0	11	746	528	442	15.7	70	7.2	0	491	403	50
FEB. 06...	.0	9.0	830	544	494	13.2	40	6.9	0	531	436	107
MAR. 13...	1.5	174	510	331	284	156	70	7.7	0	267	219	8.5
APR. 18...	6.0	51	366	229	198	32.1	40	8.8	2	219	183	.6
MAY 16...	10.0	120	365	246	199	79.7	40	8.6	0	220	180	.9
JUNE 27...	19.0	108	323	241	187	70.3	80	8.5	0	202	166	1.0
JULY 25...	21.0	18	307	224	181	11.0	70	8.2	0	194	159	2.0
AUG. 28...	24.5	42	323	232	191	26.3	60	7.9	0	203	167	4.1

DATE	DIS- SOLVED CAL- CIUM (CA) (MG/L)	DIS- SOLVED MAG- NE- SIUM (MG) (MG/L)	HARD- NESS (CA, MG) (MG/L)	NUM- CAR- BONATE HARD- NESS (MG/L)	DIS- SOLVED SODIUM (NA) (MG/L)	SODIUM AD- SORP- TION RATIO	PERCENT SODIUM	DIS- SOLVED PO- TAS- SIUM (K) (MG/L)	DIS- SOLVED CHLO- RIDE (CL) (MG/L)	DIS- SOLVED SULFATE (SO4) (MG/L)	DIS- SOLVED FLUO- RIDE (F) (MG/L)
OCT. 25...	50	19	200	22	9.3	.3	9	2.1	7.6	12	.4
NOV. 29...	65	30	290	6	12	.3	8	2.2	7.6	25	.4
JAN. 03...	92	39	390	0	14	.3	7	2.5	8.6	19	.4
FEB. 06...	96	39	400	0	25	.5	12	3.3	22	15	.5
MAR. 13...	47	21	200	0	19	.6	16	4.5	18	26	.4
APR. 18...	42	16	170	0	6.1	.2	7	3.0	4.0	13	.2
MAY 16...	45	18	190	6	6.0	.2	6	1.8	3.8	12	.0
JUNE 27...	41	15	160	0	5.1	.2	6	.8	3.4	9.9	.4
JULY 25...	39	16	160	4	5.8	.2	7	1.1	2.7	7.2	.3
AUG. 28...	41	18	180	10	6.5	.2	7	1.4	2.9	7.6	.3



05112000 ROSEAU RIVER BELOW STATE DITCH 51, NEAR CARIBOU, MINN.--Continued

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	DIS- SOLVED BORON (B) (UG/L)	DIS- SOLVED IRON (FE) (UG/L)	DIS- SOLVED MAN- GANESE (MN) (UG/L)	DIS- SOLVED SILICA (SIO2) (MG/L)	DIS- SOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL PHOS- PHORUS (P) (MG/L)	DIS- SOLVED OXYGEN (MG/L)	BIO- CHEM- ICAL OXYGEN DEMAND (MG/L)	IMME- DIATE COLI- FORM (COL. PER 100 ML)	FECAL COLI- FORM (COL. PER 100 ML)	STREP- TOCOCCI (COL- ONIES PER 100 ML)
OCT. 25...	120	120	0	7.8	.01	.28	11.5	4.1	60	--	--
NOV. 29...	80	180	40	12	.00	.19	6.9	2.8	40	--	--
JAN. 03...	100	2700	1400	21	.00	.68	.8	--	680	--	--
FEB. 06...	140	2800	1300	27	.01	1.1	.8	5.5	26000	--	--
MAR. 13...	100	160	330	14	.33	.83	5.7	6.9	1400	--	--
APR. 18...	70	70	20	3.8	.01	.10	11.8	--	83	0	0
MAY 16...	70	40	20	3.5	.03	.10	9.5	4.1	61	19	85
JUNE 27...	120	70	20	11	.10	.20	6.9	7.0	530	58	64
JULY 25...	90	50	30	13	.11	.25	5.8	2.8	320	28	74
AUG. 28...	10	0	50	12	.21	.15	7.6	2.4	210	51	53

## 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 SE¼ sec.24, T.63 N., R.10 W., Lake County, at gaging station, on left bank upstream from rapids, 2 mi (3 km) upstream from South Kawishiwi River, 2.2 mi (3.5 km) southwest of Fernberg Lookout Tower and 14 mi (23 km) east of Ely.

DRAINAGE AREA.--253 mi<sup>2</sup> (655 km<sup>2</sup>).

PERIOD OF RECORD.--Chemical analyses: October 1967 to current year.

Water temperatures: July 1966 to current year.

EXTREMES, Current year.--Water temperatures: Maximum, 23.5°C July 10, 11; minimum, freezing point Jan. 6-25.

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.

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	TEMPER- ATURE (DEG C)	DIS- CHARGE (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	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)	COLOR (PLAT- INUM- COBALT UNITS)	PH (UNITS)	CAR- BONATE (CO3) (MG/L)	BICAR- BONATE (HCO3) (MG/L)
OCT. 26...	4.0	115	39	34	26	10.6	50	7.8	0	12
FEB. 07...	.0	58	37	51	29	7.99	60	7.0	0	16
APR. 24...	5.5	474	30	38	25	48.6	50	6.9	0	10
JUNE 26...	21.0	289	31	39	27	30.4	50	6.4	0	17
AUG. 03...	20.5	180	27	43	23	20.9	40	7.7	0	13

DATE	ALKA- LITY AS CACO3 (MG/L)	CARBON DIOXIDE (CM2) (MG/L)	DIS- SOLVED CAL- CIUM (CA) (MG/L)	DIS- SOLVED MAG- NE- SIUM (MG) (MG/L)	HARD- NESS (CA, MG) (MG/L)	NON- CAR- BONATE HARD- NESS (MG/L)	DIS- SOLVED SODIUM (NA) (MG/L)	SODIUM AD- SORP- TION RATIO	PERCENT SODIUM	DIS- SOLVED PO- TAS- SIUM (K) (MG/L)
OCT. 26...	10	.3	4.4	1.5	17	7	.8	.1	9	.4
FEB. 07...	13	2.6	4.4	1.3	16	3	1.2	.1	13	.4
APR. 24...	8	2.0	3.4	1.4	14	6	1.2	.1	15	.3
JUNE 26...	14	11	5.0	1.7	19	6	.9	.1	9	.5
AUG. 03...	10	.4	2.9	1.5	13	3	1.1	.1	15	.0

DATE	DIS- SOLVED CHLO- RIDE (CL) (MG/L)	DIS- SOLVED SULFATE (SO4) (MG/L)	DIS- SOLVED FLUO- RINE (F) (MG/L)	DIS- SOLVED BORON (B) (UG/L)	DIS- SOLVED IRON (FE) (UG/L)	DIS- SOLVED MANG- ANESE (MN) (UG/L)	DIS- SOLVED SILICA (SIO2) (MG/L)	DIS- SOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL PHOS- PHORUS (P) (MG/L)
OCT. 26...	1.5	6.3	.1	400	220	0	3.8	.05	.05
FEB. 07...	2.0	6.2	.1	60	250	0	5.1	.08	.03
APR. 24...	1.6	7.3	.0	40	240	50	4.3	.08	.01
JUNE 26...	1.4	3.8	.1	40	190	0	3.8	.20	.01
AUG. 03...	1.6	6.6	.1	20	120	0	3.0	.00	.02

(Hydrologic bench-mark station)

TEMPERATURE (°C) OF WATER, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973  
(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	11.5	11.5	3.5	3.5	1.5	1.0	0.5	0.5	0.5	0.5	1.5	1.5
2	12.0	11.5	3.5	3.5	1.0	1.0	0.5	0.5	0.5	0.5	1.5	1.5
3	11.5	11.5	3.5	3.5	1.0	1.0	0.5	0.5	0.5	0.5	1.5	1.5
4	11.5	11.5	3.5	3.5	1.0	1.0	0.5	0.5	0.5	0.5	1.5	1.5
5	11.5	11.5	3.5	3.0	1.0	0.5	0.5	0.5	0.5	0.5	1.5	1.5
6	11.5	11.5	3.0	3.0	0.5	0.5	0.5	0.0	0.5	0.5	1.5	1.5
7	11.5	11.5	3.0	3.0	0.5	0.5	0.0	0.0	1.0	0.5	1.5	1.5
8	11.5	11.0	3.0	2.0	0.5	0.5	0.0	0.0	1.0	1.0	1.5	1.5
9	11.0	10.5	2.0	2.0	0.5	0.5	0.0	0.0	1.5	1.0	1.5	1.5
10	10.5	10.0	2.0	2.0	0.5	0.5	0.0	0.0	1.5	1.5	1.5	1.5
11	10.0	10.0	2.0	2.0	0.5	0.5	0.0	0.0	1.5	1.5	1.5	1.5
12	10.0	10.0	2.0	2.0	0.5	0.5	0.0	0.0	1.5	1.5	1.5	1.5
13	10.0	9.5	2.0	2.0	0.5	0.5	0.0	0.0	1.5	1.5	1.5	1.0
14	9.5	9.0	2.0	2.0	0.5	0.5	0.0	0.0	1.5	1.5	1.5	1.0
15	9.0	8.5	2.0	2.0	0.5	0.5	0.0	0.0	1.5	1.5	2.0	1.5
16	8.5	7.0	2.0	2.0	0.5	0.5	0.0	0.0	1.5	1.5	2.0	2.0
17	7.0	6.5	2.0	2.0	0.5	0.5	0.0	0.0	1.5	1.5	2.0	2.0
18	6.5	5.5	2.0	1.5	0.5	0.5	0.0	0.0	1.5	1.5	2.0	2.0
19	5.5	4.5	1.5	1.5	0.5	0.5	0.0	0.0	1.5	1.5	2.0	2.0
20	4.5	4.5	1.5	1.5	0.5	0.5	0.0	0.0	1.5	1.5	2.0	2.0
21	4.5	4.5	1.5	1.5	0.5	0.5	0.0	0.0	1.5	1.5	2.0	2.0
22	4.5	4.0	1.5	1.5	0.5	0.5	0.0	0.0	1.5	1.5	2.0	2.0
23	4.0	4.0	1.5	1.5	0.5	0.5	0.0	0.0	1.5	1.5	2.0	2.0
24	4.0	4.0	1.5	1.5	0.5	0.5	0.0	0.0	1.5	1.5	2.0	2.0
25	4.0	4.0	1.5	1.5	0.5	0.5	0.5	0.0	1.5	1.5	2.0	2.0
26	4.0	4.0	1.5	1.5	0.5	0.5	0.5	0.5	1.5	1.5	2.0	2.0
27	4.0	4.0	1.5	1.5	0.5	0.5	0.5	0.5	1.5	1.5	2.0	2.0
28	4.0	4.0	1.5	1.5	0.5	0.5	0.5	0.5	1.5	1.5	2.0	2.0
29	4.0	4.0	1.5	1.5	0.5	0.5	1.0	0.5	---	---	2.0	2.0
30	4.0	3.5	1.5	1.5	0.5	0.5	1.0	1.0	---	---	2.0	2.0
31	3.5	3.5	---	---	0.5	0.5	1.0	0.5	---	---	3.0	2.0
MONTH	12.0	3.5	3.5	1.5	1.5	0.5	1.0	0.0	1.5	0.5	3.0	1.0
APRIL			MAY		JUNE		JULY		AUGUST		SEPTEMBER	
DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
1	3.0	3.0	8.0	7.0	15.5	15.5	21.5	21.0	20.5	20.5	19.0	18.5
2	3.0	3.0	8.0	8.0	16.0	15.5	21.0	21.0	20.5	20.5	18.5	18.5
3	3.5	3.0	8.0	8.0	16.0	16.0	21.5	21.0	21.0	20.5	18.5	18.5
4	4.5	3.5	8.0	8.0	16.5	16.0	21.5	21.5	21.0	21.0	18.5	18.5
5	4.5	4.5	8.0	8.0	17.0	16.5	21.5	21.5	21.0	21.0	18.5	18.0
6	4.5	4.5	8.0	8.0	18.0	17.0	21.5	21.5	21.0	21.0	18.0	18.0
7	4.5	4.5	8.5	8.0	18.0	18.0	22.0	21.5	21.0	21.0	18.0	18.0
8	4.5	4.5	9.0	8.5	18.0	18.0	23.0	22.0	21.0	21.0	18.0	18.0
9	4.5	4.5	9.5	9.0	18.5	18.0	23.0	23.0	21.0	20.5	18.0	18.0
10	5.0	4.5	9.5	9.5	19.0	18.5	23.5	23.0	20.5	20.5	18.0	18.0
11	5.0	5.0	10.0	9.5	19.0	19.0	23.5	23.0	20.5	20.5	18.0	18.0
12	5.0	5.0	10.0	10.0	19.5	19.0	23.0	23.0	20.5	20.5	18.0	18.0
13	5.0	5.0	10.0	10.0	20.0	19.5	23.0	23.0	20.5	20.5	18.0	18.0
14	5.0	5.0	10.0	10.0	20.0	20.0	23.0	22.0	20.5	20.5	18.0	18.0
15	5.0	5.0	10.0	10.0	20.5	20.0	22.0	22.0	20.5	20.5	18.0	17.0
16	5.0	5.0	10.5	10.0	20.5	20.5	22.0	22.0	20.5	20.0	17.0	17.0
17	5.0	5.0	11.0	10.5	20.5	20.5	23.0	22.0	20.0	19.5	17.0	16.5
18	5.0	5.0	11.5	11.0	21.0	20.5	23.0	23.0	19.5	19.5	16.5	16.0
19	5.0	5.0	11.5	11.5	21.0	21.0	23.0	22.0	19.5	19.5	16.0	15.5
20	5.0	5.0	13.0	11.5	21.0	20.5	22.0	22.0	19.5	19.5	15.5	15.0
21	5.0	5.0	13.5	13.0	20.5	20.5	22.0	22.0	19.5	19.5	15.0	14.5
22	5.5	5.0	13.5	13.5	20.5	20.5	22.0	22.0	19.5	19.5	14.5	14.0
23	5.5	5.5	14.0	13.5	20.5	20.5	22.0	22.0	19.5	19.5	14.0	13.5
24	5.5	5.5	14.5	14.0	21.0	20.5	22.0	21.5	19.5	19.5	13.5	13.5
25	5.5	5.5	14.5	14.5	21.0	21.0	21.5	21.0	19.5	19.5	13.5	13.5
26	6.0	5.5	14.5	14.5	21.5	21.0	21.0	21.0	19.5	19.0	13.5	13.5
27	6.0	6.0	14.5	14.5	21.5	21.5	21.0	21.0	19.0	19.0	13.5	13.5
28	6.0	6.0	14.5	14.5	21.5	21.5	21.0	21.0	19.0	19.0	13.5	13.5
29	6.5	6.0	15.0	14.5	21.5	21.5	21.0	20.5	19.5	19.0	13.5	13.5
30	7.0	6.5	15.5	15.0	21.5	21.5	20.5	20.5	19.5	19.0	13.5	13.0
31	---	---	15.5	15.5	---	---	20.5	20.5	19.0	19.0	---	---
MONTH	7.0	3.0	15.5	7.0	21.5	15.5	23.5	20.5	21.0	19.0	19.0	13.0
YEAR	23.5	0.0										

## CROW RIVER BASIN

05279000 SOUTH FORK CROW RIVER NEAR MAYER, MINN.

LOCATION.--Lat 44°54'20", long 93°53'05", in SW¼SW¼ sec.30, T.117 N., R.25 W., Carver County, at gage, near center of span on downstream side of bridge on State Highway 7, 1.3 mi (2.1 km) north of Mayer, 4.3 mi (6.9 km) southwest of Watertown, and 16 mi (26 km) upstream from confluence with North Fork.

DRAINAGE AREA.--1,170 mi (3,030 km<sup>2</sup>), approximately.

PERIOD OF RECORD.--Chemical analyses: October 1972 to September 1973.

REMARKS.--BOD and bacteria data furnished by Metropolitan Sewer Board, St. Paul, Minn. Miscellaneous samples of chemical data published for water years 1967, 1969, 1971, 1972.

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	TEMPER- ATURE (DEG C)	DIS- CHARGE (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	DIS- SOLVED SOLIDS (RESI- DUE AT 180 C) (MG/L)	DIS- SOLVED SOLIDS (TONS PER DAY)	SUS- PENDED SOLIDS (MG/L)	TUR- BID- ITY (JTU)	COLOR (PLAT- INUM- COBALT UNITS)	DIS- SOLVED OXYGEN (MG/L)	RIO- CHEM- ICAL OXYGEN DEMAND (MG/L)	PH (UNITS)	CAR- BONATE (CO <sub>3</sub> ) (MG/L)
OCT. 17...	5.0	111	871	612	183	32	8	50	--	--	8.0	0
17...	--	--	--	--	--	--	--	--	11.3	4.0	8.4	--
NOV. 20...	2.5	312	1000	776	654	22	9	30	11.6	3.1	8.2	--
DEC. 19...	.0	66	1230	988	178	9	6	40	7.3	2.9	7.2	0
JAN. 15...	.0	66	1150	804	145	42	2	30	3.4	1.9	7.4	0
FEB. 15...	.0	57	1080	732	113	5	3	30	4.1	4.8	7.7	0
MAR. 15...	4.5	1950	484	345	1820	80	20	80	9.2	7.9	7.7	0
APR. 10...	2.5	592	776	520	831	55	10	50	14.0	6.1	8.3	0
MAY 16...	13.5	315	873	634	539	122	30	40	11.6	9.7	8.2	--
JULY 09...	24.0	113	946	650	197	64	30	40	7.4	8.5	8.1	0
AUG. 01...	19.5	72	755	516	100	27	30	30	8.0	6.8	8.1	0
SEPT. 03...	25.0	319	766	503	433	190	50	40	6.7	5.2	8.0	0

DATE	RICAR- BONATE (MG/L)	ALKA- LINITV AS CaCO <sub>3</sub> (MG/L)	CARBON DIOXIDE (CO <sub>2</sub> ) (MG/L)	DIS- SOLVED CAL- CIUM (CA) (MG/L)	DIS- SOLVED MAG- NE- SIUM (MG)	HARD- NESS (CA, MG) (MG/L)	NON- CAR- BONATE HARD- NESS (MG/L)	DIS- SOLVED SODIUM (NA) (MG/L)	SODIUM AD- SORP- TION RATIO	PERCENT SODIUM	DIS- SOLVED PH- TAS- SIUM (K) (MG/L)	DIS- SOLVED CHLO- RIDE (CL) (MG/L)
OCT. 17...	356	292	--	93	44	410	120	27	.6	12	6.1	41
17...	--	--	2.1	--	--	--	--	--	--	--	--	--
NOV. 20...	409	335	4.1	130	52	540	200	19	.4	7	5.3	30
DEC. 19...	404	405	50	140	61	600	200	43	.8	13	8.8	60
JAN. 15...	478	392	30	120	56	530	140	47	.9	16	10	66
FEB. 15...	434	356	14	120	53	520	160	40	.8	14	11	59
MAR. 15...	193	158	6.2	57	19	220	62	7.0	.2	6	7.9	18
APR. 10...	313	257	2.5	81	38	360	100	18	.4	10	5.3	27
MAY 16...	331	271	3.3	100	48	450	180	20	.4	9	5.9	30
JULY 09...	335	275	4.3	92	49	430	160	44	.9	18	6.3	60
AUG. 01...	264	217	3.4	70	32	310	90	36	.9	20	8.1	53
SEPT. 03...	262	215	4.2	75	34	330	110	31	.7	17	9.7	47

05279000 SOUTH FORK CROW RIVER NEAR MAYER, MINN.--Continued

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	DIS- SOLVED SULFATE (SO4) (MG/L)	DIS- SOLVED FLUO- RIDE (F) (MG/L)	DIS- SOLVED AMMONIA NITRO- GEN (N) (MG/L)	DIS- SOLVED NITRITE (N) (MG/L)	DIS- SOLVED NITRATE (N) (MG/L)	AMMONIA NITRO- GEN (N) (MG/L)	ORGANIC NITRO- GEN (N) (MG/L)	DIS- SOL- VED- PHOS- PHORUS (P) (MG/L)	PHENOLS (UG/L)	CON- FIRMED COLI- FORM (MPN)	FECAL COLI- FORM (EC BROTH) (MPN)
OCT. 17...	120	.6	.11	.00	2.2	--	1.6	.30	3	--	--
17...	--	--	--	--	--	.11	--	--	--	7900	3300
NOV. 20...	160	.5	.12	.02	6.2	.12	1.8	.16	6	4900	2300
DEC. 19...	190	.6	.94	.01	4.6	.90	1.3	.50	0	35000	13000
JAN. 15...	160	.5	1.7	.03	2.2	1.7	1.4	.65	0	4900	1300
FEB. 15...	180	.5	--	.03	2.1	1.4	1.6	.64	10	2100	640
MAR. 15...	51	.4	--	.14	4.9	.79	2.4	.37	2	35000	490
APR. 10...	120	.2	--	.02	2.6	.11	2.3	.09	2	3300	790
MAY. 16...	170	.2	--	.03	3.7	.25	3.0	.03	0	4900	490
JULY 09...	150	.4	--	.03	2.0	.09	2.9	.36	3	--	410
AUG. 01...	110	.4	--	.01	.66	.11	1.5	.47	7	--	330
SEP. 03...	120	.4	--	.20	2.6	.14	.78	.39	1	--	3040

DATE	DIS- SOLVED ALUM- INUM (AL) (UG/L)	TOTAL ALUM- INUM (AL) (UG/L)	DIS- SOLVED ARSENIC (AS) (UG/L)	DIS- SOLVED BARIUM (BA) (UG/L)	DIS- SOLVED BERYL- LIUM (BE) (UG/L)	TOTAL BERYL- LIUM (BE) (UG/L)	DIS- SOLVED BORON (B) (UG/L)	DIS- SOLVED CAD- MIUM (CD) (UG/L)	TOTAL CAD- MIUM (CD) (UG/L)	DIS- SOLVED CHRO- MIUM (CR) (UG/L)	HEXA- VALENT CHRO- MIUM (CR6) (UG/L)	DIS- SOLVED COBALT (CO) (UG/L)
NOV. 20...	40	200	29	0	0	0	60	0	0	0	0	0
MAY. 16...	100	840	3	0	0	0	100	0	0	0	0	0

DATE	TOTAL COBALT (CO) (UG/L)	DIS- SOLVED COPPER (CU) (UG/L)	TOTAL COPPER (CU) (UG/L)	CYANIDE (CN) (MG/L)	DIS- SOLVED IRON (FE) (UG/L)	TOTAL IRON (FE) (UG/L)	DIS- SOLVED LEAD (PB) (UG/L)	TOTAL LEAD (PB) (UG/L)	DIS- SOLVED LITHIUM (LI) (UG/L)	DIS- SOLVED MAN- GANESE (MN) (UG/L)	TOTAL MAN- GANESE (MN) (UG/L)	DIS- SOLVED MERCURY (HG) (UG/L)
NOV. 20...	0	16	17	.01	60	220	2	1	30	--	120	.2
MAY. 16...	20	2	10	.01	30	2300	1	100	30	50	360	.0

DATE	TOTAL MERCURY (MG) (UG/L)	DIS- SOLVED MOLYB- DENUM (MO) (UG/L)	DIS- SOLVED NICKEL (NI) (UG/L)	TOTAL NICKEL (NI) (UG/L)	OIL AND GREASE (MG/L)	DIS- SOLVED SELF- NIUM (SE) (UG/L)	DIS- SOLVED SILVER (AG) (UG/L)	TOTAL SILVER (AG) (UG/L)	DIS- SOLVED STRON- TIUM (SR) (UG/L)	DIS- SOLVED VANA- DIUM (V) (UG/L)	DIS- SOLVED ZINC (ZN) (UG/L)	TOTAL ZINC (ZN) (UG/L)
NOV. 20...	.2	5	7	59	4	8	2	8	400	2.1	40	50
MAY. 16...	.0	5	2	50	1	7	0	10	290	.8	0	380

## 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, 1,000 ft (305 m) downstream from gaging station at Rockford, 150 ft (46 m) downstream from bridge on State Highway 55 and 1 mi (1.6 km) downstream from confluence of North and South Forks.

DRAINAGE AREA.--2,520 mi<sup>2</sup> (6,530 km<sup>2</sup>), approximately.

PERIOD OF RECORD.--Chemical analyses: October 1972 to September 1973.

REMARKS.--BOD and bacteria data furnished by Metropolitan Sewer Board, St. Paul, Minn. Miscellaneous samples of chemical data published for water years 1964, 67 and 1969-72.

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	TEMPER- ATURE (DEG C)	DIS- CHARGE (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHMS)	DIS- SOLVED SOLIDS (RESI- DUE AT 180 C) (MG/L)	DIS- SOLVED SOLIDS (TONS PER DAY)	SUS- PENDED SOLIDS (MG/L)	TUR- BID- ITY (JTU)	COLOR (PLAT- INUM- COBALT UNITS)	DIS- SOLVED OXYGEN (MG/L)	BIO- CHEM- ICAL OXYGEN DEMAND (MG/L)	PH (UNITS)	CAR- BONATE (CO3) (MG/L)
OCT.												
17...	5.0	528	593	400	576	35	8	50	10.6	3.4	8.2	0
NOV.												
20...	2.0	1050	622	442	1250	42	5	30	11.3	1.7	8.1	--
DEC.												
15...	.0	406	704	500	548	10	4	20	7.6	2.1	7.3	0
JAN.												
15...	.0	290	720	480	376	38	4	20	4.8	2.2	7.4	0
FEB.												
15...	.0	243	726	464	306	11	4	20	6.2	2.4	7.7	0
MAR.												
14...	2.5	3020	383	279	2280	69	20	70	9.0	8.3	7.7	0
APR.												
10...	1.0	2130	551	372	2140	22	7	40	13.9	4.0	8.2	0
MAY												
15...	14.5	1270	628	406	1390	95	20	30	11.5	2.6	8.0	--
JULY												
09...	25.0	338	657	445	406	69	30	30	5.8	6.4	8.0	0
27...	22.5	186	647	412	207	51	20	30	8.3	--	8.2	0
AUG.												
29...	25.0	383	625	394	407	84	30	40	8.0	7.0	8.0	0

DATE	BICAR- BONATE (HCO3) (MG/L)	ALKA- LITY AS CaCO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DIA- SOLVED CAL- CIUM (CA) (MG/L)	DIS- SOLVED MAG- NE- SIUM (MG) (MG/L)	HARD- NESS (CA,MG) (MG/L)	NON- CAR- BONATE HARD- NESS (MG/L)	DIS- SOLVED SODIUM (NA) (MG/L)	SODIUM AD- SORP- TION RATIO	PERCENT SODIUM	DIS- SOLVED PO- TAS- SIUM (K) (MG/L)	DIS- SOLVED CHLO- RIDE (CL) (MG/L)
OCT.												
17...	318	261	3.2	71	31	300	44	11	.3	7	4.6	15
NOV.												
20...	328	269	4.3	82	35	350	80	11	.3	6	4.5	15
DEC.												
15...	373	306	30	88	39	380	74	14	.3	7	5.2	19
JAN.												
15...	387	317	25	83	38	360	46	18	.4	10	6.2	23
FEB.												
15...	375	308	12	83	38	360	56	18	.4	10	6.5	24
MAR.												
14...	176	144	5.6	44	15	170	27	5.2	.2	6	8.4	13
APR.												
10...	281	230	2.8	64	28	280	45	9.9	.3	7	5.0	15
MAY												
15...	310	254	5.0	73	34	320	68	11	.3	7	5.1	16
JULY												
09...	316	259	5.1	70	34	310	56	22	.5	13	3.8	28
27...	318	261	3.2	67	33	300	42	23	.6	14	4.9	29
AUG.												
29...	285	234	4.6	60	29	270	35	23	.6	15	7.6	32

05280000 CROW RIVER AT ROCKFORD, MINN.--Continued

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	DIS- SOLVED SULFATE (SO4) (MG/L)	DIS- SOLVED FLUOR- IDE (F) (MG/L)	DIS- SOLVED AMMONIA NITRO- GEN (N) (MG/L)	DIS- SOLVED NITRITE (N) (MG/L)	DIS- SOLVED NITRATE (N) (MG/L)	AMMONIA NITRO- GEN (N) (MG/L)	ORGANIC NITRO- GEN (N) (MG/L)	DIS- SOL- VED- PHOS- PHORUS (P) (MG/L)	PHENOLS (UG/L)	CON- FIRMED COLI- FORM (MPN)	FECAL COLI- FORM (EC PROTH) (MPN)
OCT 17...	48	.4	.07	.01	.59	.10	1.1	.14	11	1100	260
NOV 20...	60	.4	.09	.01	2.3	.10	1.2	.09	2	4900	1300
DEC 15...	77	.4	.37	.02	1.6	.37	1.1	.12	0	3300	1300
JAN 15...	58	.3	.69	.01	.99	.68	1.0	.25	0	7900	2200
FEB 15...	72	.2	--	.03	1.1	.50	.90	.21	6	7000	790
MAR 14...	34	.3	--	.06	1.9	.94	2.0	.29	11	7900	130
APR 10...	57	.3	--	.00	.71	.06	1.5	.05	3	2300	110
MAY 15...	67	.2	--	.03	4.5	.12	2.0	.03	0	--	40
JULY 09...	70	.3	--	.01	.26	.12	2.2	.08	4	--	512
27...	53	.3	--	.00	.04	.06	1.6	.11	6	--	--
AUG 29...	55	.4	--	.03	.34	.09	2.2	.25	4	--	260

DATE	DIS- SOLVED ALUM- INUM (AL) (UG/L)	TOTAL ALUM- INUM (AL) (UG/L)	DIS- SOLVED ARSENIC (AS) (UG/L)	DIS- SOLVED BARIUM (BA) (UG/L)	DIS- SOLVED BERYL- LIUM (BE) (UG/L)	TOTAL BERYL- LIUM (BE) (UG/L)	DIS- SOLVED BORON (B) (UG/L)	DIS- SOLVED CAD- MIUM (CD) (UG/L)	TOTAL CAD- MIUM (CD) (UG/L)	DIS- SOLVED CHRO- MIUM (CR) (UG/L)	HEXA- VALENT CHRO- MIUM (CR6) (UG/L)	DIS- SOLVED COBALT (CO) (UG/L)
NOV 20...	30	170	1	0	0	10	50	0	0	0	0	0
MAY 15...	120	690	1	0	0	0	80	0	0	0	0	0

DATE	TOTAL COBALT (CO) (UG/L)	DIS- SOLVED COPPER (CU) (UG/L)	TOTAL COPPER (CU) (UG/L)	CYANIDE (CN) (MG/L)	DIS- SOLVED IRON (FE) (UG/L)	TOTAL IRON (FE) (UG/L)	DIS- SOLVED LEAD (PB) (UG/L)	TOTAL LEAD (PB) (UG/L)	DIS- SOLVED LITHIUM (LI) (UG/L)	DIS- SOLVED MAN- GANESE (MN) (UG/L)	TOTAL MAN- GANESE (MN) (UG/L)	DIS- SOLVED MERCURY (MG) (UG/L)
NOV 20...	0	10	25	.00	60	260	2	2	10	--	90	.2
MAY 15...	20	6	10	.00	60	1600	1	100	10	40	250	.0

DATE	TOTAL MERCURY (MG) (UG/L)	DIS- SOLVED MOLYB- DENUM (MO) (UG/L)	DIS- SOLVED NICKEL (NI) (UG/L)	TOTAL NICKEL (NI) (UG/L)	OTL AND GREASE (MG/L)	DIS- SOLVED SELE- NIUM (SE) (UG/L)	DIS- SOLVED SILVER (AG) (UG/L)	TOTAL SILVER (AG) (UG/L)	DIS- SOLVED STRON- TIUM (SR) (UG/L)	DIS- SOLVED VANA- DIUM (V) (UG/L)	DIS- SOLVED ZINC (ZN) (UG/L)	TOTAL ZINC (ZN) (UG/L)
NOV 20...	.2	3	4	62	4	5	2	6	260	1.1	20	50
MAY 15...	.0	3	1	50	11	8	0	10	190	.2	940	1500

## MISSISSIPPI RIVER MAIN STEM

05283500 MISSISSIPPI RIVER AT ANOKA, MINN.

LOCATION.--Lat 45°11'30", long 93°23'40", in SE¼NW¼ sec.19, T.120 N., R.22 W., Anoka County, at bridge on U.S. Highways 52 and 169 at Anoka, 0.3 mi (0.5 km) upstream from Rum River, and at mile 871.3 (1,402 km) upstream from Ohio River.

DRAINAGE AREA.--17,100 sq mi, approximately.

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	TEMPER- ATURE (DEG C)	DIS- CHARGE (CFS)	SPF- CIFIC CON- DUCT- ANCE (MICRO- MHMS)	DIS- SOLVED SOLIDS (RESI- DUE AT 180 C) (MG/L)	DIS- SOLVED SOLIDS (TONS PER DAY)	SUS- PENDED SOLIDS (MG/L)	TUR- BID- ITY (JTU)	COLOR (PLAT- INUM- COBALT UNITS)	DIS- SOLVED OXYGEN (MG/L)	RIO- CHEM- ICAL OXYGEN DEMAND (MG/L)	PH (UNITS)	CAR- BONATE (CO3) (MG/L)
JAN. 03...	.0	6550	534	384	6790	A	5	20	12.6	2.2	7.9	0
FEB. 07...	.0	4940	404	744	3250	12	5	20	13.6	1.3	7.6	0
MAR. 07...	1.5	6040	410	254	4140	14	5	40	12.2	8.0	7.7	0
APR. 04...	6.0	14440	403	254	10100	32	6	50	12.2	3.5	8.0	0
MAY 17...	13.0	11340	353	290	8910	11	6	50	--	2.6	8.0	--
JUNE 06...	21.0	11450	447	301	9310	31	10	60	8.2	2.8	7.9	0
JULY 03...	24.0	5500	340	227	3370	23	6	30	8.5	4.6	8.3	0
AUG. 01...	21.0	5040	322	215	3330	9	10	30	--	2.4	8.0	0
SEP. 05...	--	5800	--	--	--	--	--	--	--	--	--	--
05...	21.0		362	224	4060	21	10	40	7.8	2.6	8.1	0

DATE	BICAR- BONATE (MG/L)	ALKAL- INITY AS CACO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DIS- SOLVED CAL- CIUM (CA) (MG/L)	DIS- SOLVED MAG- NE- SIUM (MG)	HARD- NESS (CA,MG) (MG/L)	NON- CAR- BONATE HARD- NESS (MG/L)	DIS- SOLVED SODIUM (NA) (MG/L)	SODIUM AD- SORP- TION RATIO	PERCENT SODIUM	DIS- SOLVED PO- TAS- SIUM (K) (MG/L)	DIS- SOLVED CHLO- RIDE (CL) (MG/L)
JAN. 03...	259	212	5.2	63	23	250	40	17	.5	13	3.0	21
FEB. 07...	245	201	9.8	53	18	210	6	7.5	.2	7	2.6	6.9
MAR. 07...	227	186	7.2	47	17	190	1	8.1	.3	8	4.7	9.0
APR. 04...	207	170	3.3	53	17	200	33	5.6	.2	6	3.6	8.0
MAY 17...	194	159	3.1	43	14	170	6	5.2	.2	6	2.1	5.2
JUNE 06...	217	174	4.4	52	21	220	38	7.0	.2	6	2.6	9.2
JULY 03...	149	155	1.5	42	16	170	16	6.3	.2	7	2.0	6.3
AUG. 01...	145	152	3.0	40	15	160	10	6.3	.2	8	1.7	5.9
SEP. 05...	--	--	--	--	--	--	--	--	--	--	--	--
05...	148	154	2.4	42	16	170	17	6.2	.3	9	2.9	9.6



## 05283500 MISSISSIPPI RIVER AT ANOKA, MINN.--Continued

PERIOD OF RECORD.--Chemical analyses: January 1973 to September 1973.

REMARKS.--BOD and bacteria data furnished by Metropolitan Sewer board, St. Paul, Minn. Discharge computed using records for Rum River near St. Francis, Mississippi River near Anoka and occasional measurements made on the Mississippi River at Anoka and Rum river at Anoka. Miscellaneous analyses are published for water year 1972.

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	DIS- SOLVED SULFATE (MG/L)	DIS- SOLVED FLUOR- IDE (F) (MG/L)	DIS- SOLVED AMMONIA NITRO- GEN (N) (MG/L)	DIS- SOLVED NITRITE (N) (MG/L)	DIS- SOLVED NITRATE (N) (MG/L)	AMMONIA NITRO- GEN (N) (MG/L)	ORGANIC NITRO- GEN (N) (MG/L)	DIS- SOL- VED- PHOS- PHORUS (P) (MG/L)	PHENOLS (UG/L)	CUM- FIRMED COLI- FORM (MPN)	FECAL COLI- FORM (FC BATH)
JAN. 03...	47	.2	.26	.02	.98	.26	.73	.13	2	7000	700
FEB. 07...	16	.3	.12	.00	.51	.12	.79	.06	0	17000	230
MAR. 07...	19	.3	--	.02	.64	.58	1.5	.24	2	160000	3300
APR. 04...	27	.2	--	.01	.42	.05	.95	.03	2	1700	200
MAY. 17...	18	.4	--	.12	.03	.00	1.0	.01	0	2300	130
JUNE 06...	44	.5	--	.02	.93	.07	1.4	.07	3	2800	130
JULY 03...	17	.3	--	.00	.05	.16	1.0	.05	19	--	140
AUG. 01...	15	.2	.02	.01	.07	.06	.52	.02	1	--	120
SEP. 05...	--	--	--	--	--	--	--	--	--	--	--
09...	21	.2	--	.02	.45	.07	.74	.13	--	--	110

DATE	DIS- SOLVED ALUM- INUM (AL) (UG/L)	TOTAL ALUM- INUM (AL) (UG/L)	DIS- SOLVED ARSENIC (AS) (UG/L)	DIS- SOLVED BARIUM (BA) (UG/L)	DIS- SOLVED BERYL- LIUM (BE) (UG/L)	TOTAL BERYL- LIUM (BE) (UG/L)	DIS- SOLVED BORON (B) (UG/L)	DIS- SOLVED CAD- MIUM (CD) (UG/L)	TOTAL CAD- MIUM (CD) (UG/L)	DIS- SOLVED CHRO- MIUM (CR) (UG/L)	HEXA- VALENT CHRO- MIUM (CR6) (UG/L)	DIS- SOLVED COBALT (CO) (UG/L)
MAY 17...	120	210	2	100	0	0	50	1	0	0	0	1

DATE	TOTAL COBALT (CO) (UG/L)	DIS- SOLVED COPPER (CU) (UG/L)	TOTAL COPPER (CU) (UG/L)	CYANIDE (CN) (MG/L)	DIS- SOLVED IRON (FE) (UG/L)	TOTAL IRON (FE) (UG/L)	DIS- SOLVED LEAD (PB) (UG/L)	TOTAL LEAD (PB) (UG/L)	DIS- SOLVED LITHIUM (LI) (UG/L)	DIS- SOLVED MAN- GANESE (MN) (UG/L)	TOTAL MAN- GANESE (MN) (UG/L)	DIS- SOLVED MERCURY (MG) (UG/L)
MAY 17...	20	8	10	.00	550	1400	6	100	0	70	150	.2

DATE	TOTAL MERCURY (MG) (UG/L)	DIS- SOLVED MOLYB- DENUM (MO) (UG/L)	DIS- SOLVED NICKEL (NI) (UG/L)	TOTAL NICKEL (NI) (UG/L)	OIL AND GREASE (MG/L)	DIS- SOLVED SELE- NIUM (SE) (UG/L)	DIS- SOLVED SILVER (AG) (UG/L)	TOTAL SILVER (AG) (UG/L)	DIS- SOLVED STRON- TIUM (SR) (UG/L)	DIS- SOLVED VANA- DIUM (V) (UG/L)	DIS- SOLVED ZINC (ZN) (UG/L)	TOTAL ZINC (ZN) (UG/L)
MAY 17...	.2	1	5	50	0	8	0	10	110	.0	2000	2000

## RUM RIVER BASIN

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, at gaging station on left bank at upstream side of highway bridge, 4 mi (6 km) south of St. Francis and 15.8 mi (25.4 km) upstream from mouth.

DRAINAGE AREA.--1,360 mi<sup>2</sup> (3,520 km<sup>2</sup>), approximately.

PERIOD OF RECORD.--Chemical analyses: October 1972 to September 1973.

REMARKS.--BOD and bacteria data furnished by Metropolitan Sewer Board, St. Paul, Minn. Miscellaneous samples of chemical data published for water years 1964, 1967-72.

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	TEMPER- ATURE (DEG C)	DISE- CHARGE (PPM)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	DISE- SOLVED SOLIDS (PPT) DUE AT 180 C) (MG/L)	DISE- SOLVED SOLIDS (TONS PER DAY)	SUS- PENDED SOLIDS (MG/L)	TUR- BID- ITY (JTU)	COLOR (PLAT- INUM- COHNT UNITS)	DISE- SOLVED OXYGEN (MG/L)	RIO- CHEM- ICAL OXYGEN DEMAND (MG/L)	PH (UNITS)	CAR- BONATE (CO3) (MG/L)
OCT. 19...	3.5	678	210	154	370	14	3	30	11.8	1.9	8.0	0
NOV. 27...	1.0	891	268	222	534	11	4	20	13.2	1.0	7.1	0
DEC. 18...	.0	600	291	208	337	3	4	30	7.2	.6	6.7	0
JAN. 17...	.0	500	286	202	273	38	4	20	5.8	1.2	7.2	0
FEB. 13...	.0	519	295	212	297	7	4	20	7.1	1.0	7.4	0
MAR. 19...	1.0	5390	150	101	1470	12	5	80	10.8	3.6	7.9	0
APR. 11...	4.0	1140	240	155	485	1	5	40	12.6	1.7	7.8	0
MAY 18...	15.0	1130	238	181	552	13	4	40	9.8	2.2	8.2	0
JULY 10...	23.5	485	252	168	220	13	6	30	7.8	3.0	8.1	0
AUG. 02...	19.5	475	242	163	209	25	3	7	9.2	2.8	7.6	0
30...	24.0	506	284	187	255	9	5	20	8.6	2.4	8.2	0

DATE	BICAR- BONATE (MG/L)	ALKAL- INITY AS CaCO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DISE- SOLVED CAL- CIUM (CA) (MG/L)	DISE- SOLVED MAG- NE- SIUM (MG)	HARD- NESS (CA, MG) (MG/L)	NON- CAR- BONATE HARD- NESS (MG/L)	DISE- SOLVED SODIUM (NA) (MG/L)	SODIUM AD- SORP- TION RATIO	DISE- SOLVED PO- TAS- SIUM (K) (MG/L)	DISE- SOLVED CHLO- RIDE (CL) (MG/L)
OCT. 19...	156	128	--	36	11	140	7	3.8	.1	6	3.3
NOV. 27...	159	130	20	35	11	130	0	4.7	.2	7	4.2
DEC. 18...	176	140	56	39	12	150	2	5.1	.2	7	3.6
JAN. 17...	196	153	19	38	12	140	0	4.8	.2	7	4.5
FEB. 13...	179	147	11	41	12	150	5	4.4	.2	6	4.1
MAR. 19...	42	51	1.2	14	4.6	54	3	1.9	.1	6	3.9
APR. 11...	134	110	3.4	31	9.7	120	7	3.8	.2	6	3.0
MAY 18...	106	120	1.5	32	10	120	0	4.4	.2	7	3.8
JULY 10...	108	121	1.9	14	9.8	75	0	4.4	.2	11	4.2
AUG. 02...	102	116	5.7	31	9.9	120	2	2.9	.1	5	3.8
30...	171	140	1.7	38	12	140	4	4.8	.2	7	4.3

05286000 RUM RIVER NEAR ST. FRANCIS, MINN.--Continued

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	DIS- SOLVED SULFATE (MG/L)	DIS- SOLVED FLUO- RIDE (F) (MG/L)	DIS- SOLVED AMMONIA NITRO- GEN (N) (MG/L)	DIS- SOLVED NITRITE (N) (MG/L)	DIS- SOLVED NITRATE (N) (MG/L)	AMMONIA NITRO- GEN (N) (MG/L)	ORGANIC NITRO- GEN (N) (MG/L)	DIS- SOL- VED- PHOS- PHORUS (P) (MG/L)	PHENOLS (UG/L)	CON- FIRMED COLI- FORM (MPN)	FECAL COLI- FORM (EC BROTH) (MPN)
OCT 19...	8.5	.1	.05	.00	.13	.05	.48	.04	2	330	78
NOV 27...	7.9	.2	.05	.00	1.9	.05	.51	.63	0	1300	130
DEC 18...	8.8	.2	.09	.00	.25	.09	.79	.04	0	490	130
JAN 17...	9.6	.2	.12	.00	.28	.12	.55	.04	4	1700	0
FEB 13...	17	.5	--	.00	.33	.10	.52	.03	4	1700	130
MAR 19...	11	.1	--	.01	.41	.36	1.2	.07	18	2200	18
APR 11...	8.2	.1	--	.01	.16	.05	.81	.04	5	790	78
MAY 18...	7.9	.3	--	.01	.99	.06	.84	.03	4	330	20
JULY 10...	6.4	.3	--	.00	.00	.05	.95	.02	3	--	0
AUG 02...	7.3	.2	--	.00	.02	.07	.75	.01	6	--	14
30...	7.7	.1	--	.00	.09	.19	1.0	.08	5	--	45

DATE	DIS- SOLVED ALUM- INUM (AL) (UG/L)	TOTAL ALUM- INUM (AL) (UG/L)	DIS- SOLVED ARSENIC (AS) (UG/L)	DIS- SOLVED BARIUM (BA) (UG/L)	DIS- SOLVED BERYL- LIUM (BE) (UG/L)	TOTAL BERYL- LIUM (BE) (UG/L)	DIS- SOLVED BORON (B) (UG/L)	DIS- SOLVED CAD- MIUM (CD) (UG/L)	TOTAL CAD- MIUM (CD) (UG/L)	DIS- SOLVED CHRO- MIUM (CR) (UG/L)	HEXA- VALENT CHRO- MIUM (CR6) (UG/L)	DIS- SOLVED COBALT (CO) (UG/L)
NOV 27...	20	150	0	0	0	0	40	0	1	0	0	1
MAY 18...	60	160	1	0	0	0	80	0	0	0	0	1

DATE	TOTAL COBALT (CO) (UG/L)	DIS- SOLVED COPPER (CU) (UG/L)	TOTAL COPPER (CU) (UG/L)	CYANIDE (CN) (MG/L)	DIS- SOLVED IRON (FE) (UG/L)	TOTAL IRON (FE) (UG/L)	DIS- SOLVED LEAD (PB) (UG/L)	TOTAL LEAD (PB) (UG/L)	DIS- SOLVED LITHIUM (LI) (UG/L)	DIS- SOLVED MAN- GANESE (MN) (UG/L)	TOTAL MAN- GANESE (MN) (UG/L)	DIS- SOLVED MERCURY (MG) (UG/L)
NOV 27...	0	6	27	.00	170	610	1	2	0	70	110	.2
MAY 18...	20	3	10	.01	130	910	2	100	0	20	150	.2

DATE	TOTAL MERCURY (MG) (UG/L)	DIS- SOLVED MOLYB- DENUM (MO) (UG/L)	DIS- SOLVED NICKEL (NI) (UG/L)	TOTAL NICKEL (NI) (UG/L)	OIL AND GREASE (MG/L)	DIS- SOLVED SELE- NIUM (SE) (UG/L)	DIS- SOLVED SILVER (AG) (UG/L)	TOTAL SILVER (AG) (UG/L)	DIS- SOLVED STRON- TIUM (SR) (UG/L)	DIS- SOLVED VANA- DIUM (V) (UG/L)	DIS- SOLVED ZINC (ZN) (UG/L)	TOTAL ZINC (ZN) (UG/L)
NOV 27...	1.0	0	7	43	3	3	1	7	70	.0	10	60
MAY 18...	.3	0	7	50	1	5	0	10	90	.5	370	410

## RUM RIVER BASIN

05287000 RUM RIVER AT ANOKA, MINN.

LOCATION.--Lat 45°11'54", long 93°23'28", SE¼SE¼ sec.1, T.31 N., R.25 W., Anoka County, at bridge on Main Street in Anoka, 450 ft (137 m) downstream from dam, and 0.6 mi (1.0 km) upstream from mouth.

DRAINAGE AREA.--1,580 mi<sup>2</sup> (4,090 km<sup>2</sup>), approximately.

PERIOD OF RECORD.--Chemical analyses: October 1972 to September 1973.

REMARKS.--BOD and bacteria data furnished by Metropolitan Sewer Board, St. Paul, Minn.

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	TEMPER- ATURE (DEG C)	DIS- CHARGE (CFS)	SPF- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	DIS- SOLVED SOLIDS (RESI- DUE AT 180 C) (MG/L)	DIS- SOLVED SOLIDS (TONS PER DAY)	SUS- PENDED SOLIDS (MG/L)	TUR- BID- ITY (JTU)	COLOR (PLAT- INUM- CORALY UNITS)	DIS- SOLVED OXYGEN (MG/L)	RIO- CHEM- ICAL OXYGEN DEMAND (MG/L)	PH (UNITS)	CAR- BONATE (CO3) (MG/L)
OCT. 18...	5.5	1020	273	166	457	19	4	30	12.5	11.5	7.4	0
NOV. 27...	1.0	1090	283	222	653	15	5	30	10.1	1.9	7.2	0
DEC. 18...	.5	719	310	218	423	6	4	20	11.4	.6	7.0	0
JAN. 18...	.5	780	300	184	388	40	4	20	11.1	--	7.3	0
FEB. 14...	.0	694	307	204	382	6	3	20	11.9	1.7	7.5	0
MAR. 20...	2.0	5750	141	111	1720	11	7	80	12.0	3.4	8.0	0
APR. 12...	4.0	1480	254	171	683	3	4	30	13.3	1.6	7.8	0
MAY 17...	14.0	1540	246	256	1060	9	5	40	10.3	2.4	8.0	0
JULY 10...	25.0	585	254	188	297	9	5	30	8.4	3.6	8.0	0
AUG. 02...	21.5	573	256	176	272	44	4	10	9.3	4.0	7.9	0
30...	24.0	666	269	178	320	14	6	20	8.5	2.5	8.2	0

DATE	RICAR- BONATE (MG/L)	ALKAL- INITY AS CaCO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DIS- SOLVED CAL- CIUM (CA) (MG/L)	DIS- SOLVED MAG- NES- SIUM (MG)	MAGNE- SIUM (CA, MG) (MG/L)	NON- CAR- BONATE HARD- NESS (MG/L)	DIS- SOLVED SODIUM (NA) (MG/L)	SODIUM AD- SORP- TION RATIO	PERCENT SODIUM	DIS- SOLVED PHOS- PHORUS (K) (MG/L)	DIS- SOLVED CHLOR- IDE (CL) (MG/L)
OCT. 18...	164	135	10	40	12	150	15	3.9	.1	5	1.8	4.0
NOV. 27...	166	136	17	37	12	140	4	4.8	.2	7	2.1	5.3
DEC. 18...	184	151	29	41	13	160	5	5.5	.2	7	2.1	4.2
JAN. 18...	177	145	14	41	12	150	7	5.4	.2	7	2.0	6.7
FEB. 14...	186	153	9.4	41	12	150	0	4.9	.2	6	1.9	4.9
MAR. 20...	67	55	1.1	16	4.9	60	5	2.0	.1	6	4.5	4.4
APR. 12...	143	117	3.6	33	10	120	6	3.7	.1	6	1.9	4.0
MAY 17...	146	120	2.3	33	9.9	120	0	4.1	.2	7	1.5	3.6
JULY 10...	163	134	2.6	35	11	130	0	4.9	.2	7	1.5	5.0
AUG. 02...	150	123	3.0	32	11	130	2	3.0	.1	5	1.6	4.5
30...	159	130	1.6	36	11	140	5	4.8	.2	7	2.0	4.1

05287000 RUM RIVER AT ANOKA, MINN.--Continued

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	DIS- SOLVED SULFATE (MG/L)	DIS- SOLVED FLUORIDE (MG/L)	DIS- SOLVED AMMONIA NITROGEN (MG/L)	DIS- SOLVED NITRITE (MG/L)	DIS- SOLVED NITRATE (MG/L)	AMMONIA NITROGEN (MG/L)	ORGANIC NITROGEN (MG/L)	DIS- SOLVED PHOSPHORUS (MG/L)	PHENOLS (UG/L)	CON- FIRMED COLIFORM (MPN)	FECAL COLIFORM (FC COUNT)
OCT. 18...	6.9	.2	.10	.00	.07	--	.90	.04	2	790	45
NOV. 27...	10	.2	.05	.00	3.3	.05	.61	.04	8	1400	490
DEC. 18...	10	.2	.10	.00	.29	.10	.71	.06	2	4900	1400
JAN. 18...	10	.2	.16	.02	.32	.16	.36	.04	2	790	--
FEB. 14...	11	.2	--	.01	.37	.11	.51	.03	4	330	130
MAR. 20...	11	.1	--	.01	.41	.30	1.1	.09	3	700	18
APR. 12...	8.4	.2	--	.00	.09	.06	.63	.05	7	1700	20
MAY 17...	7.4	.4	--	.25	.00	.08	1.0	.00	4	270	45
JULY 10...	7.4	.3	--	.00	.00	.06	.84	.04	3	--	730
AUG. 02...	8.4	.2	--	.00	.01	.04	.86	.01	4	--	220
30...	8.0	.0	--	.01	.12	.13	.87	.07	3	--	300

DATE	DIS- SOLVED ALUMINUM (AL) (UG/L)	TOTAL ALUMINUM (AL) (UG/L)	DIS- SOLVED ARSENIC (AS) (UG/L)	DIS- SOLVED BARIUM (BA) (UG/L)	DIS- SOLVED BERYLLIUM (BE) (UG/L)	TOTAL BERYLLIUM (BE) (UG/L)	DIS- SOLVED BORON (B) (UG/L)	DIS- SOLVED CADMIUM (CD) (UG/L)	TOTAL CADMIUM (CD) (UG/L)	DIS- SOLVED CHROMIUM (CR) (UG/L)	HEXA- VALENT CHROMIUM (CR6) (UG/L)	DIS- SOLVED COBALT (CO) (UG/L)
NOV. 27...	30	150	0	0	0	0	30	0	1	0	0	1
MAY 17...	60	180	2	0	0	0	30	2	20	0	0	0

DATE	TOTAL COBALT (CO) (UG/L)	DIS- SOLVED COPPER (CU) (UG/L)	TOTAL COPPER (CU) (UG/L)	CYANIDE (CN) (MG/L)	DIS- SOLVED IRON (FE) (UG/L)	TOTAL IRON (FE) (UG/L)	DIS- SOLVED LEAD (PB) (UG/L)	TOTAL LEAD (PB) (UG/L)	DIS- SOLVED LITHIUM (LI) (UG/L)	DIS- SOLVED MANGANESE (MN) (UG/L)	TOTAL MANGANESE (MN) (UG/L)	DIS- SOLVED MERCURY (MG) (UG/L)
NOV. 27...	1	12	24	.00	140	610	1	2	0	60	120	.2
MAY 17...	20	0	10	.01	410	1300	14	100	0	70	150	.2

DATE	TOTAL MERCURY (MG) (UG/L)	DIS- SOLVED MOLYBDENUM (MO) (UG/L)	DIS- SOLVED NICKEL (NI) (UG/L)	TOTAL NICKEL (NI) (UG/L)	OIL AND GREASE (MG/L)	DIS- SOLVED SELENIUM (SE) (UG/L)	DIS- SOLVED SILVER (AG) (UG/L)	TOTAL SILVER (AG) (UG/L)	DIS- SOLVED STRONTIUM (SR) (UG/L)	DIS- SOLVED VANADIUM (V) (UG/L)	DIS- SOLVED ZINC (ZN) (UG/L)	TOTAL ZINC (ZN) (UG/L)
NOV. 27...	.2	0	7	51	2	2	0	6	70	9.4	30	80
MAY 17...	.2	0	7	50	1	8	0	10	80	.2	0	1000

## RICE CREEK BASIN

05288600 RICE CREEK AT FRIDLEY, MINN.

LOCATION.--Lat 45°05'30", long 93°15'47", in NW¼ sec.14, T.30 N., R.24 W, Anoka County, at State Highway 47 at Fridley, 1.0 mi (1.6 km) upstream from mouth.

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	TEMPER- ATURE (DEG C)	DIS- CHARGE (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	DIS- SOLVED SOLIDS (PERI- DUE AT 180 C) (MG/L)	DTS- SOLVED SOLIDS (TONS PER DAY)	SUS- PENDED SOLIDS (MG/L)	TUR- BID- ITY (JTU)	COLOR (PLAT- INUM- COBALT UNITS)	DTS- SOLVED OXYGEN (MG/L)	RIO- CHEM- ICAL OXYGEN DEMAND (MG/L)	PH (UNITS)	CAR- BONATE (CO3) (MG/L)
OCT.												
1A...	3.0	21	454	280	16.3	29	6	40	12.0	4.6	7.5	0
NOV.												
24...	2.0	56	448	312	47.6	14	4	30	13.8	2.7	6.4	0
DEC.												
14...	.5	25	528	316	21.8	2	4	60	9.8	2.7	7.1	0
JAN.												
17...	.0	14	679	440	16.0	38	4	50	7.8	1.0	7.3	0
FEB.												
13...	.0	10	703	440	12.5	4	4	50	9.1	2.1	7.5	0
MAR.												
16...	1.5	138	386	240	69.4	32	8	40	10.9	5.8	7.5	0
APR.												
11...	2.5	135	332	216	78.7	16	5	50	12.9	5.9	7.7	0
MAY												
11...	13.0	05	409	345	88.5	26	7	40	10.9	4.9	7.7	0
JULY												
03...	22.0	56	406	269	40.7	37	10	30	7.2	5.9	7.8	0
AUG.												
01...	20.0	20	409	281	15.7	117	10	30	10.1	7.4	8.2	0
31...	24.0	8.2	467	293	64.9	17	6	30	9.6	--	8.1	0

DATE	RICAR- BONATE (MG/L)	ALKA- LITY AS CACO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DIS- SOLVED CAL- CIUM (CA) (MG/L)	DTS- SOLVED MAG- NE- SIUM (MG)	HARD- NESS (CA,MG) (MG/L)	NON- CAR- BONATE HARD- NESS (MG/L)	DIS- SOLVED SODIUM (NA) (MG/L)	SODIUM AD- SORP- TION RATIO	PERCENT SODIUM	DTS- SOLVED PO- TAS- SIUM (K) (MG/L)	DIS- SOLVED CHLO- RIDE (CL) (MG/L)
OCT.												
1A...	200	164	10	54	15	200	33	18	.6	16	3.2	32
NOV.												
24...	212	174	135	55	16	200	26	13	.4	12	3.6	21
DEC.												
14...	272	223	35	70	20	260	34	16	.4	12	3.9	24
JAN.												
17...	299	245	24	75	20	270	24	33	.9	21	5.8	58
FEB.												
13...	297	240	15	81	21	290	45	32	.8	19	6.3	56
MAR.												
16...	103	117	7.2	38	9.4	130	16	21	.8	25	4.2	37
APR.												
11...	155	127	4.9	40	11	150	18	9.6	.3	12	3.4	15
MAY												
11...	112	92	3.6	47	13	170	78	16	.5	17	4.2	27
JULY												
03...	178	146	4.5	45	14	170	24	16	.5	17	3.7	27
AUG.												
01...	164	135	1.7	44	15	170	37	20	.7	20	4.0	33
31...	170	139	2.2	43	14	170	26	29	1.0	27	5.8	46

## 05288600 RICE CREEK AT FRIDLEY, MINN.--Continued

PERIOD OF RECORD.--Chemical analyses: October 1972 to September 1973.

REMARKS.--BOD and bacteria data furnished by Metropolitan Sewer Board, St. Paul, Minn.

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	DIS- SOLVED SULFATE (SO <sub>4</sub> ) (MG/L)	DIS- SOLVED FLUOR- IDE (F) (MG/L)	DIS- SOLVED AMMONIA NITRO- GEN (N) (MG/L)	DIS- SOLVED NITRITE (N) (MG/L)	DIS- SOLVED NITRATE (N) (MG/L)	AMMONIA NITRO- GEN (N) (MG/L)	ORGANIC NITRO- GEN (N) (MG/L)	DIS- SOL- VED- PHOS- PHORUS (P) (MG/L)	PHENOLS (UG/L)	CON- FIRMED COLI- FORM (MPN)	FECAL COLI- FORM (EC BROTH) (MPN)
OCT. 18...	26	.5	.24	.01	.37	.24	1.4	.02	15	330	78
NOV. 24...	25	.3	.27	.01	6.2	.27	1.1	.05	30	700	18
DEC. 14...	29	.4	.69	.00	.29	.68	1.1	.02	2	490	330
JAN. 17...	37	.4	1.4	.01	.25	1.4	.80	.02	6	310	18
FEB. 13...	61	.4	--	.00	.30	1.4	1.0	.05	0	120	45
MAR. 16...	22	.2	--	.02	.34	.72	1.1	.05	7	790	110
APR. 11...	16	.2	--	.00	.04	.23	1.4	.04	6	78	20
MAY 11...	23	.2	--	.02	17	.20	1.6	.02	4	330	230
JULY 03...	20	.3	--	.01	.04	.23	2.4	.02	0	--	480
AUG. 01...	24	.2	--	.01	.22	.19	1.9	.02	3	--	140
31...	27	.2	--	.02	.21	.28	1.9	.04	14	--	--

DATE	DIS- SOLVED ALUM- INUM (AL) (UG/L)	TOTAL ALUM- INUM (AL) (UG/L)	DIS- SOLVED ARSENIC (AS) (UG/L)	DIS- SOLVED BARIUM (BA) (UG/L)	DIS- SOLVED BERYL- LIUM (BE) (UG/L)	TOTAL BERYL- LIUM (BE) (UG/L)	DIS- SOLVED BORON (B) (UG/L)	DIS- SOLVED CAD- MIUM (CD) (UG/L)	TOTAL CAD- MIUM (CD) (UG/L)	DIS- SOLVED CHRO- MIUM (CR) (UG/L)	HEXA- VALENT CHRO- MIUM (CR6) (UG/L)	DIS- SOLVED COBALT (CO) (UG/L)
NOV. 24...	50	100	1	0	0	0	60	0	1	0	0	0
MAY 11...	70	170	2	0	0	0	50	0	0	0	0	0

DATE	TOTAL COBALT (CO) (UG/L)	DIS- SOLVED COPPER (CU) (UG/L)	TOTAL COPPER (CU) (UG/L)	CYANIDE (CN) (MG/L)	DIS- SOLVED IRON (FE) (UG/L)	TOTAL IRON (FE) (UG/L)	DIS- SOLVED LEAD (PB) (UG/L)	TOTAL LEAD (PB) (UG/L)	DIS- SOLVED LITHIUM (LI) (UG/L)	DIS- SOLVED MAN- GANESE (MN) (UG/L)	TOTAL MAN- GANESE (MN) (UG/L)	DIS- SOLVED MERCURY (HG) (UG/L)
NOV. 24...	0	9	20	.00	190	360	2	2	0	80	130	.1
MAY 11...	20	4	10	.00	160	730	4	100	0	70	210	.0

DATE	TOTAL MERCURY (HG) (UG/L)	DIS- SOLVED MOLYS- BENUM (MO) (UG/L)	DIS- SOLVED NICKEL (NI) (UG/L)	TOTAL NICKEL (NI) (UG/L)	OIL AND GREASE (MG/L)	DIS- SOLVED SELF- NIUM (SE) (UG/L)	DIS- SOLVED SILVER (AG) (UG/L)	TOTAL SILVER (AG) (UG/L)	DIS- SOLVED STRON- TIUM (SR) (UG/L)	DIS- SOLVED VANA- DIUM (V) (UG/L)	DIS- SOLVED ZINC (ZN) (UG/L)	TOTAL ZINC (ZN) (UG/L)
NOV. 24...	.1	1	2	45	4	7	1	5	120	9.5	50	50
MAY 11...	.0	0	0	50	37	7	0	10	140	.0	560	700

## MINNESOTA RIVER BASIN

05311000 MINNESOTA RIVER AT MONTEVIDEO, MINN.

LOCATION.--Lat 44°56'00", long 95°44'00", in NW¼NW¼ sec.19, T.117 N., R.40 W., Lac qui Parle County, at gaging station, on right bank 100 ft (30 m) upstream from bridge on U.S. Highway 212, at Montevideo, and 400 ft (122 m) downstream from Chippewa River.

DRAINAGE AREA.--6,180 mi<sup>2</sup> (16,000 km<sup>2</sup>), approximately.

PERIOD OF RECORD.--Chemical analyses: November 1961 to September 1966, October 1972 to September 1973.  
Water temperatures: November 1961 to September 1963.

REMARKS.--Miscellaneous chemical analyses are published for water year 1972. Some spectrographic data available at district office at St. Paul, Minn.

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	TEMPER- ATURE (DEG C)	DIS- CHARGE (CFS)	SPE- CTIC CON- DUCT- ANCE (MICRO- MHOS)	DIS- SOLVED SOLIDS (RESI- DUE AT 180 C) (MG/L)	DIS- SOLVED SOLIDS (SUM OF CONSTIT- UENTS) (MG/L)	DIS- SOLVED SOLIDS (TONS PER DAY)	COLOR (PLAT- INUM- COBALT UNITS)	PH (UNITS)	CAR- BONATE (CO3) (MG/L)	BICAR- BONATE (HCO3) (MG/L)
NOV. 27...	1.0	272	939	768	614	564	20	7.2	0	374
JAN. 29...	.0	564	1070	772	730	1180	20	7.9	0	423
MAR. 01...	1.5	583	822	656	531	1030	30	7.4	0	306
28...	5.5	4130	827	594	533	6620	30	7.7	0	247
MAY 08...	16.5	1470	952	689	640	2730	30	7.9	0	291
JUNE 08...	22.0	1440	1030	750	718	2920	20	8.6	12	268
JULY 18...	24.5	66	979	707	640	128	30	8.1	0	330
AUG. 23...	20.0	67	930	648	578	117	20	8.0	0	251
SEP. 27...	15.5	58	902	654	592	103	20	8.2	0	313

DATE	ALKAL- INITY AS CaCO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DIS- SOLVED CAL- CIUM (CA) (MG/L)	DIS- SOLVED MAG- NE- SIUM (MG) (MG/L)	HARD- NESS (CA, MG) (MG/L)	NON- CAR- BONATE HARD- NESS (MG/L)	DIS- SOLVED SODIUM (NA) (MG/L)	SODIUM AD- SORP- TION RATIO	PERCENT SODIUM	DIS- SOLVED PO- TAS- SIUM (K) (MG/L)
NOV. 27...	307	38	100	58	490	180	25	.5	10	6.6
JAN. 29...	347	8.5	110	67	550	200	31	.6	11	8.3
MAR. 01...	251	19	87	42	390	140	22	.5	11	7.9
28...	203	7.9	89	44	400	200	20	.4	10	7.2
MAY 08...	230	5.9	110	54	500	260	23	.4	9	6.4
JUNE 08...	240	1.2	110	65	540	300	36	.7	12	7.3
JULY 18...	271	4.2	98	59	490	220	34	.7	13	6.6
AUG. 23...	206	4.0	93	38	390	180	32	.7	15	7.0
SEP. 27...	257	3.2	92	52	440	190	29	.6	12	5.8



05311000 MINNESOTA RIVER AT MONTEVIDEO, MINN.--Continued

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	DIS- SOLVED CHLO- RIDE (CL) (MG/L)	DIS- SOLVED SULFATE (SO4) (MG/L)	DIS- SOLVED FLUO- RIDE (F) (MG/L)	DIS- SOLVED BORON (B) (UG/L)	DIS- SOLVED IRON (FE) (UG/L)	DIS- SOLVED MAN- GANESE (MN) (UG/L)	DIS- SOLVED SILICA (SIO2) (MG/L)	DIS- SOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL PHOS- PHORUS (P) (MG/L)
NOV. 27...	14	210	.5	120	300	120	12	.79	.12
JAN. 29...	13	280	.4	190	250	190	10	.28	.11
MAR. 01...	12	190	.4	150	50	200	15	.77	.27
28...	9.8	220	.2	90	40	90	14	1.5	.18
MAY 08...	11	280	.3	100	20	60	7.6	.81	.16
JUNE 08...	10	340	.4	160	30	30	4.8	.09	.11
JULY 18...	24	240	.4	160	20	80	14	.26	.43
AUG. 23...	23	240	.4	170	30	50	19	.25	.38
SEP. 27...	17	220	.3	170	40	30	20	.25	.28

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 (9 m) downstream from bridge on U.S. Highway 14 at New Ulm, and 6.1 mi (9.8 km) upstream from Cottonwood River.

DRAINAGE.--9,530 mi<sup>2</sup> (24,680 km<sup>2</sup>), 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, 1,200 micromhos May 11; minimum daily observed, 561 micromhos Mar. 12.

Water temperatures: Maximum, 29°C July 18; minimum, freezing point on many days during winter period.

Sediment concentrations: Maximum daily, 342 mg/l June 11; minimum daily, 17 mg/l Jan. 29 to Feb. 11.

Sediment loads: Maximum daily, 2,500 tons (2,270 tonnes) Mar. 14; minimum daily, 9.9 tons (9.0 tonnes) Sept. 12, 15.

Period of record:

Specific conductance: Maximum daily observed, 1,200 micromhos May 11, 1973; minimum daily observed, 420 micromhos Mar. 19, 1972.

Water temperatures: Maximum, 29°C July 18, 1973; 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 (31,000 tonnes) Apr. 13, 1969; minimum daily, 6.9 tons (6.3 tonnes) Feb. 15, 16, 1970.

REMARKS.--Flow affected by ice during winter period.

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C) , WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973  
(ONCE DAILY)

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	722	777	922	---	---	---	811	847	858	868	815	845
2	784	760	1170	---	---	---	831	789	887	882	828	833
3	784	779	1160	---	---	---	793	841	935	854	864	833
4	784	839	---	---	899	---	836	825	978	847	864	821
5	750	824	---	---	---	---	836	847	969	720	851	821
6	736	871	---	---	---	---	802	770	943	808	857	972
7	701	909	---	---	---	---	811	907	887	847	833	899
8	720	929	---	1120	---	---	788	955	910	815	839	832
9	730	960	---	---	---	---	802	992	895	822	833	857
10	736	974	847	842	---	---	836	914	887	834	833	877
11	710	988	---	---	941	---	862	1200	887	840	833	833
12	736	1030	---	---	---	561	836	927	887	840	821	940
13	720	1060	---	---	---	563	841	1040	865	840	902	827
14	750	1030	---	---	---	592	811	1060	872	815	833	980
15	740	994	---	1020	---	603	831	1040	858	834	827	1080
16	744	964	---	---	---	619	811	1040	851	834	839	997
17	741	937	852	---	---	662	831	969	858	840	857	845
18	750	909	---	---	1100	727	920	976	858	880	839	833
19	750	928	---	---	---	819	830	920	872	897	833	839
20	750	928	996	---	---	892	625	969	887	875	857	864
21	757	988	---	1000	---	874	841	793	887	847	777	845
22	741	974	---	---	---	858	888	812	872	779	729	839
23	741	981	---	---	---	863	920	818	872	868	777	711
24	784	974	802	---	---	832	894	799	895	868	845	804
25	788	988	---	---	---	817	830	846	910	875	777	788
26	772	1030	---	---	---	798	830	858	918	890	799	851
27	770	960	---	---	---	766	876	844	875	882	833	833
28	784	1030	---	869	---	784	841	818	875	882	827	890
29	788	915	---	---	---	779	814	824	911	882	839	845
30	786	922	---	---	---	784	794	824	882	882	897	839
31	770	---	1140	---	---	806	---	858	---	890	839	---
MONTH	754	938	---	---	---	---	836	901	891	850	832	862
YEAR	MAX	1200	MTN	561	MEAN	857						

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

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973  
(UNCE-DAILY)

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	7.0	0.0	---	---	---	6.0	9.0	20.0	24.0	22.0	25.0
2	---	6.5	0.0	---	---	---	6.0	9.0	20.0	26.0	22.5	25.0
3	---	6.0	0.0	---	---	---	6.0	9.0	21.0	25.0	24.0	24.0
4	---	7.0	---	---	0.0	---	6.0	10.0	21.0	25.0	24.0	24.0
5	---	8.0	---	---	---	---	9.0	12.0	20.0	25.0	25.0	23.0
6	---	8.0	---	---	---	---	6.0	12.0	20.0	25.0	24.0	21.0
7	---	5.0	---	---	---	---	6.0	13.0	21.0	25.0	26.0	21.0
8	---	5.0	---	0.0	---	---	5.0	14.0	22.0	26.0	27.0	20.0
9	---	5.0	---	---	---	---	4.0	15.0	24.0	25.0	25.0	19.0
10	---	5.0	0.0	0.0	---	---	7.0	15.0	24.0	26.0	25.0	19.0
11	---	5.0	---	---	0.0	---	7.0	14.0	24.0	25.0	25.0	19.0
12	---	5.0	---	---	---	3.0	7.0	14.0	23.0	26.0	25.0	18.0
13	13.0	3.0	---	---	---	3.0	6.0	14.0	23.0	25.0	25.0	18.0
14	12.0	3.0	---	---	---	3.0	6.0	14.0	24.0	25.0	24.0	17.0
15	10.0	2.5	---	0.0	---	4.0	7.0	14.0	24.0	22.0	24.0	15.0
16	11.0	2.0	---	---	---	3.0	9.0	13.0	25.0	27.0	24.0	14.0
17	6.0	1.0	0.0	---	---	1.5	9.5	14.0	25.0	27.0	24.0	14.0
18	6.0	2.0	---	---	0.0	3.0	13.0	17.0	24.0	29.0	26.0	15.0
19	6.0	1.0	---	---	---	4.0	10.0	17.0	22.0	27.0	28.0	17.0
20	6.0	2.0	0.5	---	---	6.0	14.0	18.0	22.0	26.0	24.0	15.0
21	6.0	1.0	---	0.0	---	6.0	13.0	19.0	22.0	24.0	24.0	15.0
22	6.0	1.0	---	---	---	5.0	12.0	19.0	24.0	25.0	20.0	15.0
23	8.0	4.0	---	---	---	7.0	13.0	19.0	24.0	25.0	20.0	15.0
24	6.0	2.0	0.0	---	---	5.0	13.0	19.0	24.0	26.0	24.0	15.0
25	4.0	2.0	---	---	---	5.0	13.0	18.5	24.0	24.0	24.0	15.0
26	8.0	2.0	---	---	---	5.0	12.0	19.0	25.0	25.0	25.0	16.0
27	8.0	0.0	---	---	---	8.0	11.0	19.0	24.0	24.0	25.0	16.0
28	7.0	0.0	---	0.0	---	7.0	11.0	17.0	22.0	25.0	26.0	17.0
29	6.0	0.0	---	---	---	7.0	11.0	16.0	21.0	25.0	25.0	17.0
30	7.0	0.0	---	---	---	8.0	11.0	17.0	23.0	24.0	25.0	18.0
31	7.0	---	0.0	---	---	6.0	---	18.0	---	22.0	25.0	---
MONTH	---	3.5	---	---	---	---	9.0	15.0	22.5	25.0	24.5	18.0
YEAR	MAX	29.0	MIN	0.0	MEAN	14.5						

BED MATERIAL PARTICLE SIZE, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973  
(METHODS OF ANALYSIS: B, BOTTOM WITHDRAWAL TUBE; C, CHEMICALLY DISPERSED; P, PIPET; S, SIEVE;  
V, VISUAL ACCUMULATION TUBE; W, IN DISTILLED WATER)

DATE	TIME	NUMBER OF SAMPLING POINTS	INSTANTANEOUS DISCHARGE (CFS)	BED MAT. FALL DIAM. % FINER THAN .062 MM	BED MAT. FALL DIAM. % FINER THAN .125 MM	BED MAT. FALL DIAM. % FINER THAN .250 MM	BED MAT. FALL DIAM. % FINER THAN .500 MM	BED MAT. FALL DIAM. % FINER THAN 1.00 MM	BED MAT. SIEVE DIAM. % FINER THAN 2.00 MM	BED MAT. SIEVE DIAM. % FINER THAN 4.00 MM	BED MAT. SIEVE DIAM. % FINER THAN 8.00 MM	METHOD OF ANALYSIS
MAR.												
26...	1720	4	7120	65	78	90	98	99	100	--	--	SVW
AUG.												
13...	1130	4	107	19	23	31	43	52	56	59	64	SVW

## MINNESOTA RIVER BASIN

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

## SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	MEAN DISCHARGE (CFS)	OCTOBER	SEDIMENT DISCHARGE (TUNS/DAY)	MEAN DISCHARGE (CFS)	NOVEMBER	SEDIMENT DISCHARGE (TUNS/DAY)	MEAN DISCHARGE (CFS)	DECEMBER	SEDIMENT DISCHARGE (TUNS/DAY)
		MEAN CONCEN- TRATION (MG/L)			MEAN CONCEN- TRATION (MG/L)			MEAN CONCEN- TRATION (MG/L)	
1	682	110	203	677	256	468	538	133	193
2	682	112	206	941	232	589	538	131	190
3	686	115	213	1120	168	508	538	128	186
4	668	121	218	1430	177	683	540	120	175
5	650	125	219	1660	146	654	550	111	165
6	654	112	198	1850	165	824	560	104	157
7	668	110	198	1940	187	980	570	100	154
8	708	130	249	1930	162	844	580	97	152
9	740	125	250	1820	144	708	590	95	151
10	736	118	234	1620	124	542	600	94	152
11	682	112	206	1500	117	474	610	89	147
12	636	108	185	1530	145	599	620	83	139
13	618	103	172	1630	168	739	630	82	139
14	610	120	198	1700	143	656	640	79	137
15	587	132	209	1720	152	706	650	76	133
16	564	125	190	1730	140	654	660	75	134
17	538	110	160	1720	115	534	670	71	128
18	528	96	137	1690	131	598	680	70	129
19	528	62	88	1590	143	614	700	69	130
20	524	78	110	1480	149	595	704	68	129
21	528	52	74	1440	151	587	708	60	115
22	533	49	71	1400	152	575	704	54	103
23	528	67	96	1340	142	514	700	48	91
24	528	100	143	1220	129	425	690	43	80
25	528	110	157	1130	119	363	680	39	72
26	533	105	151	1110	122	366	685	39	72
27	538	102	148	920	128	318	690	38	71
28	528	96	137	803	130	282	700	38	72
29	502	90	122	623	133	224	720	37	72
30	510	120	165	551	133	198	730	37	73
31	556	309	464	--	--	--	720	36	70
TOTAL	18501	--	5571	41815	--	16821	19895	--	3911
DAY	MEAN DISCHARGE (CFS)	JANUARY	SEDIMENT DISCHARGE (TUNS/DAY)	MEAN DISCHARGE (CFS)	FEBRUARY	SEDIMENT DISCHARGE (TUNS/DAY)	MEAN DISCHARGE (CFS)	MARCH	SEDIMENT DISCHARGE (TUNS/DAY)
		MEAN CONCEN- TRATION (MG/L)			MEAN CONCEN- TRATION (MG/L)			MEAN CONCEN- TRATION (MG/L)	
1	700	35	66	661	17	30	820	24	53
2	680	34	62	661	17	30	915	28	69
3	670	33	60	661	17	30	1040	32	90
4	660	32	57	661	17	30	1170	35	111
5	640	32	55	661	17	30	1330	39	140
6	635	31	53	661	17	30	1500	45	182
7	635	31	53	661	17	30	1680	53	240
8	630	31	53	661	17	30	1890	58	296
9	630	30	51	661	17	30	2130	66	380
10	630	29	49	661	17	30	2400	78	505
11	630	29	49	661	17	30	2700	101	736
12	630	28	48	661	18	32	3060	118	975
13	630	28	48	661	18	32	3490	196	1850
14	630	27	46	661	18	32	3900	237	2500
15	640	27	47	661	18	32	4600	195	2420
16	660	26	46	661	18	32	5300	149	2130
17	680	26	48	661	18	32	6100	106	1750
18	700	25	47	661	18	32	7260	104	2040
19	680	25	46	661	18	32	7580	92	1880
20	670	24	43	661	18	32	7620	61	1260
21	661	23	41	661	18	32	7440	93	1870
22	661	23	41	661	18	32	7230	74	1440
23	661	22	39	661	18	32	7100	54	1040
24	661	21	37	665	18	32	7010	35	662
25	661	20	36	670	19	34	6950	48	901
26	661	19	34	680	19	35	6880	31	576
27	661	19	34	720	20	39	6870	44	816
28	661	18	32	770	21	44	6710	30	544
29	661	17	30	--	--	--	6580	54	959
30	661	17	30	--	--	--	6440	86	1500
31	661	17	30	--	--	--	6260	45	761
TOTAL	20331	--	1411	18708	--	898	141955	--	30676

SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977									
APRIL									
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TUNS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TUNS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TUNS/DAY)
1	6080	43	706	2760	87	648	3260	245	2160
2	5870	54	856	2830	68	520	3140	232	1970
3	5620	58	880	2900	90	705	3000	254	2060
4	5360	51	738	2920	63	497	2870	206	1600
5	5100	50	689	2930	119	941	2770	277	2070
6	4900	99	1310	2930	88	696	2680	295	2130
7	4680	81	1020	2890	148	1150	2580	224	1560
8	4430	75	897	2880	177	1380	2470	298	1990
9	4090	70	773	2940	153	1210	2390	217	1400
10	3790	60	614	2960	150	1200	2300	263	1630
11	3560	79	759	2890	164	1280	2200	342	2030
12	3380	76	694	2750	129	958	2150	297	1720
13	3260	40	352	2570	160	1110	2080	286	1610
14	3150	57	485	2420	227	1480	1990	235	1260
15	3090	82	684	2400	189	1220	1880	224	1140
16	3040	92	755	2400	172	1110	1790	167	807
17	2990	70	565	2380	153	983	1610	167	726
18	3010	44	358	2340	179	1130	1540	232	965
19	3010	76	618	2280	124	763	1530	244	1010
20	3050	122	1000	2220	211	1260	1510	242	987
21	3060	99	818	2200	225	1340	1450	154	603
22	3000	149	1210	2180	217	1280	1360	142	521
23	2980	143	1150	2170	186	1090	1230	150	498
24	3020	117	954	2160	177	1030	1120	168	508
25	3060	107	884	2150	189	1100	1040	219	615
26	3050	133	1100	2660	228	1640	930	187	470
27	2960	121	967	3090	217	1810	837	197	445
28	2870	84	651	3200	210	1810	766	242	501
29	2800	120	907	3290	248	2200	652	188	351
30	2740	97	718	3360	215	1950	527	184	262
31	--	--	--	3360	210	1910	--	--	--
TOTAL	111000	--	24112	83410	--	37401	55652	--	35579
JULY									
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TUNS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TUNS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TUNS/DAY)
1	438	220	260	111	102	31	155	104	44
2	446	182	219	104	96	27	148	134	54
3	518	202	283	101	110	30	147	31	12
4	557	186	280	101	158	43	144	42	16
5	539	187	272	99	158	42	144	45	17
6	493	78	104	100	99	27	142	28	11
7	544	46	68	101	117	32	141	38	15
8	455	85	104	104	126	35	130	39	14
9	388	110	115	106	130	37	130	44	15
10	339	137	125	106	144	41	128	56	19
11	304	121	99	107	146	42	122	41	14
12	291	142	112	106	125	36	122	30	9.9
13	269	159	115	108	132	38	122	62	20
14	242	146	95	115	129	40	122	63	21
15	221	126	75	120	96	31	122	30	9.9
16	204	104	57	124	102	34	122	43	14
17	190	118	61	125	127	43	122	66	22
18	171	130	60	125	70	24	121	53	17
19	161	112	49	120	55	18	120	46	15
20	154	89	37	119	107	34	120	57	18
21	148	102	41	125	57	19	119	84	27
22	144	100	39	131	109	39	120	67	22
23	137	95	35	135	117	43	120	49	16
24	139	110	41	134	168	61	121	41	13
25	140	139	53	131	78	28	120	61	21
26	136	143	52	135	96	35	129	89	31
27	129	126	45	170	73	34	129	96	33
28	129	140	49	190	33	17	126	99	34
29	134	130	47	178	63	30	125	80	27
30	131	120	42	166	63	28	132	70	25
31	119	116	37	163	79	35	--	--	--
TOTAL	8410	--	3071	3860	--	1054	3671	--	626.8
TOTAL DISCHARGE FOR YEAR (CFS-DAYS)									
TOTAL SUSPENDED-SEDIMENT DISCHARGE FOR YEAR (TUNS)									
									527466
									161151.8

## MINNESOTA RIVER BASIN

05325000 MINNESOTA RIVER AT MANKATO, MINN.

LOCATION.--Lat 44°09'54", long 94°00'45", in NE¼NE¼ sec.13, T.108 N., R.27 W., Blue Earth County, 0.2 mi (0.3 km) upstream from gaging station on right bank at bridge on U.S. Highway 169 at Mankato, 1.1 mi (1.8 km) downstream from Blue Earth River, and at mile 107.1 (172.3 km) upstream from Mississippi River.

DRAINAGE AREA.--14,900 mi<sup>2</sup> (38,600 km<sup>2</sup>), approximately.

PERIOD OF RECORD.--Chemical analyses: October 1963 to August 1966.

Specific conductance: October 1971 to current year.

Water temperatures: October 1967 to current year.

Sediment records: October 1967 to current year.

EXTREMES.--Current year:

Specific conductance: Maximum daily observed, 1,000 micromhos Nov. 13, 14, Feb. 25; minimum daily observed, 450 micromhos March 14.

Water temperatures: Maximum, 26°C July 8, 13; minimum, freezing point on many days during winter period.

Sediment concentrations: Maximum daily, 980 mg/l Mar. 14; minimum daily, 24 mg/l Feb. 4, 5.

Sediment loads: Maximum daily, 46,800 tons (42,500 tonnes) Mar. 14; minimum daily, 45 tons (41 tonnes) Sept. 21.

Period of record:

Specific conductance: Maximum daily observed, 1,000 micromhos Nov. 13, 14, Feb. 25, 1973; 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 (224,100 tonnes) Apr. 9, 1969; minimum daily, 14 tons (13 tonnes) Jan. 13, 14, 1968.

REMARKS.--Flow affected by ice during winter period.

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C) , WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973  
(UNCE-DAILY)

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	757	796	961	852	---	---	802	730	872	770	717	733
2	757	869	961	---	---	---	811	706	895	770	729	752
3	761	889	---	---	---	---	816	698	918	770	729	738
4	761	798	---	---	827	---	836	665	918	727	715	733
5	772	858	---	---	---	---	836	694	935	737	729	743
6	766	847	---	---	---	---	862	734	943	722	747	735
7	761	834	---	---	---	---	841	760	910	727	747	765
8	757	869	---	762	---	---	873	825	918	737	733	752
9	750	922	---	---	---	---	862	830	903	730	752	752
10	753	880	---	---	---	---	862	847	903	712	757	752
11	766	892	---	---	---	721	878	847	895	716	762	752
12	761	934	---	---	880	500	884	888	895	716	752	757
13	761	1000	---	812	---	500	816	841	895	716	755	752
14	766	1000	---	---	---	450	811	847	887	725	757	752
15	784	996	---	---	---	611	788	876	880	711	752	772
16	853	941	---	---	---	673	719	907	880	720	715	777
17	802	934	922	---	---	680	789	941	851	716	747	777
18	802	909	---	---	899	689	784	907	844	716	743	793
19	802	903	---	---	---	693	770	888	832	720	752	783
20	807	903	945	817	---	699	804	860	838	720	762	793
21	807	903	---	---	---	760	836	847	838	716	747	799
22	798	886	---	---	---	780	847	804	812	730	724	815
23	795	897	886	---	---	792	858	841	818	735	729	815
24	795	922	---	---	---	771	894	879	805	662	729	810
25	795	922	---	---	1000	777	888	770	805	688	707	767
26	820	934	---	---	---	778	847	799	818	706	694	702
27	807	922	---	758	---	759	876	819	818	683	686	670
28	779	966	---	---	---	777	858	793	818	688	715	648
29	798	947	---	---	---	775	841	759	787	692	747	634
30	766	954	---	---	---	788	847	781	770	698	747	637
31	784	---	---	---	---	811	---	832	---	692	738	---
MONTH	776	908	---	---	---	---	835	813	863	718	736	749
YEAR	MAX	1000	MIN	450	MEAN	796						

05325000 MINNESOTA RIVER AT MANKATO, MINN.--Continued

TEMPERATURE (DEG. C) OF WATER , WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973  
(ONCE=DAILY)

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	15.5	7.0	1.0	0.0	---	---	7.5	9.5	18.0	21.0	22.0	23.5
2	16.5	2.0	1.0	---	---	---	6.0	8.0	19.5	23.0	20.0	23.0
3	16.0	7.0	---	---	---	---	7.0	9.0	20.0	23.0	21.5	24.0
4	15.0	6.0	---	---	0.0	---	6.5	10.0	19.0	24.0	23.0	22.0
5	16.0	8.0	---	---	---	---	7.0	11.5	19.0	23.0	24.0	20.0
6	16.0	8.0	---	---	---	---	7.0	12.0	19.0	24.0	23.0	19.0
7	15.0	6.0	---	---	---	---	7.0	12.0	20.0	25.0	24.0	18.5
8	15.0	6.0	---	0.0	---	---	6.0	11.5	21.0	26.0	25.0	20.0
9	12.5	6.0	---	---	---	---	5.0	13.0	21.0	25.5	25.0	18.0
10	14.0	6.0	---	---	---	---	4.0	14.0	23.0	24.5	22.5	18.0
11	14.0	5.0	---	---	---	0.0	5.0	13.5	24.0	24.0	22.0	18.0
12	13.0	5.0	---	---	0.0	3.0	5.0	13.0	22.0	25.0	22.0	17.0
13	14.0	4.0	---	0.0	---	4.0	5.5	12.0	21.0	26.0	23.0	18.0
14	12.0	4.0	---	---	---	5.0	6.0	12.0	22.0	22.5	22.0	16.5
15	10.0	3.0	---	---	---	5.0	9.0	13.0	24.0	21.5	23.0	17.0
16	10.0	2.0	---	---	---	4.0	5.5	13.0	24.5	21.5	22.0	14.0
17	8.5	2.0	0.0	---	---	4.0	7.5	13.0	24.0	22.0	22.5	13.5
18	7.0	2.5	---	---	0.0	4.0	10.0	13.5	23.0	23.5	24.0	13.0
19	7.0	3.0	---	---	---	4.5	12.0	15.0	21.0	24.0	25.0	14.5
20	5.0	2.0	0.0	0.0	---	5.0	12.5	16.0	20.0	23.0	24.0	13.0
21	6.0	2.0	---	---	---	5.0	14.0	17.5	19.0	22.0	22.0	14.0
22	6.0	1.0	---	---	---	6.0	13.0	19.0	19.0	21.0	19.0	13.0
23	5.0	2.0	0.0	---	---	6.0	12.0	18.0	21.0	21.0	19.0	13.0
24	5.0	3.0	---	---	---	6.5	12.5	18.5	22.0	21.0	20.0	15.0
25	8.0	1.5	---	---	0.0	7.0	12.0	16.0	22.0	23.0	20.0	17.0
26	10.0	1.0	---	---	---	7.0	12.0	15.5	23.0	22.5	21.0	18.0
27	8.0	1.0	---	0.0	---	9.0	11.5	15.5	22.0	22.0	24.0	16.0
28	8.0	1.0	---	---	---	8.0	12.0	14.5	20.0	20.0	25.0	15.0
29	8.0	1.0	---	---	---	7.5	11.0	15.0	20.0	21.0	24.5	16.0
30	7.0	1.0	---	---	---	7.5	12.0	15.0	20.0	22.0	25.0	15.0
31	6.5	---	---	---	---	7.5	---	16.0	---	22.0	24.5	---
MONTH	10.5	3.5	---	---	---	---	9.0	13.5	21.0	23.0	22.5	17.0
YEAR	MAX	26.0	MIN	0.0	MEAN	13.5						

BED MATERIAL PARTICLE SIZE, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973  
(METHODS OF ANALYSIS: B, BOTTOM WITHDRAWAL TUBE; C, CHEMICALLY DISPERSED; P, PIPET; S, SIEVE;  
V, VISUAL ACCUMULATION TUBE; W, IN DISTILLED WATER)

DATE	TYPE	TIME	NUMBER OF SAM- PLING POINTS	INSTAN- TANEOUS DIS- CHARGE (CF8)	BED MAT. FALL DIAM. % FINER THAN .062 MM	BED MAT. FALL DIAM. % FINER THAN .125 MM	BED MAT. FALL DIAM. % FINER THAN .250 MM	BED MAT. FALL DIAM. % FINER THAN .500 MM	BED MAT. FALL DIAM. % FINER THAN 1.00 MM	BED MAT. FALL DIAM. % FINER THAN 2.00 MM
			00063	00061	80158	80159	80160	80161	80162	80169
MAR. 27...	2	1500	4	13100	0	2	20	56	81	87
AUG. 13...	2	1130	5	309	1	2	4	10	32	37

DATE	BED MAT. SIEVE DIAM. % FINER THAN 4.00 MM	BED MAT. SIEVE DIAM. % FINER THAN 8.00 MM	METHOD OF ANALY- SIS
MAR. 27...	96	--	SVW
AUG. 13...	55	65	SVW

## MINNESOTA RIVER BASIN

05325000 MINNESOTA RIVER AT MANKATO, MINN.--Continued

SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	MEAN DISCHARGE (CFS)	OCTOBER	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	NOVEMBER	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	DECEMBER	SEDIMENT DISCHARGE (TONS/DAY)
		MEAN CONCEN- TRATION (MG/L)			MEAN CONCEN- TRATION (MG/L)			MEAN CONCEN- TRATION (MG/L)	
1	1590	98	421	1640	64	283	1980	120	642
2	1500	104	421	2400	203	1320	1850	114	569
3	1400	112	423	3330	284	2550	1800	110	535
4	1310	100	354	4180	274	3090	1770	105	502
5	1250	95	321	4690	415	5260	1730	100	467
6	1230	100	332	4810	330	4290	1700	98	450
7	1180	93	296	4790	299	3870	1650	96	428
8	1180	92	293	4630	190	2380	1600	95	410
9	1340	90	326	4450	162	1950	1570	95	403
10	1430	93	359	4180	164	1850	1530	94	388
11	1410	87	331	3880	143	1500	1480	92	368
12	1350	71	259	3740	105	1060	1440	92	358
13	1290	76	263	3780	137	1400	1400	92	348
14	1210	86	281	3640	146	1510	1370	91	337
15	1120	66	200	3820	123	1270	1340	91	329
16	1080	65	190	3760	119	1210	1320	92	328
17	1030	60	167	3700	103	1030	1300	92	323
18	982	47	125	3560	101	971	1250	92	311
19	937	47	119	3510	97	919	1240	91	305
20	903	31	76	3340	82	739	1200	89	288
21	937	57	144	3230	96	837	1200	88	285
22	937	58	147	3130	107	904	1200	86	279
23	982	40	106	2990	101	815	1200	84	272
24	992	48	129	2910	76	597	1200	84	272
25	1080	51	149	2840	93	713	1200	84	272
26	1480	56	224	2720	78	573	1200	83	269
27	1700	89	409	2570	102	708	1200	82	266
28	1690	86	392	2330	107	673	1200	81	262
29	1630	54	238	2080	139	781	1200	80	259
30	1560	47	198	2030	118	647	1220	78	257
31	1600	83	359	--	--	--	1260	76	259
TOTAL	39300	--	8052	102860	--	45700	43800	--	11041
DAY	MEAN DISCHARGE (CFS)	JANUARY	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	FEBRUARY	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MARCH	SEDIMENT DISCHARGE (TONS/DAY)
		MEAN CONCEN- TRATION (MG/L)			MEAN CONCEN- TRATION (MG/L)			MEAN CONCEN- TRATION (MG/L)	
1	1300	72	253	1650	26	116	1540	54	225
2	1350	70	255	1600	25	108	1670	65	293
3	1400	67	253	1580	25	107	1840	85	422
4	1430	63	243	1560	24	101	2050	110	609
5	1460	58	229	1550	24	100	2300	140	869
6	1400	53	200	1530	25	103	2700	180	1310
7	1360	48	176	1520	25	103	3100	240	2010
8	1300	48	168	1500	25	101	3800	290	2980
9	1280	47	162	1480	25	100	4700	370	4700
10	1270	47	161	1460	25	99	6300	450	7650
11	1230	47	156	1440	25	97	7800	624	13100
12	1230	46	153	1420	25	96	9200	623	15500
13	1230	45	149	1400	25	95	13500	860	31300
14	1230	43	143	1380	25	93	17700	980	46800
15	1230	40	133	1360	25	92	19100	753	38800
16	1230	39	130	1350	25	91	19600	570	30200
17	1230	38	126	1340	25	90	19500	436	23000
18	1300	36	126	1320	25	89	18600	333	16700
19	1380	34	127	1310	25	88	17800	263	12600
20	1500	33	134	1300	25	88	16700	369	16600
21	1600	30	130	1290	26	91	15700	243	10300
22	1720	33	153	1280	26	90	14500	213	8340
23	1860	35	176	1280	26	90	15500	214	7800
24	1850	34	170	1290	26	91	12900	197	6860
25	1800	33	160	1300	27	95	12800	184	6360
26	1790	32	155	1340	28	101	13000	176	6180
27	1780	31	149	1370	34	126	13300	191	6860
28	1760	30	143	1440	40	156	13300	194	6970
29	1740	29	136	--	--	--	12800	157	5430
30	1700	28	129	--	--	--	12400	156	5220
31	1670	27	122	--	--	--	11900	158	5080
TOTAL	45610	--	5100	39640	--	2797	335600	--	341068



SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

TABLE 1. MEAN DAILY DISCHARGE AND MEAN SUSPENDED SOLIDS LOAD FOR OCTOBER 1970 TO SEPTEMBER 1970									
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	11600	154	4820	8330	586	13200	9000	175	4250
2	11300	139	4240	10200	558	15400	8490	280	6420
3	11200	149	4510	12000	593	19200	7920	308	6590
4	11100	162	4860	13900	610	22900	7460	251	5060
5	10800	155	4520	14400	413	16100	7090	243	4650
6	10300	133	3700	13400	312	11300	6780	288	5270
7	9840	154	4090	12100	276	9020	6500	252	4420
8	9360	130	3290	11100	203	6080	6150	245	4070
9	8940	148	3570	10700	206	5950	5830	275	4330
10	8220	156	3460	10700	216	6240	5530	288	4300
11	7550	132	2690	10500	218	6180	5200	280	3930
12	7390	161	3210	9890	211	5630	5000	243	3280
13	7540	210	4280	8970	188	4550	4750	242	3100
14	7700	156	3240	8040	179	3890	4520	238	2900
15	8060	208	4530	7340	159	3150	4260	247	2840
16	8970	245	5930	6940	165	3090	4090	220	2430
17	9660	256	6680	6530	151	2660	3870	231	2410
18	10500	256	7260	6200	149	2490	3780	207	2110
19	10900	280	8240	5840	190	3000	3740	206	2080
20	10700	265	7660	5540	164	2450	3770	179	1820
21	10100	244	6650	5370	148	2150	3920	174	1840
22	9340	194	4890	5190	157	2200	3860	177	1840
23	8680	164	3840	4610	163	2030	3640	162	1590
24	8210	168	3720	5230	169	2390	3370	162	1470
25	7880	172	3660	5540	218	3260	3120	174	1470
26	7580	154	3150	5560	232	3480	2910	165	1300
27	7240	165	3230	6150	244	4050	2670	170	1230
28	6880	168	3120	6790	413	7570	2490	157	1060
29	6610	157	2800	7630	374	7700	2310	136	848
30	6480	143	2500	8520	237	5450	2160	135	787
31	--	--	--	9000	179	4350	--	--	--
TOTAL	270630	--	132340	262210	--	207110	144180	--	89695
JULY									
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	1910	147	758	579	94	147	496	114	153
2	1890	145	740	514	58	80	440	112	133
3	1860	137	688	455	42	52	432	151	176
4	2000	150	810	410	84	93	403	172	187
5	2070	145	810	364	68	68	363	135	132
6	2040	148	815	338	69	63	332	102	91
7	1960	146	773	315	78	66	326	97	85
8	1880	143	726	310	65	54	310	98	82
9	1690	153	698	315	71	60	305	90	74
10	1530	140	578	315	79	67	310	96	80
11	1500	119	482	299	62	50	294	94	75
12	1410	142	541	305	85	70	278	78	59
13	1240	128	429	357	91	88	273	101	74
14	1140	97	299	344	109	101	269	97	70
15	1030	96	267	344	114	106	259	95	66
16	926	96	240	375	110	117	259	104	73
17	816	112	247	363	83	81	259	100	70
18	705	124	236	363	107	105	259	73	51
19	672	89	161	395	108	115	254	77	53
20	598	93	150	351	105	100	245	78	52
21	541	84	123	337	164	149	236	71	45
22	532	84	121	505	158	215	236	76	48
23	640	93	161	551	123	183	240	77	50
24	1020	232	639	496	141	189	250	90	61
25	971	209	548	805	382	830	278	116	89
26	1140	229	705	903	268	653	496	169	226
27	1180	177	564	794	175	375	661	286	510
28	992	126	337	750	168	340	1070	446	1290
29	848	100	229	794	161	345	1590	648	2780
30	784	88	186	716	194	375	2320	909	5690
31	694	90	169	560	135	204	--	--	--
TOTAL	38209	--	14230	14627	--	5541	13743	--	12625
TOTAL DISCHARGE FOR YEAR (CFS-DAYS)									1350409
TOTAL SUSPENDED-SEDIMENT DISCHARGE FOR YEAR (TUNS)									875299

## 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 1.5 mi (2.4 km) northwest of Jordan, and at mile 39.4 (63.4 km) upstream from Mississippi River.

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	TEMPER- ATURE (DEG C)	DTS- CHARGE (CFS)	SPE- CTIC CON- DUCT- ANCE (MICRO- MHOS)	DIS- SOLVED SOLIDS (RFS)- DUE AT 180 C) (MG/L)	DIS- SOLVED SOLIDS (SUM OF CONSTI- TUENTS) (MG/L)	DIS- SOLVED SOLIDS (TONG PER DAY)	SUS- PENDED SOLIDS (MG/L)	TUR- BID- ITY (JTU)	COLOR (PLAT- INUM- COBALT UNITS)	DIS- SOLVED OXYGEN (MG/L)
OCT.										
24...	6.0	1460	845	536	540	2110	--	--	30	--
NOV.										
21...	2.0	3700	948	756	--	7550	45	20	20	10.3
DEC.										
18...	.0	1600	1180	796	--	3440	5	3	20	--
19...	.0	1050	1110	812	749	2300	--	--	5	--
JAN.										
10...	.0	1200	960	652	--	2110	4	4	20	8.0
FEB.										
10...	.0	2400	937	668	--	4330	15	4	20	10.0
27...	.0	1910	935	720	631	3710	--	--	10	--
MAR.										
09...	1.0	8660	452	302	280	7060	--	--	70	--
10...	4.0	14700	494	336	--	13300	527	90	80	12.0
APR.										
11...	5.0	9100	870	649	--	15900	91	30	30	12.5
MAY										
09...	13.0	14800	780	589	--	23500	122	30	30	9.8
JUNE										
20...	22.0	4370	886	634	--	7480	146	30	5	7.2
JULY										
11...	21.0	2180	846	618	--	3640	154	20	20	7.6
AUG.										
08...	26.0	750	732	495	--	1000	51	20	10	--
SEP.										
12...	18.0	440	829	524	--	623	107	20	20	9.9

DATE	DIS- SOLVED ALUM- INUM (AL) (UG/L)	TOTAL ALUM- INUM (AL) (UG/L)	DTS- SOLVED ARSENIC (AS) (UG/L)	DIS- SOLVED BARIUM (BA) (UG/L)	DIS- SOLVED PERYL- LIUM (BE) (UG/L)	TOTAL BERYL- LIUM (BE) (UG/L)	DIS- SOLVED BORON (B) (UG/L)	DIS- SOLVED CAD- MIUM (CD) (UG/L)	TOTAL CAD- MIUM (CD) (UG/L)	DIS- SOLVED CHRO- MIUM (CR) (UG/L)	HEXA- VALENT CHRO- MIUM (CR6) (UG/L)	DIS- SOLVED COBALT (CO) (UG/L)
NOV.												
21...	20	310	0	0	0	0	100	0	0	0	0	0
MAY												
09...	60	840	3	0	0	0	60	0	10	0	0	1

DATE	DIS- SOLVED GROSS ALPHA AS U-NAT. (PC/L)	SUS- PENDED GROSS ALPHA AS U-NAT. (PC/L)	DIS- SOLVED GROSS ALPHA AS U-NAT. (UG/L)	SUS- PENDED GROSS ALPHA AS U-NAT. (UG/L)	DIS- SOLVED GROSS BETA AS CS-137 (PC/L)	SUS- PENDED GROSS BETA AS CS-137 (PC/L)	DIS- SOLVED GROSS BETA AS AS SR90 /Y90 (PC/L)
OCT.							
24...	<1.2	.6	<3.7	1.7	15	3.6	12
NOV.							
21...	9.7	.5	29	1.5	10	6.9	9.2
DEC.							
19...	--	--	17	<.4	11	2.5	9.3
JAN.							
30...	--	--	14	<.4	13	1.6	11
FEB.							
27...	--	--	15	<.4	9.5	1.1	7.9
MAR.							
09...	--	--	7.7	10	8.6	5.8	6.9
APR.							
11...	--	--	38	4.3	8.2	7.2	7.3
MAY							
09...	--	--	27	2.7	9.6	6.0	8.0
JUNE							
20...	--	--	24	7.3	9.2	9.3	7.9
JULY							
11...	--	--	30	3.3	9.4	4.2	8.0
AUG.							
08...	--	--	25	3.0	9.2	3.0	7.5
SEP.							
12...	--	--	9.7	3.0	10	2.6	8.4

## 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 current year.

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	RIO- CHEM- TCL OXYGEN DEMAND (MG/L)	PH (UNITS)	CAR- BONATE (CO3) (MG/L)	BICAR- BONATE (HCO3) (MG/L)	ALKA- LITY AS CaCO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DIS- SOLVED CAL- CIUM (CA) (MG/L)	DIS- SOLVED MAG- NE- SIUM (MG) (MG/L)	HARD- NESS (CA,MG) (MG/L)	NON- CAR- BONATE HARD- NESS (MG/L)
OCT.										
24...	--	8.4	A	353	303	2.4	97	43	420	120
NOV.										
21...	3.7	7.8	0	344	282	8.7	120	50	510	230
DEC.										
13...	3.2	7.5	0	478	392	24	150	64	640	250
19...	--	7.8	0	430	353	11	130	59	570	210
JAN.										
10...	2.9	7.7	0	400	328	13	110	47	470	140
FEB.										
14...	2.3	7.8	0	390	320	9.9	110	47	470	150
27...	--	7.7	0	393	322	13	110	51	480	160
MAR.										
09...	--	7.6	0	176	144	7.1	53	18	210	62
14...	7.5	8.0	0	198	154	3.0	58	19	220	69
APR.										
11...	5.5	8.1	0	293	240	3.7	110	45	460	220
MAY										
09...	1.3	8.0	0	280	230	4.5	100	37	400	170
JUNE										
20...	4.1	7.8	0	321	263	8.1	100	46	440	180
JULY										
11...	2.7	7.8	0	321	263	8.1	94	42	410	140
AUG.										
08...	--	8.0	0	261	214	4.2	65	40	330	110
SEP.										
12...	5.8	8.0	0	321	263	5.1	80	41	370	110

DATE	TOTAL COBALT (CO) (UG/L)	DIS- SOLVED COPPER (CU) (UG/L)	TOTAL COPPER (CU) (UG/L)	CYANIDE (CN) (MG/L)	DIS- SOLVED IRON (FE) (UG/L)	TOTAL IRON (FE) (UG/L)	DIS- SOLVED LEAD (PB) (UG/L)	TOTAL LEAD (PB) (UG/L)	DIS- SOLVED LITHIUM (LI) (UG/L)	DIS- SOLVED MAN- GANESE (MN) (UG/L)	TOTAL MAN- GANESE (MN) (UG/L)	DIS- SOLVED MERCURY (HG) (UG/L)
NOV.												
21...	0	10	25	.01	30	300	1	2	30	30	120	.2
MAY												
09...	20	7	20	.01	40	2200	2	100	30	20	180	.0

DATE	SUS- PENDED GROSS BETA AS SR90 /Y90 (PC/L)	DIS- SOLVED RA-226 (PLAN- CHET COUNT) (PC/L)	DIS- SOLVED RA-226 (RADON METHOD) (PC/L)	DIS- SOLVED NATURAL URANIUM (U) (UG/L)	TOTAL FILTRABLE RESIDUE (MG/L)	TOTAL NON- FILTRABLE RESIDUE (MG/L)
OCT.						
24...	2.9	<.1	--	5.9	360	37
NOV.						
21...	5.8	--	.08	12	720	59
DEC.						
19...	2.3	--	.08	9.0	850	4
JAN.						
30...	1.5	--	.06	6.2	540	9
FEB.						
27...	1.0	--	.07	4.8	750	3
MAR.						
09...	4.6	--	.08	2.6	320	48
APR.						
11...	6.1	--	.11	12	720	120
MAY						
09...	5.1	--	.08	6.3	600	110
JUNE						
20...	7.6	--	.10	3.2	650	170
JULY						
11...	3.4	--	.12	7.9	630	94
AUG.						
08...	2.6	--	.08	5.0	520	65
SEP.						
12...	2.3	--	.13	3.5	580	65

## MINNESOTA RIVER BASIN

05330000 MINNESOTA RIVER NEAR JORDAN, MINN.--Continued

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	DIS- SOLVED SODIUM (NA) (MG/L)	SODIUM AD- SUPP- TION RATIO	PERCENT SODIUM	DIS- SOLVED PO- TAS- SIUM (K) (MG/L)	DIS- SOLVED CHLO- RIDE (CL) (MG/L)	DIS- SOLVED SULFATE (SO4) (MG/L)	DIS- SOLVED FLUO- RIDE (F) (MG/L)	DIS- SOLVED SILICA (SiO2) (MG/L)	DIS- SOLVED AMMONIA NITRO- GEN (N) (MG/L)
OCT. .									
24...	25	.5	11	5.1	25	140	.4	14	--
NOV. .									
21...	26	.5	10	4.6	23	200	.6	--	.06
DEC. .									
13...	33	.6	10	4.6	34	240	.5	--	.20
19...	34	.6	11	5.3	28	240	.5	19	--
JAN. .									
10...	27	.5	11	6.0	29	160	.4	--	.45
FEB. .									
14...	26	.5	11	6.6	24	180	.4	--	--
27...	28	.6	11	8.4	23	190	.4	18	--
MAR. .									
09...	8.3	.3	8	5.6	11	66	.3	13	--
14...	7.2	.2	6	5.3	13	61	.4	--	--
APR. .									
11...	18	.4	8	4.8	17	200	.6	--	--
MAY .									
09...	13	.3	7	3.7	19	140	.5	--	--
JUNE .									
20...	20	.4	9	4.9	21	180	.5	--	--
JULY .									
11...	22	.5	10	4.4	26	150	.6	--	--
AUG. .									
08...	30	.7	16	4.9	32	140	.3	--	--
SEP. .									
12...	37	.8	18	5.5	35	140	.1	--	--

DATE	TOTAL MERCURY (HG) (UG/L)	DIS- SOLVED MOLYB- DENUM (MO) (UG/L)	DIS- SOLVED NICKEL (NI) (UG/L)	TOTAL NICKEL (NI) (UG/L)	OIL AND GREASE (MG/L)	DIS- SOLVED SELE- NIUM (SE) (UG/L)	DIS- SOLVED SILVER (AG) (UG/L)	TOTAL SILVER (AG) (UG/L)	DIS- SOLVED STRON- TIUM (SR) (UG/L)	DIS- SOLVED VANA- DIUM (V) (UG/L)	DIS- SOLVED ZINC (ZN) (UG/L)	TOTAL ZINC (ZN) (UG/L)
NOV. .												
21...	.2	3	11	64	4	7	1	8	460	2.0	20	120
MAY .												
09...	--	4	4	54	--	4	0	10	300	.1	1800	900

## 05330000 MINNESOTA RIVER NEAR JORDAN, MINN.--Continued

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	DIS- SOLVED NITRITE (N) (MG/L)	DIS- SOLVED NITRATE (N) (MG/L)	AMMONIA NITRO- GEN (N) (MG/L)	ORGANIC NITRO- GEN (N) (MG/L)	DIS- SOL- VED- PHOS- PHORUS (P) (MG/L)	TOTAL PHOS- PHORUS (P) (MG/L)	PHENOLS (UG/L)	CON- FIRMED COLI- FORM (MPN)	FECAL COLI- FORM (EC BROTH) (MPN)
OCT. 24...	--	--	--	--	--	--	--	--	--
NOV. 21...	.01	8.0	.10	1.1	.08	--	0	2300	230
DEC. 13...	.01	7.5	.20	.69	.19	--	2	79	330
19...	--	--	--	--	--	.22	--	--	--
JAN. 10...	.03	5.3	.45	.95	.33	--	2	18000	1100
FEB. 14...	.04	3.1	.51	1.1	.19	--	4	2800	310
27...	--	--	--	--	--	.26	--	--	--
MAR. 09...	--	--	--	--	--	.54	--	--	--
14...	.10	4.8	.78	1.7	.17	--	6	2700	200
APR. 11...	.02	4.7	.05	1.6	.05	--	13	7000	490
MAY 09...	.03	9.4	.09	1.4	.06	--	1	4600	790
JUNE 20...	.03	5.0	.22	1.4	.04	--	8	7900	78
JULY 11...	.03	1.1	.13	1.2	.08	--	2	--	100
AUG. 08...	.02	.19	.15	5.5	.01	--	3	--	--
SEP. 12...	.01	.00	.12	1.3	.01	--	2	--	0

## TEMPERATURE (DEG. C) OF WATER , WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	JUNE			JULY			AUGUST			SEPTEMBER		
	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
1	---	---	---	---	---	---	26.0	23.5	24.5	---	---	---
2	---	---	---	---	---	---	25.0	22.0	23.5	---	---	---
3	---	---	---	26.0	24.5	25.5	23.5	20.0	21.5	---	---	---
4	---	---	---	26.5	25.0	25.5	21.0	18.5	19.5	---	---	---
5	---	---	---	27.0	25.0	26.0	---	---	---	---	---	---
6	---	---	---	27.0	25.5	26.5	---	---	---	---	---	---
7	---	---	---	27.5	26.0	26.5	---	---	---	---	---	---
8	---	---	---	27.5	26.5	27.0	---	---	---	---	---	---
9	---	---	---	27.0	26.0	26.5	---	---	---	---	---	---
10	---	---	---	27.5	25.5	27.0	---	---	---	---	---	---
11	---	---	---	27.5	26.0	26.5	---	---	---	---	---	---
12	---	---	---	28.0	26.0	27.0	---	---	---	---	---	---
13	---	---	---	27.5	26.5	27.0	---	---	---	---	---	---
14	---	---	---	26.5	25.0	25.5	---	---	---	---	---	---
15	---	---	---	25.5	24.0	25.0	---	---	---	---	---	---
16	---	---	---	26.0	23.5	25.0	---	---	---	---	---	---
17	---	---	---	26.0	24.5	25.5	---	---	---	---	---	---
18	---	---	---	26.5	25.0	26.0	---	---	---	---	---	---
19	---	---	---	27.0	25.5	26.0	---	---	---	---	---	---
20	---	---	---	26.5	25.5	26.0	---	---	---	---	---	---
21	---	---	---	26.5	25.5	26.0	---	---	---	---	---	---
22	---	---	---	25.5	25.0	25.5	---	---	---	---	---	---
23	---	---	---	27.5	25.0	26.5	---	---	---	---	---	---
24	---	---	---	28.0	24.0	26.0	---	---	---	---	---	---
25	---	---	---	24.5	22.0	23.0	---	---	---	---	---	---
26	---	---	---	22.0	19.0	20.5	---	---	---	---	---	---
27	---	---	---	20.0	18.5	19.0	---	---	---	---	---	---
28	---	---	---	19.5	18.5	19.0	---	---	---	---	---	---
29	---	---	---	21.0	19.0	20.0	---	---	---	---	---	---
30	---	---	---	26.5	25.0	25.5	---	---	---	---	---	---
31	---	---	---	26.5	24.5	25.5	---	---	---	---	---	---

## MINNESOTA RIVER BASIN

05330000 MINNESOTA RIVER NEAR JORDAN, MINN.--Continued

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C) , WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	JUNE			JULY			AUGUST			SEPTEMBER		
	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
1	---	---	---	---	---	---	794	781	789	545	---	499
2	---	---	---	---	---	---	803	794	799	630	530	571
3	---	---	---	731	695	721	813	803	809	760	---	---
4	---	---	---	708	609	671	825	814	820	759	---	---
5	---	---	---	---	---	---	897	---	---	759	---	---
6	---	---	---	761	687	719	707	451	643	758	---	---
7	---	---	---	791	761	776	722	663	701	---	---	---
8	---	---	---	798	780	790	720	702	712	---	---	---
9	---	---	---	784	769	778	---	656	---	---	---	---
10	---	---	---	795	781	794	---	680	---	---	---	---
11	---	---	---	800	795	798	704	671	683	---	---	---
12	---	---	---	802	781	794	---	687	---	---	---	---
13	---	---	---	783	720	765	---	680	---	---	---	---
14	---	---	---	764	601	708	---	764	---	---	---	---
15	---	---	---	781	561	733	---	745	---	---	---	---
16	---	---	---	---	657	---	853	754	793	---	---	---
17	---	---	---	764	748	757	845	712	785	---	---	---
18	---	---	---	758	739	750	877	797	842	---	---	---
19	---	---	---	---	664	---	858	793	832	---	---	---
20	---	---	---	---	---	---	809	730	763	---	---	---
21	---	---	---	---	---	---	721	591	640	---	---	---
22	---	---	---	---	---	---	714	617	652	---	---	---
23	---	---	---	---	568	---	873	719	798	---	---	---
24	---	---	---	---	592	---	852	814	833	---	---	---
25	---	---	---	---	974	---	831	791	816	---	---	---
26	---	---	---	---	970	---	818	752	776	---	---	---
27	---	---	---	---	---	---	762	701	740	---	---	---
28	---	---	---	---	993	---	765	664	730	---	---	---
29	---	---	---	---	984	---	732	528	632	---	---	---
30	---	---	---	770	768	769	578	474	533	---	---	---
31	---	---	---	781	---	---	571	515	538	---	---	---

DISSOLVED OXYGEN (DO), IN MILLIGRAMS PER LITER , WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	JUNE			JULY			AUGUST			SEPTEMBER		
	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
1	---	---	---	---	---	---	---	---	---	---	---	---
2	---	---	---	---	---	---	---	---	---	---	---	---
3	---	---	---	12.2	9.2	10.7	---	---	---	---	---	---
4	---	---	---	11.0	7.9	9.4	---	---	---	---	---	---
5	---	---	---	12.9	6.8	9.9	---	---	---	---	---	---
6	---	---	---	10.4	6.6	8.2	10.4	7.8	8.0	---	---	---
7	---	---	---	7.7	5.8	6.7	7.9	7.3	7.6	---	---	---
8	---	---	---	6.7	5.5	6.1	7.4	6.8	7.0	---	---	---
9	---	---	---	6.6	4.9	5.8	7.0	6.6	6.8	---	---	---
10	---	---	---	6.4	5.5	6.1	7.7	6.3	6.7	---	---	---
11	---	---	---	7.2	5.6	6.3	7.0	6.3	6.6	---	---	---
12	---	---	---	7.7	5.6	6.6	7.1	6.1	6.5	---	---	---
13	---	---	---	7.4	5.3	6.3	6.7	6.2	6.4	---	---	---
14	---	---	---	8.0	5.3	6.5	6.8	6.1	6.3	---	---	---
15	---	---	---	8.3	5.3	6.6	---	---	---	---	---	---
16	---	---	---	10.3	5.2	8.0	---	---	---	---	---	---
17	---	---	---	10.4	7.5	8.9	---	---	---	---	---	---
18	---	---	---	10.2	7.6	8.6	---	---	---	---	---	---
19	---	---	---	9.8	6.9	8.2	---	---	---	---	---	---
20	---	---	---	9.2	6.5	7.8	---	---	---	---	---	---
21	---	---	---	9.7	7.8	8.5	---	---	---	---	---	---
22	---	---	---	8.3	6.8	7.5	---	---	---	---	---	---
23	---	---	---	11.4	5.3	7.6	---	---	---	---	---	---
24	---	---	---	9.0	4.9	6.3	---	---	---	---	---	---
25	---	---	---	9.9	4.1	7.6	---	---	---	---	---	---
26	---	---	---	10.0	8.2	9.0	---	---	---	---	---	---
27	---	---	---	9.0	6.0	7.8	---	---	---	---	---	---
28	---	---	---	---	8.9	---	---	---	---	---	---	---
29	---	---	---	---	---	---	---	---	---	---	---	---
30	---	---	---	10.5	9.7	10.1	---	---	---	---	---	---
31	---	---	---	---	9.8	---	---	---	---	---	---	---



## MINNESOTA RIVER BASIN

05330920 MINNESOTA RIVER AT FT. SNELLING STATE PARK, ST. PAUL, MINN.

LOCATION.--Lat 44°52'13", long 93°11'32", in NE¼SE¼ sec.32, T.28 N., R.23 W., Hennepin County, on left bank 3 mi (5 km) upstream from mouth.

DRAINAGE AREA.--1,580 miles.

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	TEMPER- ATURE (DEG C)	DIS- CHARGE (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICHO- MHOS)	DIS- SOLVED SOLIDS (PPT) DUE AT 180 C) (MG/L)	DTS- SOLVFD SOLIDS (TONS PER DAY)	SUS- PENDED SOLIDS (MG/L)	TUR- BID- ITY (JTU)	COLOR (PLAT- INUM- CONALT UNITS)	DTS- SOLVFD OXYGEN DEMAND (MG/L)	RIO- CHEM- ICAL OXYGEN DEMAND (MG/L)	PH (UNITS)	CAR- BONATE (CO3) (MG/L)
NOV. 22...	2.0	3920	1020	642	7320	40	30	20	9.6	2.5	8.1	0
DEC. 13...	.0	1730	1120	720	3360	13	4	20	--	2.5	7.6	0
JAN. 10...	.0	1790	948	612	2940	14	5	30	9.0	3.2	7.7	0
FEB. 23...	.0	525	1010	643	911	7	3	20	--	--	7.6	0
MAR. 14...	1.0	2420	930	652	4260	37	6	20	10.4	5.5	7.7	0
APR. 14...	4.0	15150	474	318	13000	515	90	80	11.6	7.4	7.8	0
MAY 11...	5.0	10100	854	625	17000	223	40	30	12.4	5.3	8.0	0
JUNE 08...	12.0	14300	729	506	19500	510	20	50	9.1	1.8	7.9	0
JULY 20...	24.0	4630	902	644	8050	172	40	30	7.6	3.8	7.9	0
AUG. 11...	25.0	2230	808	570	3430	74	20	20	7.2	3.2	7.7	0
SEP. 08...	28.0	616	744	489	1080	48	20	20	--	--	7.9	0
12...	23.0	586	631	490	611	48	20	20	5.2	5.6	8.2	0

DATE	RICAR- BONATE (MG/L)	ALKAL- INITY AS CACO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DIS- SOLVED CAL- CIUM (CA) (MG/L)	DTS- SOLVFD MAG- NE- SIUM (MG)	HARD- NESS (CA,MG) (MG/L)	NON- CAR- BONATE HARD- NESS (MG/L)	DIS- SOLVED SODIUM (NA) (MG/L)	SODIUM AD- SORP- TION RATIO	PERCENT SODIUM	DTS- SOLVED PO- TAS- SIUM (K) (MG/L)	DIS- SOLVED CHLO- RIDE (CL) (MG/L)
NOV. 22...	350	287	4.4	120	48	500	210	25	.5	10	5.1	24
DEC. 13...	457	375	18	130	54	550	170	38	.7	13	4.6	33
JAN. 10...	397	326	13	110	47	470	140	30	.6	12	5.8	31
FEB. 23...	412	338	17	120	44	480	140	33	.7	13	5.0	42
MAR. 14...	391	313	12	110	44	460	140	30	.6	12	6.5	32
APR. 14...	194	151	4.7	55	19	220	65	7.7	.2	7	5.7	14
MAY 11...	291	239	4.7	100	44	430	190	17	.4	8	4.8	17
JUNE 08...	299	212	5.2	91	33	360	150	12	.3	7	3.9	20
JULY 20...	329	270	6.6	110	48	470	200	19	.4	8	4.9	22
AUG. 11...	307	252	9.8	87	41	390	130	24	.5	12	4.5	27
SEP. 08...	275	226	5.5	68	37	320	97	32	.8	17	5.1	37
12...	342	281	3.4	83	38	360	83	37	.8	18	5.6	38



05330920 MINNESOTA RIVER AT FT. SNELLING STATE PARK, ST. PAUL, MINN.--Continued

PERIOD OF RECORD.--Chemical analyses: October 1972 to September 1973.

REMARKS.--BOD and bacteria data furnished by Metropolitan Sewer Board, St. Paul, Minn. Water discharge computed by adding 5% to the Minnesota River near Jordan discharge and adjusting for a 1-day lag.

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	DTS= SOLVED SULFATE (MG/L)	DTS= SOLVED FLUORIDE (MG/L)	DTS= SOLVED AMMONIA NITROGEN (MG/L)	DTS= SOLVED NITRITE (MG/L)	DTS= SOLVED NITRATE (MG/L)	AMMONIA NITROGEN (MG/L)	ORGANIC NITROGEN (MG/L)	DTS= SOLVED PHOSPHORUS (MG/L)	PHENOLS (UG/L)	CUMULATIVE FIRMED COLIFORMS (MPN)	FECAL COLIFORMS (FC COUNT)
NOV. 22...	200	.5	.16	.02	11	.20	1.2	.13	0	23000	4900
DEC. 13...	200	.4	.32	.03	6.5	.32	.88	.23	2	2200	200
JAN. 10...	140	.5	.58	.05	4.5	.58	.92	.34	4	11000	700
JAN. 23...	130	.4	.46	.05	4.4	1.0	2.7	.33	32	--	--
FEB. 14...	170	.4	--	.07	2.9	.62	.88	.26	10	2200	170
MAR. 14...	54	.4	--	.07	4.8	.91	1.9	.19	7	14000	780
APR. 11...	180	.5	--	.02	4.9	.09	1.6	.06	4	17000	790
MAY 08...	110	.4	--	.04	9.5	.17	1.3	.13	6	2300	130
JUNE 20...	180	.5	--	.04	4.7	.17	2.4	.04	7	2300	180
JULY 11...	140	.6	--	.00	1.6	1.2	1.2	.11	2	--	132
AUG. 08...	120	.3	--	.05	.73	1.4	4.8	.53	3	--	--
SEP. 12...	170	.2	--	.09	.63	.84	.26	.28	0	--	56

DATE	DTS= SOLVED ALUMINUM (AL) (UG/L)	TOTAL ALUMINUM (AL) (UG/L)	DTS= SOLVED ARSENIC (AS) (UG/L)	DTS= SOLVED BARIUM (BA) (UG/L)	DTS= SOLVED BERYLLIUM (BE) (UG/L)	TOTAL BERYLLIUM (BE) (UG/L)	DTS= SOLVED BORON (B) (UG/L)	DTS= SOLVED CADMIUM (CD) (UG/L)	TOTAL CADMIUM (CD) (UG/L)	DTS= SOLVED CHROMIUM (CR) (UG/L)	HEXA-VALENT CHROMIUM (CR6) (UG/L)	DTS= SOLVED COBALT (CO) (UG/L)
NOV. 22...	70	350	1	0	0	0	100	1	0	0	0	0
MAY 08...	20	1900	1	0	0	0	110	0	0	0	0	0

DATE	TOTAL COBALT (CO) (UG/L)	DTS= SOLVED COPPER (CU) (UG/L)	TOTAL COPPER (CU) (UG/L)	CYANIDE (CN) (MG/L)	DTS= SOLVED IRON (FE) (UG/L)	TOTAL IRON (FE) (UG/L)	DTS= SOLVED LEAD (PB) (UG/L)	TOTAL LEAD (PB) (UG/L)	DTS= SOLVED LITHIUM (LI) (UG/L)	DTS= SOLVED MANGANESE (MN) (UG/L)	TOTAL MANGANESE (MN) (UG/L)	DTS= SOLVED MERCURY (MG) (UG/L)
NOV. 22...	1	13	29	.01	30	290	1	3	30	60	120	.1
MAY 08...	20	15	20	.02	950	4000	4	100	20	0	290	.0

DATE	TOTAL MERCURY (MG) (UG/L)	DTS= SOLVED MOLYBDENUM (MO) (UG/L)	DTS= SOLVED NICKEL (NI) (UG/L)	TOTAL NICKEL (NI) (UG/L)	OIL AND GREASE (MG/L)	DTS= SOLVED SELENIUM (SE) (UG/L)	DTS= SOLVED SILVER (AG) (UG/L)	TOTAL SILVER (AG) (UG/L)	DTS= SOLVED STRONTIUM (SR) (UG/L)	DTS= SOLVED VANADIUM (V) (UG/L)	DTS= SOLVED ZINC (ZN) (UG/L)	TOTAL ZINC (ZN) (UG/L)
NOV. 22...	.1	4	12	76	4	4	2	6	430	2.2	30	60
MAY 08...	.0	3	7	50	0	10	0	10	270	.1	20	60

## MISSISSIPPI RIVER MAIN STEM

05331000 MISSISSIPPI RIVER AT ST. PAUL, MINN.

LOCATION.--Lat 44°56'40", long 93°05'20", in SEANEK sec.6, T.28 N., R.22 W., Ramsey County, temperature recorder at gaging station on left bank in St. Paul, 300 ft (91 m) upstream from Robert Street Bridge, 1.1 mi (1.8 km) downstream from Northern States Power Company steam generating plant, 6 mi (10 km) downstream from Minnesota River, and at mile 839.3 (1,350 km) upstream from Ohio River.  
 DRAINAGE AREA.--36,800 mi<sup>2</sup> (95,300 km<sup>2</sup>), approximately.  
 PERIOD OF RECORD.--Chemical analyses: October 1972 to September 1973.  
 Water temperature: October 1956 to current year.

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	TEMPER- ATURE (DEG C)	DIS- CHARGE (CFS)	SPE- CTIFIC CON- DUCT- ANCE (MICRO- MHOS)	DIS- SOLVED SOLIDS (RESI- DUE AT 180 C) (MG/L)	DIS- SOLVED SOLIDS (SUM OF CONSTIT- TUENTS) (MG/L)	DIS- SOLVED SOLIDS (TONS PER DAY)	SUS- PENDED SOLIDS (MG/L)	TUR- BID- ITY (JTU)	COLOR (PLAT- INUM- COBALT UNITS)	DIS- SOLVED OXYGEN (MG/L)
OCT.										
04...	15.0	12000	395	274	--	8880	19	10	50	10.4
NOV.										
22...	1.0	14500	490	354	--	13900	19	20	50	10.7
JAN.										
03...	.0	8860	520	338	--	8090	1	4	30	--
FEB.										
07...	.0	8400	492	326	--	7390	10	4	20	12.8
MAR.										
07...	3.0	13720	474	298	--	11000	50	10	40	--
APR.										
04...	6.0	28440	502	334	--	25600	36	10	40	12.8
MAY										
04...	12.5	24900	571	376	--	25300	77	30	40	9.7
JUNE										
05...	21.0	21500	567	377	--	21900	49	20	40	--
13...	24.5	15400	613	396	--	16500	44	20	30	8.2
JULY										
03...	26.0	8240	511	330	--	7340	74	20	30	9.2
25...	27.0	3920	465	302	--	3120	60	10	30	--
AUG.										
01...	23.0	6400	435	291	252	5030	10	9	20	4.0
SEP.										
05...	25.0	6540	373	226	--	4030	24	10	40	7.4
19...	19.0	4440	399	284	--	3410	23	9	40	--

DATE	DIS- SOLVED SOLIDS (MG/L)	PH	CAR- BONATE (MG/L)	HYDRO- GEN (MG/L)	ALUM- INITY AS ALUM (MG/L)	CARBON DIOXIDE (MG/L)	DIS- SOLVED CAL- CIUM (MG/L)	DIS- SOLVED MAG- NESIUM (MG/L)	HARD- NESS (CA, MG/L)	NON- CAR- BONATE HARD- NESS (MG/L)
OCT.										
04...	1.8	7.9	0	209	171	--	51	18	200	30
NOV.										
22...	1.5	7.7	0	221	161	7.1	54	24	260	79
JAN.										
03...	2.5	7.7	0	284	233	9.1	64	26	270	34
FEB.										
07...	1.7	7.7	0	249	204	6.0	63	22	250	44
MAR.										
07...	6.1	7.6	0	226	185	9.1	54	19	210	28
APR.										
04...	3.5	6.2	0	220	180	2.2	62	22	250	65
MAY										
04...	1.7	7.9	0	230	189	4.6	69	24	270	81
JUNE										
06...	--	7.0	0	230	189	9.2	69	27	280	95
13...	3.7	6.1	0	231	206	3.2	72	28	300	89
JULY										
03...	5.2	6.0	0	216	177	3.5	58	23	240	62
25...	--	6.0	0	214	176	3.4	50	22	220	40
AUG.										
01...	--	5.2	0	216	177	2.2	52	20	210	33
SEP.										
05...	2.7	6.0	0	189	155	3.0	43	16	170	18
19...	--	7.9	0	216	177	4.4	48	18	190	17

## 05331000 MISSISSIPPI RIVER AT ST. PAUL, MINN.--Continued

## EXTREMES.--Current year:

Water temperatures: Maximum, 26.5°C Aug. 9; minimum, freezing point on many days during winter period.

## Period of record:

Water temperatures: Maximum, 31°C July 24-28, 1964; minimum, freezing point on many days during winter period.

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	DIS- SOLVED SODIUM (NA) (MG/L)	SODIUM AD- SORP- TION RATIO	PERCENT SODIUM	DIS- SOLVED PO- TAS- SIUM (K) (MG/L)	DIS- SOLVED CHLO- RIDE (CL) (MG/L)	DIS- SOLVED SULFATE (SO4) (MG/L)	DIS- SOLVED FLUO- RIDE (F) (MG/L)	DIS- SOLVED SILICA (SiO2) (MG/L)	DIS- SOLVED AMMONIA NITRO- GEN (N) (MG/L)
OCT.									
04...	8.2	.3	8	2.3	9.1	28	.4	--	.10
NOV.									
22...	10	.3	8	3.0	11	61	.4	--	.09
JAN.									
03...	11	.3	8	3.9	14	38	.2	--	.26
FEB.									
07...	11	.3	9	3.5	13	37	.4	--	.31
MAR.									
07...	11	.3	10	4.6	13	44	.3	--	--
APR.									
04...	8.8	.2	7	3.7	10	69	.2	--	.09
MAY									
08...	9.9	.3	7	3.2	14	76	.3	--	--
JUNE									
06...	10	.3	7	2.6	12	86	.4	--	--
13...	14	.4	9	3.5	16	78	1.0	--	--
JULY									
03...	12	.3	10	2.7	14	58	.4	--	--
25...	14	.4	12	2.6	16	50	.3	--	--
AUG.									
01...	9.5	.3	9	2.2	15	35	.3	11	.08
SEP.									
05...	11	.4	12	2.6	12	25	.2	--	--
19...	11	.3	11	2.7	11	27	.2	--	--

DATE	DIS- SOLVED NITRITE (N) (MG/L)	DIS- SOLVED NITRATE (N) (MG/L)	AMMONIA NITRO- GEN (N) (MG/L)	ORGANIC NITRO- GEN (N) (MG/L)	DIS- SOL- VED- PHOS- PHORUS (P) (MG/L)	TOTAL PHOS- PHORUS (P) (MG/L)	PHENOLS (UG/L)	CON- FIRMED COLI- FORM (MPN)	FECAL COLI- FORM (EC BROTH) (MPN)
OCT.									
04...	.02	.25	.10	1.2	.08	.10	22	17000	2300
NOV.									
22...	.01	11	--	.91	.07	--	3	7900	2300
JAN.									
03...	.03	.86	.26	.94	.16	--	4	13000	4900
FEB.									
07...	.01	1.3	.31	.79	.13	--	0	22000	790
MAR.									
07...	.04	1.6	.55	1.4	.21	--	2	33000	1300
APR.									
04...	.02	1.8	--	1.4	.05	--	3	17000	1300
MAY									
08...	.02	5.2	.06	1.5	.09	--	2	3300	33
JUNE									
06...	.02	3.0	.10	1.5	.05	--	2	--	--
13...	.04	2.6	.57	1.4	.14	--	10	79000	1700
JULY									
03...	.01	1.1	.52	1.6	.09	--	12	--	1400
25...	.02	.22	.36	1.2	.12	--	2	--	--
AUG.									
01...	.00	.21	.04	1.3	--	.17	1	--	250
SEP.									
05...	.02	.24	.23	.55	.11	--	3	--	2300
19...	.02	.08	.25	.85	.09	--	0	--	--

## MISSISSIPPI RIVER MAIN STEM

05331000 MISSISSIPPI RIVER AT ST. PAUL, MINN.--Continued

## TEMPERATURE (DEG. C) OF WATER , WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
1	16.5	15.0	9.5	6.5	2.0	0.0	4.0	1.5	1.0	0.0	2.0	0.0
2	16.5	15.5	9.0	6.5	2.0	0.0	4.0	0.5	1.0	0.0	2.0	0.5
3	16.5	16.0	9.0	6.0	3.5	0.0	3.0	0.0	1.0	0.0	3.0	1.0
4	16.5	16.0	8.5	6.0	4.0	0.0	3.0	0.5	1.5	0.0	3.0	1.5
5	16.5	16.5	8.0	5.5	3.5	0.0	4.0	0.5	2.0	0.0	3.0	1.0
6	16.5	16.5	7.0	5.5	4.0	1.0	4.0	1.0	1.5	0.0	3.5	1.0
7	16.5	16.0	6.5	5.5	4.5	1.5	4.0	1.5	1.5	0.0	2.0	0.5
8	16.5	16.0	6.5	5.0	4.5	1.0	4.0	1.0	1.5	0.0	1.5	0.5
9	16.5	15.5	6.5	4.5	4.5	1.0	3.5	0.5	1.5	0.0	1.0	0.5
10	16.0	15.0	6.5	4.5	4.0	1.0	3.5	1.0	1.0	0.0	1.0	0.0
11	16.0	15.0	6.5	5.0	3.5	0.5	3.5	1.0	0.5	0.0	0.5	0.0
12	15.5	15.0	5.5	4.0	3.0	0.0	3.5	0.5	0.5	0.0	0.5	0.0
13	15.5	15.0	5.0	4.0	3.0	0.0	3.0	0.0	1.0	0.0	0.0	0.0
14	15.5	14.5	5.0	3.5	3.0	0.0	3.5	1.0	1.5	0.0	1.0	0.0
15	15.5	14.0	4.5	2.0	3.5	1.0	3.5	0.5	1.5	0.0	1.5	1.0
16	15.5	11.5	4.5	3.0	4.0	0.5	3.5	0.5	2.0	0.0	1.0	0.5
17	14.0	11.0	4.0	1.5	4.0	1.0	3.5	1.0	2.0	0.0	0.5	0.0
18	13.5	10.5	4.0	1.5	4.0	1.0	4.0	1.0	1.5	0.0	0.5	0.5
19	13.5	10.0	4.5	1.5	3.5	0.5	4.0	0.5	1.0	0.0	0.5	0.5
20	13.0	9.5	3.5	1.0	3.5	0.5	4.0	1.5	1.5	0.0	1.5	1.0
21	13.0	9.0	3.5	1.0	4.0	0.5	4.0	1.5	1.0	0.0	1.5	1.5
22	12.0	8.5	3.0	0.0	3.5	0.5	3.5	0.5	1.5	0.0	2.0	1.5
23	11.5	9.0	2.0	0.0	3.5	0.5	4.0	1.0	1.5	0.0	2.0	2.0
24	11.0	8.5	2.0	0.0	3.5	1.0	4.0	2.0	1.5	0.0	3.0	2.0
25	11.5	8.5	3.0	0.5	4.0	1.5	4.0	1.5	1.5	0.0	3.5	3.5
26	10.5	8.5	3.0	0.0	4.0	0.5	4.0	1.0	1.5	0.0	4.0	3.5
27	10.5	8.5	3.0	0.5	4.0	0.5	4.5	1.0	2.0	0.0	4.0	4.0
28	10.5	9.0	3.0	0.0	4.0	1.0	---	---	2.0	0.5	4.5	4.0
29	10.5	8.5	2.0	0.0	3.5	0.5	---	---	---	---	5.0	4.5
30	10.5	8.0	2.0	0.0	3.0	0.0	1.0	0.0	---	---	5.0	5.0
31	9.5	6.5	---	---	3.5	0.5	1.0	0.0	---	---	5.0	5.0
MONTH	16.5	6.5	9.5	0.0	4.5	0.0	4.5	0.0	2.0	0.0	5.0	0.0

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	DIS-SOLVED ALUMINUM (AL) (UG/L)	TOTAL ALUMINUM (AL) (UG/L)	DIS-SOLVED ARSENIC (AS) (UG/L)	DIS-SOLVED BARIUM (BA) (UG/L)	DIS-SOLVED BERYLLIUM (BE) (UG/L)	TOTAL BERYLLIUM (BE) (UG/L)	DIS-SOLVED BORON (B) (UG/L)	DIS-SOLVED CADMIUM (CD) (UG/L)	TOTAL CADMIUM (CD) (UG/L)	DIS-SOLVED CHROMIUM (CR) (UG/L)	HEXA-VALENT CHROMIUM (CR6) (UG/L)	DIS-SOLVED COBALT (CO) (UG/L)
NOV. 22...	50	300	2	0	0	0	50	0	1	0	0	0
MAY 08...	40	750	1	0	0	0	110	0	0	0	0	0
AUG. 01...	--	--	--	--	--	--	40	--	--	--	--	--

DATE	TOTAL COBALT (CO) (UG/L)	DIS-SOLVED COPPER (CU) (UG/L)	TOTAL COPPER (CU) (UG/L)	CYANIDE (CN) (MG/L)	DIS-SOLVED IRON (FE) (UG/L)	TOTAL IRON (FE) (UG/L)	DIS-SOLVED LEAD (PB) (UG/L)	TOTAL LEAD (PB) (UG/L)	DIS-SOLVED LITHIUM (LI) (UG/L)	DIS-SOLVED MANGANESE (MN) (UG/L)	TOTAL MANGANESE (MN) (UG/L)	DIS-SOLVED MERCURY (HG) (UG/L)
NOV. 22...	0	14	40	.00	180	560	2	4	20	70	140	.2
MAY 08...	20	16	20	.01	50	2300	3	100	10	0	220	.1
AUG. 01...	--	--	--	--	60	--	--	--	--	60	--	--

## TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973[illegible]

## MISSISSIPPI RIVER MAIN STEM

05331580 MISSISSIPPI RIVER BELOW LOCK AND DAM 2, AT HASTINGS, MINN.

LOCATION.--Lat 44°44'48", long 92°51'08", in SE½SE¼ sec.21, T.115 N., R.17 W., Dakota County, at bridge on U.S. Highway 61 at Hastings, 2.5 mi (4.0 km) upstream from St. Croix River.  
 DRAINAGE AREA.--37,100 mi<sup>2</sup> (96,100 km<sup>2</sup>), approximately.

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	TEMPER- ATURE (DEG C)	DIS- CHARGE (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	DIS- SOLVED SOLIDS (RESI- DUE AT 180 C) (MG/L)	DTS- SOLVED SOLIDS (TONS PER DAY)	SUS- PENDED SOLIDS (MG/L)	TUR- BID- ITY (JTU)	COLOR (PLAT- INUM- COBALT UNITS)	DTS- SOLVED OXYGEN DEMAND (MG/L)	RIO- CHEM- ICAL OXYGEN DEMAND (MG/L)	PH (UNITS)	CAR- BONATE (CO3) (MG/L)
NOV.												
01-30	5.0	21000	--	--	--	--	50	--	11.0	4.1	8.1	--
28...	--	--	--	--	--	--	--	--	13.6	--	--	0
28...	1.0	10800	535	424	12400	23	5	40	--	2.9	7.9	--
DEC.												
01-31	0	6600	--	--	--	--	15	--	11.9	3.6	7.9	--
19...	0	5100	600	422	5810	11	8	40	--	3.4	7.8	0
JAN.												
17...	1.0	8400	537	366	8300	40	8	30	11.8	2.0	7.4	0
FEB.												
22...	1.0	4800	585	346	4480	12	5	20	12.0	3.8	7.7	0
MAR.												
21...	4.0	50000	346	252	34000	46	30	50	12.0	3.7	8.0	0
APR.												
18...	12.0	20700	607	393	22000	37	20	30	12.6	4.2	8.2	0
MAY												
07...	--	--	--	--	--	--	--	--	9.8	--	--	0
07...	11.0	26500	553	336	24000	76	30	40	--	4.0	7.7	--
10...	13.0	28000	--	--	--	--	20	50	--	--	--	--
JUNE												
13...	24.0	15000	580	378	15300	66	30	40	6.8	5.8	8.0	0
JULY												
25...	26.0	4500	502	325	3950	36	20	30	7.4	4.9	8.0	0
SEP.												
19...	--	5400	--	--	4600	--	--	--	--	--	--	--
19...	17.0	540000	409	302	440000	25	10	40	9.3	4.8	7.7	0

DATE	RICAR- BONATE (MG/L)	ALKA- LINITY AS CaCO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DIS- SOLVED CAL- CIUM (CA) (MG/L)	DTS- SOLVED MAG- NE- SIUM (MG)	MAH- NERS (CA,MG) (MG/L)	NON- CAR- BONATE HARD- NESS (MG/L)	DIS- SOLVED SODIUM (NA) (MG/L)	SODIUM AD- SORP- TION RATIO	DTS- SOLVED PO- TAS- SIUM (K) (MG/L)	DTS- SOLVED CHLO- RIDE (CL) (MG/L)
NOV.											
01-30	--	--	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--	--	--
28...	141	132	3.2	64	25	260	130	13	.4	10	14
DEC.											
01-31	--	--	--	--	--	--	--	--	--	--	--
19...	284	233	7.2	73	27	290	60	17	.4	11	20
JAN.											
17...	246	218	17	61	23	250	29	17	.5	13	22
FEB.											
22...	275	226	8.8	65	23	260	31	22	.6	15	26
MAR.											
21...	140	131	2.6	47	15	180	48	5.8	.2	6	11
APR.											
18...	249	204	2.5	73	28	300	93	15	.4	10	15
MAY											
07...	--	--	--	--	--	--	--	--	--	--	--
07...	232	190	7.4	64	24	260	69	11	.3	8	15
10...	--	--	--	--	--	--	--	--	--	--	--
JUNE											
13...	246	202	3.9	70	28	290	88	11	.3	8	12
JULY											
25...	227	186	3.6	53	21	220	33	19	.6	16	21
SEP.											
19...	--	--	--	--	--	--	--	--	--	--	--
19...	213	175	6.8	48	17	190	15	16	.5	15	17

05331580 MISSISSIPPI RIVER BELOW LOCK AND DAM 2, AT HASTINGS, MINN.--Continued

PERIOD OF RECORD.--Chemical analyses: November 1972 to September 1973.

REMARKS.--BOD and bacteria data furnished by Metropolitan Sewer Board, St. Paul, Minn. Discharge data furnished by Corps of Engineers. Miscellaneous analyses are published for water year 1971.

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	DIS- SOLVED SULFATE (SO4) (MG/L)	DIS- SOLVED FLUOR- IDE (F) (MG/L)	DIS- SOLVED AMMONIA NITRO- GEN (N) (MG/L)	DIS- SOLVED NITRITE (N) (MG/L)	DIS- SOLVED NITRATE (N) (MG/L)	AMMONIA NITRO- GEN (N) (MG/L)	ORGANIC NITRO- GEN (N) (MG/L)	DIS- SOL- VED- PHOS- PHORUS (P) (MG/L)	PHENOLS (UG/L)	CON- FIRMED COLI- FORM (MPN)	FECAL COLI- FORM (EC BROTH) (MPN)
NOV.											
01-30	--	--	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--	--	--
28...	130	.2	.55	.00	8.6	.55	.65	.22	10	79000	17000
DEC.											
01-31	--	--	--	--	--	--	--	--	--	--	--
19...	70	.3	1.0	.03	1.9	.98	1.2	.32	4	79000	23000
JAN.											
17...	41	.4	1.1	.01	1.3	1.1	.80	.34	5	49000	--
FEB.											
22...	55	.4	--	.02	1.1	1.1	.90	.30	10	79000	33000
MAR.											
21...	44	.2	--	.05	3.1	.49	1.8	.16	13	46000	7900
APR.											
18...	99	.4	--	.02	2.2	.34	1.4	.06	6	28000	3300
MAY											
07...	--	--	--	--	--	--	--	--	--	--	--
07...	69	.3	--	.03	3.3	--	--	.08	2	7900	330
10...	--	--	--	--	--	.27	1.5	--	--	--	--
JUNE											
13...	74	1.0	--	.01	2.5	.11	1.4	.06	5	3300	490
JULY											
25...	45	.4	--	.05	.46	1.2	1.4	.23	1	--	100
SEP.											
19...	--	--	--	--	--	--	--	--	--	--	--
19...	31	.3	--	.04	.17	.79	.91	.22	1	--	360

DATE	DIS- SOLVED ALUM- INUM (AL) (UG/L)	TOTAL ALUM- INUM (AL) (UG/L)	DIS- SOLVED ARSENIC (AS) (UG/L)	DIS- SOLVED BARIUM (BA) (UG/L)	DIS- SOLVED BERYL- LIUM (BE) (UG/L)	TOTAL BERYL- LIUM (BE) (UG/L)	DIS- SOLVED BORON (B) (UG/L)	DIS- SOLVED CAD- MIUM (CD) (UG/L)	TOTAL CAD- MIUM (CD) (UG/L)	DIS- SOLVED CHRO- MIUM (CR) (UG/L)	HEXA- VALFNT CHRO- MIUM (CR6) (UG/L)	DIS- SOLVED COBALT (CO) (UG/L)
NOV.												
28...	60	170	2	0	0	0	60	1	0	0	0	1
MAY												
07...	0	360	0	0	0	0	70	1	0	0	0	1

DATE	TOTAL COBALT (CO) (UG/L)	DIS- SOLVED COPPER (CU) (UG/L)	TOTAL COPPER (CU) (UG/L)	CYANIDE (CN) (MG/L)	DIS- SOLVED IRON (FE) (UG/L)	TOTAL IRON (FE) (UG/L)	DIS- SOLVED LEAD (PB) (UG/L)	TOTAL LEAD (PB) (UG/L)	DIS- SOLVED LITHIUM (LI) (UG/L)	DIS- SOLVED MAN- GANESE (MN) (UG/L)	TOTAL MAN- GANESE (MN) (UG/L)	DIS- SOLVED MERCURY (MG) (UG/L)
NOV.												
28...	1	14	25	.02	140	1300	0	3	10	90	110	.0
MAY												
07...	20	13	20	.00	110	1100	3	100	10	680	160	.1

DATE	TOTAL MERCURY (MG) (UG/L)	DIS- SOLVED MOLYB- DENIUM (MO) (UG/L)	DIS- SOLVED NICKEL (NI) (UG/L)	TOTAL NICKEL (NI) (UG/L)	OIL AND GREASE (MG/L)	DIS- SOLVED SELE- NIUM (SE) (UG/L)	DIS- SOLVED SILVER (AG) (UG/L)	TOTAL SILVER (AG) (UG/L)	DIS- SOLVED STRON- TIUM (SR) (UG/L)	DIS- SOLVED VANA- DIUM (V) (UG/L)	DIS- SOLVED ZINC (ZN) (UG/L)	TOTAL ZINC (ZN) (UG/L)
NOV.												
28...	.0	1	7	45	32	5	0	9	180	.5	20	50
MAY												
07...	.1	2	9	50	1	13	0	10	190	.0	40	40

## 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 mi (8 km) northwest of Red Wing, and at mile 796.7 (1,282 km) upstream from Ohio River.

DRAINAGE AREA.--46,600 mi<sup>2</sup> (120,700 km<sup>2</sup>), approximately.

PERIOD OF RECORD.--Chemical analyses: July 1969 to current year.

Water temperatures: August 1969 to current year.

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	TEMPER- ATURE (DEG C)	DIS- CHARGE (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	DIS- SOLVED SOLIDS (RESI- DUE AT 180 C) (MG/L)	DIS- SOLVED SOLIDS (TONS PER DAY)	SUS- PENDED SOLIDS (MG/L)	TUR- BID- ITY (JTU)	COLOR (PLAT- INUM- COBALT UNITS)	DIS- SOLVED OXYGEN (MG/L)	RIO- CHEM- ICAL OXYGEN DEMAND (MG/L)	PH (UNITS)	CAR- BONATE (CO3) (MG/L)
NOV.												
08...	6.0	33900		395	--	--	25	40	10.9	1.9	8.0	--
22...	--	--	--	--	--	--	--	--	--	--	--	--
22...	1.0	20600	--	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	12.7	--	--	0
28...	1.5	14000		412	348	15000	14	50	--	4.5	7.6	--
DEC.												
09...	.0	9100		440	--	--	10	40	12.8	2.0	7.9	--
19...	.0	10900		430	294	8710	7	50	--	1.9	7.6	0
JAN.												
17...	.0	11300		440	330	10100	40	10	10.8	1.4	7.8	0
FEB.												
22...	.0	9600		500	334	8710	6	15	11.0	2.1	7.8	0
MAR.												
21...	3.0	78000		350	226	47600	24	40	11.4	3.8	7.8	0
APR.												
18...	10.0	24000		500	341	23900	22	70	12.2	3.0	8.5	0
MAY												
07...	--	--	--	--	--	--	--	--	9.8	--	--	0
07...	11.0	35000		463	286	27000	56	50	--	2.1	7.6	--
10...	13.0	36300		--	--	--	20	50	--	--	--	--
JUNE												
27...	23.0	12200		486	303	9980	50	20	7.2	6.4	8.1	0
JULY												
18...	25.0	8100		423	274	5990	26	10	9.0	6.0	8.2	0
AUG.												
29...	25.0	10500		317	209	5930	15	40	--	4.9	7.9	0
SEP.												
26...	18.0	9550		339	200	5160	35	10	8.3	5.3	7.9	0

DATE	DIS- SOLVED ALUM- INUM (AL) (UG/L)	TOTAL ALUM- INUM (AL) (UG/L)	DIS- SOLVED ARSENIC (AS) (UG/L)	DIS- SOLVED BARIUM (BA) (UG/L)	DIS- SOLVED BERYL- LIUM (BE) (UG/L)	TOTAL BERYL- LIUM (BE) (UG/L)	DIS- SOLVED BORON (B) (UG/L)	DIS- SOLVED CAD- MIUM (CD) (UG/L)	TOTAL CAD- MIUM (CD) (UG/L)	DIS- SOLVED CHRO- MIUM (CR) (UG/L)	HEXA- VALENT CHRO- MIUM (CR6) (UG/L)	DIS- SOLVED COBALT (CO) (UG/L)
NOV.												
28...	0	170	3	0	0	0	70	1	0	0	0	1
MAY												
07...	0	300	0	0	0	0	60	1	10	0	0	1



05344980 MISSISSIPPI RIVER AT LOCK AND DAM 3, NEAR RED WING, MINN.--Continued

## EXTREMES.--Current year:

Water temperatures: Maximum, 27.5°C July 12; minimum, freezing point on many days during winter period.

Period of record:

Water temperatures: Maximum, 28°C July 2, 14, 17, 30, 1970; minimum, freezing point on many days during winter period.

REMARKS.--Some analyses furnished by Metropolitan Wastewater Treatment Plant. Water discharge furnished by the St. Paul District, Corps of Engineers.

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	BICARBONATE (HCO <sub>3</sub> ) (MG/L)	ALKALINITY AS CaCO <sub>3</sub> (MG/L)	CARBON DIOXIDE (CO <sub>2</sub> ) (MG/L)	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG)	NON-CARBONATE HARDNESS (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	SODIUM ADDITION (MG/L)	PERCENT SODIUM	DISSOLVED POTASSIUM (K) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED SULFATE (SO <sub>4</sub> ) (MG/L)
NOV.												
08...	--	164	--	--	--	--	--	--	--	--	12	38
22...	--	--	--	--	--	--	--	--	--	--	--	--
22...	--	--	--	--	--	--	--	--	--	--	--	--
28...	--	--	--	--	--	--	--	--	--	--	--	--
28...	189	155	7.6	48	19	43	9.4	.3	9	2.7	11	46
DEC.												
09...	--	166	--	--	--	--	--	--	--	--	16	41
19...	212	174	8.5	53	20	41	12	.4	11	2.4	13	39
JAN.												
17...	233	170	5.9	55	20	18	14	.4	12	3.0	17	33
FEB.												
22...	253	183	6.4	59	21	12	16	.5	13	3.1	19	47
MAR.												
21...	150	123	3.8	42	13	48	5.6	.2	7	4.8	11	31
APR.												
18...	210	163	1.1	62	23	70	12	.3	9	3.6	14	79
MAY												
07...	--	--	--	--	--	--	--	--	--	--	--	--
07...	198	162	8.0	57	20	62	9.3	.3	8	2.8	12	60
10...	--	--	--	--	--	--	--	--	--	--	--	--
JUNE												
27...	201	165	2.6	56	22	66	12	.3	10	2.6	13	66
JULY												
18...	192	157	1.9	48	19	41	13	.4	12	2.5	15	48
AUG.												
29...	154	126	3.1	35	12	10	9.4	.4	13	1.9	11	21
SEP.												
26...	172	141	3.5	38	14	11	12	.4	14	2.1	12	20

DATE	TOTAL COBALT (CO) (UG/L)	DISSOLVED COPPER (CU) (UG/L)	TOTAL COPPER (CU) (UG/L)	CYANIDE (CN) (MG/L)	DISSOLVED IRON (FE) (UG/L)	TOTAL IRON (FE) (UG/L)	DISSOLVED LEAD (PB) (UG/L)	TOTAL LEAD (PB) (UG/L)	DISSOLVED LITHIUM (LI) (UG/L)	DISSOLVED MANGANESE (MN) (UG/L)	TOTAL MANGANESE (MN) (UG/L)	DISSOLVED MERCURY (HG) (UG/L)
NOV.												
28...	2	18	32	.00	670	1100	0	3	10	80	110	.1
MAY												
07...	20	23	20	.00	100	900	5	100	10	20	130	.0

05344980 MISSISSIPPI RIVER AT LOCK AND DAM 3, NEAR RED WING, MINN.--Continued

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	DIS- SOLVED FLUO- RIDE (F) (MG/L)	DIS- SOLVED AMMONIA NITRO- GEN (N) (MG/L)	DIS- SOLVED NITRITE (N) (MG/L)	DIS- SOLVED NITRATE (N) (MG/L)	AMMONIA NITRO- GEN (N) (MG/L)	ORGANIC NITRO- GEN (N) (MG/L)	DIS- SOL- VED- PHOS- PHORUS (P) (MG/L)	TOTAL PHOS- PHORUS (P) (MG/L)	PHENOLS (UG/L)	CON- FIRMED COLI- FORM (MPN)	FECAL COLI- FORM (EC PROTH) (MPN)
NOV.											
08...	--	--	--	--	--	--	--	--	--	160000	--
22...	--	--	--	--	.53	--	--	--	--	--	--
22...	.4	.53	.01	1.8	--	.67	--	.19	--	--	--
28...	--	--	--	--	--	--	--	--	--	--	--
28...	.2	.35	.00	12	.35	.38	.15	--	14	70000	7900
DEC.											
09...	--	--	--	--	--	--	--	--	--	--	--
19...	.3	.39	.01	1.3	.39	1.2	.21	--	4	49000	7000
JAN.											
17...	.4	.86	.02	1.2	.84	.76	.40	--	4	7000	--
FEB.											
22...	.3	--	.02	1.1	.90	.80	.24	--	6	7900	1700
MAR.											
21...	.3	--	.04	2.6	.58	1.9	.13	--	4	7900	1300
APR.											
18...	.3	--	.01	1.6	.28	1.4	.05	--	0	7900	330
MAY											
07...	--	--	--	--	--	--	--	--	--	--	--
07...	.2	--	.02	2.2	--	--	.08	--	7	11000	68
10...	--	--	--	--	.27	1.5	--	--	--	--	--
JUNE											
27...	.4	--	.04	1.5	.25	1.4	.09	--	10	3500	45
JULY											
18...	.4	--	.06	.40	.31	1.4	.07	--	0	--	4
AUG.											
29...	.3	--	.03	.50	.41	.89	.14	--	3	--	68
SEP.											
26...	.2	--	.04	.33	.46	1.1	.14	--	1	--	36

DATE	TOTAL MERCURY (UG/L)	DIS- SOLVED MOLYB- DENUM (MO) (UG/L)	DIS- SOLVED NICKEL (NI) (UG/L)	TOTAL NICKEL (NI) (UG/L)	UTL AND GREASE (MG/L)	DIS- SOLVED SELE- NIUM (SE) (UG/L)	DIS- SOLVED SILVER (AG) (UG/L)	TOTAL SILVER (AG) (UG/L)	DIS- SOLVED STRON- TIUM (SR) (UG/L)	DIS- SOLVED VANA- DIUM (V) (UG/L)	DIS- SOLVED ZINC (ZN) (UG/L)	TOTAL ZINC (ZN) (UG/L)
NOV.												
28...	.1	1	6	43	18	5	0	10	140	.6	30	60
MAY												
07...	.1	1	5	50	1	8	0	10	160	.0	30	30

TEMPERATURE (°C) OF WATER, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

OCTOBER			NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
1	15.0	14.0	7.5	7.5	1.0	0.5	0.5	0.0	1.0	0.5	1.5	1.5
2	15.5	15.0	7.5	7.0	0.5	0.5	0.5	0.5	0.5	0.5	2.0	1.5
3	15.5	15.5	7.0	7.0	0.5	0.0	0.5	0.5	1.0	0.5	2.0	2.0
4	15.5	15.0	7.0	7.0	0.0	0.0	0.5	0.0	1.0	1.0	2.5	2.0
5	15.5	15.0	7.0	7.0	0.5	0.0	0.0	0.0	1.0	1.0	2.5	2.0
6	15.5	15.0	7.5	7.0	0.0	0.0	0.0	0.0	1.0	0.5	3.0	2.5
7	15.0	14.5	7.5	6.5	0.0	0.0	0.0	0.0	1.0	0.5	3.0	2.5
8	14.5	14.5	6.5	6.5	0.0	0.0	0.0	0.0	0.5	0.5	2.5	2.5
9	14.5	14.0	6.5	6.5	0.0	0.0	0.0	0.0	0.5	0.5	2.5	2.5
10	14.0	13.5	6.5	6.5	0.0	0.0	0.0	0.0	0.5	0.5	2.5	2.0
11	13.5	13.5	6.5	6.0	0.5	0.0	0.0	0.0	0.5	0.5	2.5	2.5
12	13.5	13.0	6.0	5.5	0.5	0.0	0.0	0.0	1.0	0.5	3.0	2.0
13	13.5	12.5	5.5	4.5	0.5	0.0	0.5	0.0	1.0	0.5	3.5	3.0
14	13.0	12.5	4.5	4.0	0.0	0.0	0.5	0.0	1.0	0.5	4.0	3.0
15	12.5	11.5	4.0	3.5	0.0	0.0	0.5	0.5	0.5	0.5	4.5	3.5
16	11.5	10.5	3.5	3.0	0.0	0.0	0.5	0.5	0.5	0.0	4.0	3.5
17	10.5	9.5	3.0	3.0	0.0	0.0	0.5	0.5	0.5	0.0	3.5	3.0
18	9.5	9.0	3.0	3.0	0.5	0.0	0.5	0.5	0.5	0.5	3.0	2.5
19	9.0	8.0	3.0	3.0	0.5	0.5	0.5	0.5	0.5	0.5	3.5	2.5
20	8.0	7.5	3.5	3.0	0.5	0.5	0.5	0.5	1.0	0.5	4.0	3.0
21	7.5	7.5	3.0	2.5	0.5	0.5	0.5	0.5	0.5	0.5	4.5	3.5
22	7.5	7.5	2.5	2.0	0.5	0.5	0.5	0.5	1.0	0.5	4.5	4.0
23	8.0	7.5	2.0	1.5	0.5	0.5	0.5	0.5	1.5	1.0	5.5	4.5
24	7.5	7.0	2.0	1.5	0.5	0.5	0.5	0.5	1.0	0.5	5.5	5.5
25	7.5	7.0	2.5	2.0	0.5	0.5	1.0	0.5	1.0	0.5	6.0	5.5
26	8.5	7.5	2.0	1.5	0.5	0.5	1.0	0.5	1.0	1.0	6.5	5.5
27	9.0	8.5	1.5	1.5	0.5	0.5	1.0	0.5	1.5	1.0	7.0	6.5
28	9.0	8.5	1.5	1.0	0.5	0.5	0.5	0.5	1.5	1.5	7.5	7.0
29	8.5	8.0	1.0	1.0	0.5	0.5	0.5	0.5	---	---	7.5	7.0
30	8.0	7.5	1.0	0.5	1.0	0.5	1.0	0.5	---	---	8.0	7.0
31	7.5	7.5	---	---	0.5	0.0	1.0	0.5	---	---	8.0	7.5
MONTH	15.5	7.0	7.5	0.5	1.0	0.0	1.0	0.0	1.5	0.0	8.0	1.5
APRIL			MAY		JUNE		JULY		AUGUST		SEPTEMBER	
DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
1	7.5	7.5	12.0	11.5	20.5	18.5	23.5	22.0	24.0	23.0	26.0	25.5
2	7.5	7.0	11.5	10.5	20.5	19.5	24.5	23.5	24.5	23.5	25.5	25.0
3	7.0	6.5	11.5	10.0	20.5	20.0	26.0	24.5	24.5	23.5	25.0	25.0
4	7.5	6.5	12.5	10.5	20.5	20.0	25.5	25.0	24.5	24.0	25.0	24.5
5	7.5	7.0	12.0	11.5	21.5	20.0	25.5	24.5	25.0	24.5	24.5	24.0
6	7.5	7.0	11.5	11.0	22.5	20.5	25.5	25.0	25.0	24.5	24.0	23.0
7	7.5	7.0	12.0	11.5	22.5	21.0	26.5	25.0	26.0	24.5	23.0	23.0
8	7.0	6.0	14.0	12.0	23.0	21.5	26.5	26.0	26.0	25.5	23.0	22.0
9	6.0	5.0	14.5	13.5	24.0	22.0	26.5	26.0	26.0	25.5	22.0	22.0
10	6.0	4.5	14.0	13.5	24.5	22.5	27.0	26.0	25.5	25.0	22.5	22.0
11	6.5	5.5	14.5	13.5	24.0	23.0	27.0	26.0	25.5	24.5	---	---
12	6.5	6.0	14.0	13.5	24.0	23.0	27.5	26.5	26.0	25.0	22.0	21.5
13	7.5	6.0	14.5	13.5	24.5	23.0	27.0	26.5	25.5	25.0	21.5	21.0
14	9.0	7.0	15.0	13.5	25.0	24.0	26.5	26.0	26.0	25.0	21.5	21.0
15	9.0	8.5	15.5	14.0	25.0	24.0	26.5	25.0	25.5	25.0	21.0	19.5
16	9.0	8.0	15.0	14.0	25.0	24.0	26.0	25.0	25.0	24.5	19.5	19.5
17	10.0	8.0	15.5	13.5	25.5	24.0	26.0	25.5	25.5	24.5	19.5	19.0
18	11.5	9.5	16.5	14.5	25.0	24.0	26.5	25.5	26.0	25.0	19.0	18.5
19	12.5	11.5	17.5	15.5	24.0	23.0	26.5	25.5	26.5	25.5	19.0	18.0
20	14.0	12.0	18.0	16.5	23.5	22.5	26.0	25.5	26.0	25.5	18.5	18.0
21	14.5	13.0	18.0	17.0	22.5	21.0	25.5	25.0	25.5	24.5	18.0	17.0
22	14.5	12.5	17.0	16.5	22.5	21.0	25.0	24.5	24.5	22.5	17.5	17.0
23	13.5	12.0	18.0	17.0	23.5	21.5	24.5	24.5	22.5	22.0	17.0	16.5
24	14.0	12.5	17.5	17.5	24.0	23.0	25.0	24.0	22.5	22.0	17.5	17.0
25	14.5	13.0	17.5	17.0	24.0	23.5	26.0	24.5	22.5	22.0	18.5	17.5
26	14.0	13.0	17.5	17.0	24.0	23.5	25.5	25.0	23.5	22.5	18.5	18.0
27	14.0	12.5	17.5	16.0	24.0	23.0	25.0	24.0	24.5	23.5	18.5	18.0
28	14.0	13.0	17.5	15.5	23.0	22.0	24.0	23.0	25.5	24.5	18.0	18.0
29	14.0	13.0	18.0	16.0	22.0	21.5	23.5	23.0	26.0	25.0	18.0	17.5
30	13.0	12.0	19.0	17.0	22.5	21.0	24.0	22.5	26.0	25.5	17.5	17.5
31	---	---	19.5	18.0	---	---	24.0	23.0	26.0	25.5	---	---
MONTH	14.5	4.5	19.5	10.0	25.5	18.5	27.5	22.0	26.5	22.0	24.0	16.5
YEAR	27.5	0.0										

## VERMILLION RIVER BASIN

05345000 VERMILLION RIVER NEAR EMPIRE CITY, MINN.

LOCATION.--Lat 44°40'00", long 93°03'17", on line between sections 23 and 24, T.114 N., R.19 W., Dakota County at gaging station, on right bank on downstream side of bridge on County Road 79, 2 mi (3.2 km) northwest of Empire City and 4 mi (6.4 km) northeast of Farmington.

DRAINAGE AREA.--110 mi<sup>2</sup> (285 km<sup>2</sup>).

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	TEMPER- ATURE (DEG C)	DIS- CHARGE (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICROH- MOS)	DISE- SOLVED SOLIDS (RESI- DUE AT 180 CI (MG/L)	DISE- SOLVED SOLIDS (TONS PER DAY)	SUR- PENED SOLIDS (MG/L)	THIR- DITY (JTU)	COLOR (PLAT- INUM- CORALY UNITS)	DISE- SOLVED OXYGEN DEMAND (MG/L)	RIN- CHEM- ICAL OXYGEN DEMAND (MG/L)	PH (UNITS)	CAR- BONATE (CO3) (MG/L)
OCT.												
06...	--	--	--	--	--	--	--	--	9.7	--	--	--
16...	7.0	31	590	384	32.5	25	4	10	--	2.4	7.8	0
NOV.												
16...	--	--	--	--	--	--	--	--	11.2	--	--	0
16...	3.5	41	626	434	44.7	13	4	20	--	2.2	7.4	--
DEC.												
13...	--	--	--	--	--	--	--	--	10.2	--	--	--
13...	7.0	21	545	340	19.6	4	3	10	--	1.7	7.2	0
JAN.												
16...	2.0	26	547	382	24.9	34	2	10	9.9	4.5	7.9	0
FEB.												
12...	3.0	25	637	375	25.9	12	2	9	12.1	3.5	7.8	0
MAR.												
09...	5	357	265	197	140	4	5	70	10.9	8.6	7.2	0
APR.												
09...	1.0	59	608	356	56.9	7	4	20	12.2	3.1	7.8	0
MAY												
15...	--	--	--	--	--	--	--	--	--	--	--	0
15...	9.0	47	596	475	84.2	23	3	4	8.5	2.1	7.5	--
JULY												
02...	17.0	40	576	360	39.1	54	10	4	5.6	3.6	7.7	0
30...	17.5	34	618	364	34.7	34	5	10	7.7	--	8.3	0
SEP.												
04...	18.5	29	613	359	24.7	14	4	4	7.4	--	8.0	0

DATE	RICAR- BONATE (MG/L)	ALKA- LINITY AS CALCO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DISE- SOLVED CAL- CIUM (CA) (MG/L)	DISE- SOLVED MAG- NE- SIUM (MG)	HARD- NESS (CA, MG)	NON- CAR- BONATE HARD- NESS (MG/L)	DISE- SOLVED SODIUM (NA) (MG/L)	SODIUM AD- SORP- TION RATIO	PERCENT SODIUM	DISE- SOLVED PHOS- PHORUS (K) (MG/L)	DISE- SOLVED CHLO- RIDE (CL) (MG/L)
OCT.												
06...	--	--	7.8	--	--	--	--	--	--	--	--	--
16...	314	254	--	77	25	300	38	11	.3	7	2.3	14
NOV.												
16...	--	--	--	--	--	--	--	--	--	--	--	--
16...	312	254	20	41	26	310	53	14	.4	11	2.5	23
DEC.												
13...	--	--	--	--	--	--	--	--	--	--	--	--
13...	302	244	30	76	26	300	49	14	.4	9	2.7	23
JAN.												
16...	302	244	6.1	73	25	290	37	17	.4	11	2.7	25
FEB.												
12...	311	255	7.9	74	25	300	43	21	.5	13	2.7	30
MAR.												
09...	117	94	12	24	9.1	110	11	5.1	.2	9	6.6	11
APR.												
09...	306	251	7.8	76	25	290	42	16	.4	11	2.6	24
MAY												
15...	--	--	--	--	--	--	--	--	--	--	--	--
15...	301	247	15	74	26	290	45	14	.4	9	2.4	23
JULY												
02...	274	224	8.9	70	23	270	41	14	.4	11	2.8	25
30...	240	230	2.2	71	23	270	42	24	.6	16	2.8	37
SEP.												
04...	303	249	4.8	76	25	290	44	17	.4	11	3.0	28

05345000 VERMILLION RIVER NEAR EMPIRE CITY, MINN.--Continued

PERIOD OF RECORD.--Chemical analyses: October 1972 to September 1973.

REMARKS.--BOD and bacteria data furnished by Metropolitan Sewer Board, St. Paul, Minn.

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	DTS- SOLVED SULFATE (SO4) (MG/L)	DTS- SOLVED FLUOR- IDE (F) (MG/L)	DTS- SOLVED AMMONIA NITRO- GEN (N) (MG/L)	DTS- SOLVED NITRITE (NI) (MG/L)	DTS- SOLVED NITRATE (N) (MG/L)	AMMONIA NITRO- GEN (N) (MG/L)	ORGANIC NITRO- GEN (N) (MG/L)	DTS- SOL- VED- PHOS- PHORUS (P) (MG/L)	PHENOLS (UG/L)	CON- FIRMED COLI- FORM (MPN)	FECAL COLI- FORM (FC BODTH) (MPN)
OCT.											
16...	--	--	--	--	--	.25	--	--	--	--	--
16...	47	.3	.25	.04	1.6	--	.34	.49	22	160000	35000
NOV.											
16...	--	--	--	--	--	.28	--	--	--	--	--
16...	63	.6	.28	.00	2.2	--	.28	2.0	2	33000	7000
DEC.											
13...	--	--	--	--	--	--	--	--	--	--	--
13...	43	.4	.50	.01	2.2	.50	.26	.88	2	13000	3300
JAN.											
16...	42	.3	.49	.02	2.1	.69	.51	.70	3	33000	13000
FEB.											
12...	39	.3	1.1	.03	2.2	1.1	.40	.87	0	3300	1300
MAR.											
09...	20	.2	--	.05	1.6	1.2	1.2	.33	0	64000	2200
APR.											
09...	46	.1	--	.02	1.4	.48	.47	.41	0	4900	1700
MAY											
15...	--	--	--	--	--	--	--	--	--	--	--
15...	38	.1	--	.05	1.6	.08	.63	.41	0	1400	--
JULY											
02...	35	.3	--	.18	1.7	.01	.99	.53	9	--	2500
30...	38	.3	--	.08	1.6	.08	.66	.63	2	--	--
SEP.											
04...	36	.4	--	.10	2.0	.09	.36	.82	2	--	--

DATE	DTS- SOLVED ALUM- INUM (AL) (UG/L)	TOTAL ALUM- INUM (AL) (UG/L)	DTS- SOLVED ARSENIC (AS) (UG/L)	DTS- SOLVED BARIUM (BA) (UG/L)	DTS- SOLVED BERYL- LIUM (RE) (UG/L)	TOTAL BERYL- LIUM (BE) (UG/L)	DTS- SOLVED BORON (B) (UG/L)	DTS- SOLVED CAD- MIUM (CD) (UG/L)	TOTAL CAD- MIUM (CD) (UG/L)	DTS- SOLVED CHRO- MIUM (CR) (UG/L)	HEXA- VALENT CHRO- MIUM (CR6) (UG/L)	DTS- SOLVED COBALT (CO) (UG/L)
NOV.												
16...	20	130	6	0	0	10	50	0	0	0	0	1
MAY												
15...	100	230	0	0	0	0	60	0	0	0	0	1

DATE	TOTAL COBALT (CO) (UG/L)	DTS- SOLVED COPPER (CU) (UG/L)	TOTAL COPPER (CU) (UG/L)	CYANIDE (CN) (MG/L)	DTS- SOLVED IRON (FE) (UG/L)	TOTAL IRON (FE) (UG/L)	DTS- SOLVED LEAD (PB) (UG/L)	TOTAL LEAD (PB) (UG/L)	DTS- SOLVED LITHIUM (LI) (UG/L)	DTS- SOLVED MAN- GANESE (MN) (UG/L)	TOTAL MAN- GANESE (MN) (UG/L)	DTS- SOLVED MERCURY (MG) (UG/L)
NOV.												
16...	2	5	50	.00	40	520	1	1	10	400	400	.7
MAY												
15...	20	7	10	.01	100	1400	1	100	0	120	220	.0

DATE	TOTAL MERCURY (MG) (UG/L)	DTS- SOLVED MOLYB- DENUM (MO) (UG/L)	DTS- SOLVED NICKEL (NI) (UG/L)	TOTAL NICKEL (NI) (UG/L)	OIL AND GREASE (MG/L)	DTS- SOLVED SELE- NIUM (SE) (UG/L)	DTS- SOLVED SILVER (AG) (UG/L)	TOTAL SILVER (AG) (UG/L)	DTS- SOLVED STRON- TIUM (SR) (UG/L)	DTS- SOLVED VANA- DIUM (V) (UG/L)	DTS- SOLVED ZINC (ZN) (UG/L)	TOTAL ZINC (ZN) (UG/L)
NOV.												
16...	.1	1	2	57	3	1	1	7	140	.8	20	80
MAY												
15...	.0	1	2	50	6	7	0	10	120	.0	2500	3000

## VERMILLION RIVER BASIN

05346000 VERMILLION RIVER AT HASTINGS, MINN.

LOCATION.--Lat 44°43'12", long 92°51'57", SE¼SW¼ sec.33, T.115 N., R.17 W., Dakota County, at bridge on County Road 47, in Hastings, 0.7 mi (1.1 km) upstream from mill dam, and 3 mi (4.8 km) upstream from Vermillion Slough.

DRAINAGE AREA.--195 mi (505 km<sup>2</sup>).

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	TEMPER- ATURE (DEG C)	DIS- CHARGE (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHMS)	DIS- SOLVED SOLIDS (RESI- DUE AT 180 C) (MG/L)	DIS- SOLVED SOLIDS (TONS PER DAY)	SUS- PENDED SOLIDS (MG/L)	TUR- BID- ITY (JTU)	COLOR (PLAT- INUM- COBALT UNITS)	DIS- SOLVED OXYGEN (MG/L)	RIO- CHEM- ICAL OXYGEN DEMAND (MG/L)	PH (UNITS)	CAR- BONATE (CO <sub>3</sub> ) (MG/L)
OCT.	--	--	--	--	--	--	--	--	9.4	--	--	--
16...	6.5	47	556	352	45.0	28	3	7	--	1.9	8.1	0
NOV.	--	--	--	--	--	--	--	--	11.5	--	--	0
16...	2.0	60	578	360	50.0	18	7	20	--	1.4	7.4	--
DEC.	--	--	--	--	--	--	--	--	8.5	--	--	--
14...	0	33	574	322	28.9	24	5	5	--	1.2	7.3	0
JAN.	0	32	543	354	31.0	46	3	7	9.1	2.0	7.7	0
FEB.	0	34	569	364	33.7	10	2	7	11.0	1.9	7.8	0
MAR.	1.0	600	228	163	264	75	10	70	11.5	8.5	7.2	0
APR.	0	90	572	337	82.2	9	4	20	14.1	2.8	7.9	0
MAY	--	--	--	--	--	--	--	--	--	--	--	0
14...	9.0	109	567	361	106	25	5	20	11.1	0	8.2	--
JULY	23.0	47	542	342	44.0	34	5	4	9.3	1.7	8.3	0
30...	21.5	57	566	330	52.3	56	9	7	9.5	--	8.2	0
SEP.	18.0	40	560	325	35.6	38	9	3	8.7	1.3	8.3	0

DATE	RICAP- RONATE (MG/L)	ALKA- LITY AS CACO <sub>3</sub> (MG/L)	CARBON DIOXIDE (CO <sub>2</sub> ) (MG/L)	DIS- SOLVED CAL- CIUM (CA) (MG/L)	DIS- SOLVED MAG- NE- SIUM (MG)	HARD- NESS (CA, MG)	NON- CAR- BONATE HARD- NESS (MG/L)	DIS- SOLVED SODIUM (NA) (MG/L)	SODIUM AD- JUST- TION RATIO	PERCENT SODIUM	DIS- SOLVED PO- TAS- SIUM (K) (MG/L)	DIS- SOLVED CHLO- RIDE (CL) (MG/L)
OCT.	--	--	3.8	--	--	--	--	--	--	--	--	--
16...	295	242	--	74	25	290	46	8.5	.2	6	1.9	14
NOV.	--	--	--	--	--	--	--	--	--	--	--	--
16...	300	246	19	72	26	290	41	11	.3	8	2.1	17
DEC.	--	--	--	--	--	--	--	--	--	--	--	--
14...	284	233	23	72	25	280	50	10	.3	7	2.4	14
JAN.	291	239	9.3	67	24	270	27	14	.4	10	2.1	22
FEB.	291	239	7.4	15	25	290	51	15	.4	10	2.2	23
MAR.	29	81	10	24	7.8	42	11	3.0	.2	8	6.9	9.5
APR.	287	235	5.8	75	24	290	51	12	.3	8	2.1	20
MAY	--	--	--	--	--	--	--	--	--	--	--	--
14...	293	240	3.0	75	26	290	54	11	.3	7	1.9	19
JULY	243	216	2.1	67	23	260	46	12	.3	9	2.2	21
30...	273	224	2.8	67	23	260	38	18	.5	13	2.5	28
SEP.	289	237	2.3	70	25	280	41	12	.3	9	2.4	18

05346000 VERMILLION RIVER AT HASTINGS, MINN.--Continued

PERIOD OF RECORD.--Chemical analyses: October 1972 to September 1973.

REMARKS.--BOD and bacteria data furnished by Metropolitan Sewer Board, St. Paul, Minn. Miscellaneous analyses are published for water year 1967.

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	DIS- SOLVED SULFATE (SO4) (MG/L)	DIS- SOLVED FLUORIDE (F) (MG/L)	DIS- SOLVED AMMONIA NITROGEN (N) (MG/L)	DIS- SOLVED NITRITE (N) (MG/L)	DIS- SOLVED NITRATE (N) (MG/L)	AMMONIA NITROGEN (N) (MG/L)	ORGANIC NITROGEN (N) (MG/L)	DIS- SOLVED PHOSPHORUS (P) (MG/L)	PHENOLS (UG/L)	CON- FIRMED COLIFORM (MPN)	FECAL COLIFORM (EC BROTH) (MPN)
OCT. 16...	--	--	--	--	--	.01	--	--	--	--	--
NOV. 16...	49	.3	.01	.00	1.9	--	.53	.31	2	4900	1300
NOV. 16...	--	--	--	--	--	.07	--	--	--	--	--
NOV. 16...	38	.3	.07	.01	2.7	--	.44	.35	0	7900	1700
DEC. 14...	--	--	--	--	--	--	--	--	--	--	--
DEC. 14...	38	.3	.22	.01	3.1	.22	.33	.35	3	4900	4900
JAN. 16...	37	.2	.34	.03	2.9	.34	.27	.46	3	4900	1300
FEB. 12...	38	.3	.43	.02	3.0	.43	.40	.48	0	4900	2300
MAR. 09...	16	.2	--	.05	1.4	1.2	1.4	.34	10	35000	2600
APR. 09...	39	.1	--	.02	2.0	.09	.39	.29	0	11000	450
MAY 14...	--	--	--	--	--	--	--	--	--	--	--
MAY 14...	35	.3	--	.03	1.7	.01	.36	.09	0	4900	170
JULY 02...	33	.3	--	.03	2.5	.03	.63	.36	6	--	5000
JULY 30...	36	.2	--	.03	2.4	.05	.88	.50	2	--	--
SEP. 04...	39	.2	--	.01	2.6	.03	.62	.50	0	--	1700

DATE	DIS- SOLVED ALUMINUM (AL) (UG/L)	TOTAL ALUMINUM (AL) (UG/L)	DIS- SOLVED ARSENIC (AS) (UG/L)	DIS- SOLVED BARIUM (BA) (UG/L)	DIS- SOLVED BERYLLIUM (BE) (UG/L)	TOTAL BERYLLIUM (BE) (UG/L)	DIS- SOLVED BORON (B) (UG/L)	DIS- SOLVED CADMIUM (CD) (UG/L)	TOTAL CADMIUM (CD) (UG/L)	DIS- SOLVED CHROMIUM (CR) (UG/L)	HEXA- VALENT CHROMIUM (CR6) (UG/L)	DIS- SOLVED COBALT (CO) (UG/L)
NOV. 16...	10	180	2	0	0	0	30	0	0	0	0	2
MAY 14...	80	290	2	0	0	0	40	0	0	0	0	0

DATE	TOTAL COBALT (CO) (UG/L)	DIS- SOLVED COPPER (CU) (UG/L)	TOTAL COPPER (CU) (UG/L)	CYANIDE (CN) (MG/L)	DIS- SOLVED IRON (FE) (UG/L)	TOTAL IRON (FE) (UG/L)	DIS- SOLVED LEAD (PB) (UG/L)	TOTAL LEAD (PB) (UG/L)	DIS- SOLVED LITHIUM (LI) (UG/L)	DIS- SOLVED MANGANESE (MN) (UG/L)	TOTAL MANGANESE (MN) (UG/L)	DIS- SOLVED MERCURY (HG) (UG/L)
NOV. 16...	2	4	16	.01	60	480	2	4	0	220	400	.1
MAY 14...	20	7	10	.00	140	1300	1	100	0	40	180	.0

DATE	TOTAL MERCURY (MG) (UG/L)	DIS- SOLVED MOLYBDENUM (MO) (UG/L)	DIS- SOLVED NICKEL (NI) (UG/L)	TOTAL NICKEL (NI) (UG/L)	OIL AND GREASE (MG/L)	DIS- SOLVED SILICUM (SE) (UG/L)	DIS- SOLVED SILVER (AG) (UG/L)	TOTAL SILVER (AG) (UG/L)	DIS- SOLVED STRONTIUM (SR) (UG/L)	DIS- SOLVED VANADIUM (V) (UG/L)	DIS- SOLVED ZINC (ZN) (UG/L)	TOTAL ZINC (ZN) (UG/L)
NOV. 16...	.1	1	1	73	3	1	1	11	120	.9	20	50
MAY 14...	--	.1	5	50	2	7	0	10	140	.0	0	1900

## 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 mi (3.7 km) upstream from Middle Fork, 2.4 mi (3.9 km) west of Elba, and 3.5 mi (5.6 km) upstream from confluence with South Fork.

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	TEMPER- ATURE (DEG C)	DIS- CHARGE (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	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)	COLOR (PLAT- INUM- COBALT UNITS)	DIS- SOLVED OXYGEN (MG/L)	BIO- CHEM- ICAL OXYGEN DEMAND (MG/L)	PH (UNITS)	CAR- BONATE (CO3) (MG/L)
NOV.											
06...	9.5	--	--	--	--	--	--	--	--	--	--
06...	9.5	63	563	376	341	64.0	20	10.6	1.0	8.2	0
DEC.											
12...	.0	32	543	302	329	26.1	5	13.7	.7	8.2	0
JAN.											
12...	.0	32	559	370	334	32.0	3	13.2	1.0	8.1	0
12...	.0	31	--	--	--	--	--	--	1.0	--	--
FEB.											
08...	.0	34	536	322	331	29.6	3	--	2.3	8.3	0
MAR.											
05...	1.5	236	275	184	150	117	90	11.8	>8.4	7.3	0
07...	1.0	955	198	158	132	407	80	11.6	>7.8	7.3	0
APR.											
11...	6.0	40	499	291	287	31.4	3	--	1.8	8.9	0
19...	12.0	--	--	--	--	--	--	--	--	--	--
MAY											
17...	14.0	86	518	318	304	73.8	10	12.4	2.0	8.7	0
JUNE											
28...	14.5	55	550	349	322	51.8	6	9.3	2.2	8.3	0
JULY											
25...	17.5	48	--	--	--	--	--	--	--	--	--
25...	21.0	--	--	--	--	--	--	--	--	--	--
26...	17.5	47	448	283	262	36.5	30	8.3	2.1	7.8	0
AUG.											
10...	18.0	--	--	--	--	--	--	--	--	--	--
28...	18.0	50	562	347	327	46.8	2	--	--	8.1	0

DATE	DIS- SOLVED ARSENIC (AS) (UG/L)	DIS- SOLVED CAD- MIUM (CD) (UG/L)	HEXA- VALENT CHRO- MIUM (CR6) (UG/L)	DIS- SOLVED COBALT (CM) (UG/L)	DIS- SOLVED COPPER (CU) (UG/L)	DIS- SOLVED LEAD (PB) (UG/L)	DIS- SOLVED LITHIUM (LI) (UG/L)
JUNE							
28...	3	1	0	0	5	10	0

DATE	DIS- SOLVED GROSS ALPHA AS U-NAT, (UG/L)	SUS- PENDED GROSS ALPHA AS U-NAT, (UG/L)	DIS- SOLVED GROSS BETA AS CS-137 (PC/L)	SUS- PENDED GROSS BETA AS CS-137 (PC/L)	DIS- SOLVED GROSS BETA AS SR90 /Y90 (PC/L)	SUS- PENDED GROSS BETA AS SR90 /Y90 (PC/L)	DIS- SOLVED RA-226 (RADON METHOD) (PC/L)	DIS- SOLVED NATURAL URANIUM (U) (UG/L)	TOTAL FILT- RABLE RESIDUE (MG/L)	TOTAL NON- FILT- RABLE RESIDUE (MG/L)
DEC.										
12...	<2.8	<.4	2.4	<.4	2.0	<.4	.03	.5	350	3



05376000 NORTH FORK WHITEWATER RIVER NEAR ELBA, MINN.--Continued

(Hydrologic bench-mark station)

 DRAINAGE AREA.--101 mi<sup>2</sup> (262 km<sup>2</sup>).

PERIOD OF RECORD.--Chemical analyses: August 1967 to current year.

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	BICARBONATE (HCO <sub>3</sub> ) (MG/L)	ALKALINITY AS CaCO <sub>3</sub> (MG/L)	CARBON DIOXIDE (CO <sub>2</sub> ) (MG/L)	DIS- SOLVED CAL- CIUM (CA) (MG/L)	DIS- SOLVED MAG- NE- SIUM (MG)	HARD- NESS (CA, MG)	NON- CAL- BONATE MAGNE- SIUM (MG/L)	DIS- SOLVED SODIUM (NA) (MG/L)	SODIUM AD- SUMP- TION RATIO	PERCENT SODIUM	DIS- SOLVED PO- TAS- SIUM (K) (MG/L)
NOV.											
06...	--	--	--	--	--	--	--	--	--	--	--
06...	329	270	3.3	88	23	310	45	4.5	.1	3	2.6
DEC.											
12...	334	274	3.4	76	25	290	19	5.1	.1	4	1.3
JAN.											
12...	343	281	4.4	77	25	300	14	4.4	.1	3	1.7
12...	--	--	--	--	--	--	--	--	--	--	--
FEB.											
06...	336	276	2.7	78	25	300	22	4.4	.1	3	1.5
MAR.											
05...	134	110	11	31	8.8	110	4	2.2	.1	4	8.5
07...	86	71	6.9	19	5.3	69	0	1.8	.1	4	30
APR.											
11...	295	242	.6	68	24	270	27	4.4	.1	3	1.4
19...	--	--	--	--	--	--	--	--	--	--	--
MAY											
17...	297	244	.9	75	24	290	42	4.5	.1	3	1.6
JUNE											
26...	307	252	2.5	77	24	290	39	5.1	.1	4	2.5
JULY											
25...	--	--	--	--	--	--	--	--	--	--	--
25...	--	--	--	--	--	--	--	--	--	--	--
26...	257	211	6.5	61	20	230	24	3.6	.1	3	3.3
AUG.											
10...	--	--	--	--	--	--	--	--	--	--	--
26...	330	271	4.2	78	25	300	27	4.9	.1	3	2.2

DATE	DIS- SOLVED MOLYB- DENUM (MO) (UG/L)	DIS- SOLVED NICKEL (NI) (UG/L)	DIS- SOLVED SELE- NIUM (SE) (UG/L)	DIS- SOLVED STRON- TIUM (SR) (UG/L)	DIS- SOLVED VANA- DIUM (V) (UG/L)	DIS- SOLVED ZINC (ZN) (UG/L)
JUNE						
26...	0	9	0	110	1.4	10

DATE	TIME	INSTAN- TANEOUS DIS- CHARGE (CFS)	TEMPER- ATURE (DEG C)	SUS- PENDE SEDI- MENT (MG/L)	SUS- PENDE SEDI- MENT DIS- CHARGE (T/DAY)
NOV.					
06...	1515	63	9.5	78	13
DEC.					
12...	1200	32	.0	44	3.8
JAN.					
12...	1014	32	.0	18	1.6
FEB.					
06...	1445	34	.0	22	2.0
MAR.					
05...	1119	236	1.5	211	134
07...	1217	955	1.0	1260	3250
APR.					
11...	1545	40	6.0	24	2.6
19...	1605	121	12.0	60	20
MAY					
17...	1555	86	14.0	30	7.0
JUNE					
26...	1203	55	14.5	139	21
JULY					
25...	1740	53	21.0	534	76
26...	0901	48	17.5	163	21
AUG.					
10...	1135	49	18.0	130	17
26...	1045	50	18.0	59	8.0

(Hydrologic bench-mark station)

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	DIS- SOLVED CHLOR- IDE (CL) (MG/L)	DIS- SOLVED SULFATE (SO <sub>4</sub> ) (MG/L)	DIS- SOLVED FLUOR- IDE (F) (MG/L)	DIS- SOLVED BORON (B) (UG/L)	DIS- SOLVED IRON (FE) (UG/L)	DIS- SOLVED MAN- GANESE (MN) (UG/L)	DIS- SOLVED SILICA (SIO <sub>2</sub> ) (MG/L)	DIS- SOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL PHOS- PHORUS (P) (MG/L)	IMME- DIATE COLI- FORM (COL. PER 100 ML)
NOV.										
06...	--	--	--	--	--	--	--	--	--	--
06...	9.5	20	.5	20	70	60	17	3.2	.20	2700
DEC.										
12...	8.7	19	.3	20	40	30	16	2.9	.16	280
JAN.										
12...	7.3	19	.2	10	50	10	18	2.9	.21	700
12...	--	--	--	--	--	--	--	--	--	--
FEB.										
04...	6.3	19	.2	30	50	20	18	2.9	.26	100
MAR.										
05...	6.2	12	.2	50	100	90	7.3	1.6	.94	119000
07...	6.3	13	.4	60	130	120	6.6	1.5	1.4	811000
APR.										
11...	5.1	17	.2	10	9	30	12	2.1	.11	86
19...	--	--	--	--	--	--	--	--	--	--
MAY										
17...	9.7	22	.4	30	50	40	5.9	3.2	.10	55
JUNE										
28...	10	20	.2	20	40	50	16	3.5	.37	47000
JULY										
25...	--	--	--	--	--	--	--	--	--	--
25...	--	--	--	--	--	--	--	--	--	--
26...	5.6	17	.2	30	50	10	15	2.2	.34	14000
AUG.										
10...	--	--	--	--	--	--	--	--	--	--
28...	6.9	19	.2	40	0	45	16	2.7	.19	--

## BED MATERIAL PARTICLE SIZE, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

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

DATE	TIME	NUMBER OF SAMPLING POINTS	INSTANTANEOUS DISCHARGE (CFS)	RED	RED	RED	RED	RED	METHOD OF ANALYSIS
				MAT. FALL DIAM. % FINER THAN	MAT. FALL DIAM. % FINER THAN	MAT. FALL DIAM. % FINER THAN	MAT. FALL DIAM. % FINER THAN	MAT. FALL DIAM. % FINER THAN	MAT. FALL DIAM. % FINER THAN
AUG. 10...	1135	4	49	0	0	1	4		
				0.62 MM	.125 MM	.250 MM	.500 MM		
				RED MAT. FALL DIAM. % FINER THAN	RED MAT. FALL DIAM. % FINER THAN	RED MAT. FALL DIAM. % FINER THAN	RED MAT. FALL DIAM. % FINER THAN	RED MAT. FALL DIAM. % FINER THAN	
DATE	1.00 MM	2.00 MM	4.00 MM	8.00 MM	16.0 MM	32.0 MM			
AUG. 10...	5	6	6	6	17	64	5VW		



## DES MOINES RIVER BASIN

05476000 DES MOINES RIVER AT JACKSON, MINN.

LOCATION.--Lat 43°37'10", long 94°59'10", in SE¼SW¼ sec.24, T.102 N., R.35 W., Jackson County, 1,000 ft (305 m) upstream from gaging station, on right bank in storage room of city powerplant in Jackson.

DRAINAGE AREA.--1,220 mi<sup>2</sup> (3,160 km<sup>2</sup>), approximately.

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	TEMPER- ATURE (DEG C)	DIS- CHARGE (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	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)	COLOR (PLAT- INUM- COBALT UNITS)	PH (UNITS)	CAR- BONATE (CO3) (MG/L)	BICAR- BONATE (HCO3) (MG/L)
OCT.										
12...	10.0	48	--	--	--	--	--	--	--	--
12...	10.0	48	935	680	620	89.6	30	8.5	7	294
NOV.										
21...	1.0	258	1160	908	814	633	20	6.9	0	282
JAN.										
08...	.0	28	1360	1040	976	79.7	20	7.7	0	383
FEB.										
15...	.0	82	878	658	589	146	40	7.7	0	278
APR.										
04...	6.0	910	901	656	593	1610	20	7.8	0	247
MAY										
23...	20.0	257	968	690	651	479	30	7.6	0	198
JULY										
03...	24.0	99	902	632	585	170	20	7.5	0	181
AUG.										
01...	23.5	40	822	555	520	61.1	20	7.6	0	208
SEP.										
06...	23.0	2.8	911	538	570	4.10	20	7.6	0	204

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C) , WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973  
(ONCE-DAILY)

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	---	---	726	794	781	---	821	---
2	---	---	---	---	---	---	690	665	698	---	---	---
3	---	---	---	---	---	---	699	765	858	845	---	---
4	---	---	---	---	---	---	739	747	840	---	---	---
5	---	---	---	---	---	---	774	819	845	---	---	928
6	---	---	---	---	---	---	784	847	819	---	---	---
7	---	---	---	---	---	516	804	819	832	---	---	---
8	---	---	---	---	---	469	738	834	872	---	---	---
9	---	---	---	---	---	412	760	819	872	---	863	---
10	---	---	---	---	---	423	779	756	858	---	---	---
11	---	---	---	---	---	398	779	770	---	---	---	---
12	---	---	---	---	---	416	836	834	---	---	---	---
13	---	---	---	---	---	503	760	819	---	---	---	---
14	---	---	---	---	---	469	804	874	---	---	---	---
15	---	---	---	---	---	512	784	894	---	---	---	---
16	---	---	---	---	---	508	804	847	---	---	---	---
17	---	---	---	---	---	552	804	894	---	---	---	---
18	---	---	---	---	---	591	784	858	753	---	---	---
19	---	---	---	---	---	591	706	847	---	---	---	---
20	---	---	---	---	---	588	789	---	---	---	---	---
21	---	---	---	---	---	635	804	---	---	---	---	---
22	---	---	---	---	---	635	809	---	---	---	---	---
23	---	---	---	---	---	632	794	---	---	---	---	---
24	---	---	---	---	---	651	747	900	---	---	---	---
25	---	---	---	---	---	---	819	---	---	---	---	---
26	---	---	---	---	---	610	847	---	---	---	---	---
27	---	---	---	---	---	616	819	743	---	---	---	---
28	---	---	---	---	---	632	819	707	---	---	---	---
29	---	---	---	---	---	635	760	722	---	---	---	---
30	---	---	---	---	---	698	760	707	---	---	---	---
31	---	---	---	---	---	685	---	781	---	---	---	---
MONTH	---	---	---	---	---	---	777	803	---	---	---	---
YEAR	MAX	928	MTN	398	MEAN	737						

## 05476000 DES MOINES RIVER AT JACKSON, MINN.--Continued

PERIOD OF RECORD.--Chemical analyses: October 1972 to September 1973.

Water temperatures: Water year 1973 (partial-record station).

Sediment: Water years 1968-1971, 1973 (partial-record station).

REMARKS.--Miscellaneous chemical and sediment data published for water years 1968-72.

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	ALKALINITY AS CaCO <sub>3</sub> (MG/L)	CARBON DIOXIDE (CO <sub>2</sub> ) (MG/L)	DISTOLVED CALCIUM (CA) (MG/L)	DISTOLVED MAGNESIUM (MG/L)	HARDNESS (CA, MG) (MG/L)	NON-CARBONATE HARDNESS (MG/L)	DISTOLVED SODIUM (NA) (MG/L)	SODIUM ADSORPTION RATIO	PERCENT SODIUM	DISTOLVED POTASSIUM (K) (MG/L)
OCT. 12...	--	--	--	--	--	--	--	--	--	--
12...	253	--	110	46	460	210	35	.7	14	4.2
NOV. 21...	231	57	130	65	590	340	34	.6	11	5.7
JAN. 08...	314	12	160	77	720	400	37	.6	10	6.7
FEB. 15...	228	8.9	100	44	430	200	19	.4	9	9.4
APR. 04...	203	6.3	110	44	460	250	17	.3	7	5.1
MAY 23...	162	8.0	100	57	480	320	25	.5	10	4.9
JULY 03...	148	9.2	86	53	430	280	30	.6	13	4.2
AUG. 01...	171	8.4	82	38	360	190	28	.6	14	4.3
SEP. 06...	167	8.2	76	49	390	220	35	.8	16	5.9

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973  
(ONCE-DAILY)

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	---	---	6.0	9.0	22.0	---	23.5	---
2	---	---	---	---	---	---	5.0	9.0	22.0	---	---	---
3	---	---	---	---	---	---	6.0	10.0	21.0	24.0	---	---
4	---	---	---	---	---	---	6.5	11.0	19.0	---	---	---
5	---	---	---	---	---	---	9.0	13.0	20.0	---	---	23.0
6	---	---	---	---	---	---	8.0	12.0	21.0	---	---	---
7	---	---	---	---	---	2.0	7.0	12.0	23.0	---	---	---
8	---	---	---	---	---	2.0	5.0	16.0	23.0	---	---	---
9	---	---	---	---	---	2.0	3.0	17.0	23.0	---	24.0	---
10	---	---	---	---	---	2.0	4.0	15.0	23.0	---	---	---
11	---	---	---	---	---	2.0	5.0	15.0	---	---	---	---
12	---	---	---	---	---	4.0	7.0	15.0	---	---	---	---
13	---	---	---	---	---	4.0	8.0	12.0	---	---	---	---
14	---	---	---	---	---	5.0	10.0	12.0	---	---	---	---
15	---	---	---	---	---	4.0	9.0	15.0	---	---	---	---
16	---	---	---	---	---	3.0	9.0	15.0	---	---	---	---
17	---	---	---	---	---	---	10.0	15.0	---	---	---	---
18	---	---	---	---	---	3.0	13.0	18.0	22.0	---	---	---
19	---	---	---	---	---	4.0	15.0	17.0	---	---	---	---
20	---	---	---	---	---	5.0	16.0	---	---	---	---	---
21	---	---	---	---	---	6.0	15.0	---	---	---	---	---
22	---	---	---	---	---	5.0	14.0	---	---	---	---	---
23	---	---	---	---	---	6.0	14.0	---	---	---	---	---
24	---	---	---	---	---	5.0	14.0	19.5	---	---	---	---
25	---	---	---	---	---	6.0	14.0	---	---	---	---	---
26	---	---	---	---	---	7.0	12.0	---	---	---	---	---
27	---	---	---	---	---	8.0	12.0	13.0	---	---	---	---
28	---	---	---	---	---	8.0	11.0	15.0	---	---	---	---
29	---	---	---	---	---	7.0	12.0	17.0	---	---	---	---
30	---	---	---	---	---	8.0	10.0	17.0	---	---	---	---
31	---	---	---	---	---	6.0	---	20.0	---	---	---	---
MONTH	---	---	---	---	---	---	9.5	14.5	---	---	---	---
YEAR	MAX	24.0	MIN	2.0	MEAN	11.5						

## DES MOINES RIVER BASIN

05476000 DES MOINES RIVER AT JACKSON, MINN.--Continued

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	DIS- SOLVED CHLO- RIDE (CL) (MG/L)	DIS- SOLVED SULFATE (SO4) (MG/L)	DIS- SOLVED FLUO- RIDE (F) (MG/L)	DIS- SOLVED BORON (B) (UG/L)	DIS- SOLVED IRON (FE) (UG/L)	DIS- SOLVED MANG- ANESE (MN) (UG/L)	DIS- SOLVED SILICA (SiO2) (MG/L)	DIS- SOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL PHOS- PHORUS (P) (MG/L)
OCT. 12...	--	--	--	--	--	--	--	.00	.58
12...	45	220	.6	110	30	32	7.9	.00	--
NOV. 21...	40	370	.8	90	30	20	17	2.9	.16
JAN. 08...	56	420	.6	190	140	210	19	2.4	.34
FEB. 15...	28	230	.7	110	70	120	15	1.3	.33
APR. 04...	19	250	.5	0	9	0	13	2.8	.18
MAY 23...	29	330	.7	100	40	40	3.2	.80	.27
JULY 03...	31	280	.6	110	20	50	8.2	.58	.23
AUG. 01...	38	200	.7	90	40	30	14	2.7	.16
SEP. 06...	48	240	.5	110	20	80	13	.33	.21

## SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

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	54	--	--	165	--	--	180	--	--
2	45	--	--	168	--	--	240	--	--
3	40	--	--	165	--	--	310	--	--
4	37	--	--	162	--	--	400	--	--
5	35	--	--	160	--	--	500	--	--
6	33	--	--	150	--	--	510	--	--
7	31	--	--	138	--	--	504	--	--
8	28	--	--	122	--	--	520	46	65
9	28	--	--	118	--	--	550	51	76
10	28	--	--	109	--	--	670	65	118
11	28	--	--	103	--	--	860	88	204
12	28	--	--	98	--	--	980	106	280
13	28	--	--	94	--	--	1280	329	1110
14	29	--	--	91	--	--	1530	150	620
15	31	--	--	89	--	--	1350	220	802
16	39	--	--	84	--	--	1410	217	826
17	78	--	--	82	--	--	1360	137	503
18	150	--	--	82	--	--	1330	105	377
19	197	--	--	82	--	--	1380	114	425
20	175	--	--	82	--	--	1410	123	468
21	165	--	--	82	--	--	1390	113	424
22	150	--	--	88	--	--	1310	110	389
23	135	--	--	105	--	--	1220	104	343
24	130	--	--	137	--	--	1180	86	274
25	135	--	--	175	--	--	1160	130	407
26	150	--	--	170	--	--	1120	178	538
27	170	--	--	165	--	--	1080	215	627
28	175	--	--	160	--	--	1060	213	610
29	170	--	--	--	--	--	1000	204	551
30	165	--	--	--	--	--	976	189	498
31	160	--	--	--	--	--	954	216	556
TOTAL	2847	--	--	3426	--	--	29724	--	11091

05476000 DES MOINES RIVER AT JACKSON, MINN.--Continued

## SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	APRIL			MAY			JUNE		
	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	942	210	534	552	104	155	489	169	223
2	936	222	561	579	120	188	468	160	202
3	924	222	554	597	117	189	445	169	203
4	900	162	394	630	130	221	424	160	183
5	864	155	362	639	123	212	398	175	188
6	846	158	361	636	125	215	381	187	192
7	813	149	327	621	141	236	355	185	177
8	771	142	296	582	151	237	329	180	160
9	744	150	301	564	155	236	306	175	145
10	684	158	292	546	156	230	283	160	122
11	645	148	258	504	150	204	269	--	--
12	717	139	269	459	148	183	250	--	--
13	690	120	224	424	150	172	234	--	--
14	663	115	206	404	143	156	224	--	--
15	696	169	318	381	130	134	210	--	--
16	735	146	290	369	126	126	206	--	--
17	744	132	265	326	126	111	197	--	--
18	753	151	307	314	126	107	300	179	145
19	747	177	357	306	125	103	275	--	--
20	753	220	447	281	--	--	267	--	--
21	777	184	386	269	--	--	232	--	--
22	744	149	299	278	--	--	188	--	--
23	699	137	259	263	--	--	167	--	--
24	657	138	245	250	86	58	155	--	--
25	642	140	243	256	--	--	145	--	--
26	627	140	237	250	--	--	139	--	--
27	606	145	237	295	161	128	125	--	--
28	567	128	196	416	184	207	107	--	--
29	537	136	197	462	180	225	98	--	--
30	528	133	190	480	179	232	100	--	--
31	--	--	--	489	185	244	--	--	--
TOTAL	21951	--	9412	13422	--	4509	7766	--	1940

## DES MOINES RIVER BASIN

05476000 DES MOINES RIVER AT JACKSON, MINN.--Continued

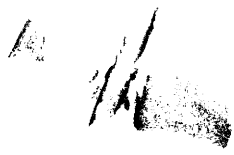
## SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

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	89	--	--	44	103	12	6.0	--	--
2	101	--	--	36	--	--	6.6	--	--
3	96	--	--	42	--	--	6.0	--	--
4	98	--	--	46	--	--	3.9	--	--
5	94	--	--	47	--	--	3.4	40	.37
6	88	--	--	46	--	--	6.0	--	--
7	80	--	--	43	--	--	51	--	--
8	77	--	--	40	--	--	36	--	--
9	79	--	--	37	50	5.0	24	--	--
10	82	--	--	35	--	--	9.6	--	--
11	80	--	--	32	--	--	3.4	--	--
12	82	--	--	31	--	--	4.8	--	--
13	76	--	--	31	--	--	12	--	--
14	71	--	--	29	--	--	25	--	--
15	63	--	--	26	--	--	24	--	--
16	50	--	--	29	--	--	17	--	--
17	46	--	--	40	--	--	16	--	--
18	45	--	--	46	--	--	17	--	--
19	43	--	--	48	--	--	24	--	--
20	39	--	--	36	--	--	25	--	--
21	36	--	--	26	--	--	24	--	--
22	38	--	--	23	--	--	19	--	--
23	44	--	--	20	--	--	16	--	--
24	51	--	--	20	--	--	15	--	--
25	46	--	--	20	--	--	10	--	--
26	42	--	--	16	--	--	48	--	--
27	37	--	--	15	--	--	46	--	--
28	39	--	--	10	--	--	35	--	--
29	47	--	--	8.0	--	--	139	--	--
30	103	--	--	6.0	--	--	143	--	--
31	70	--	--	6.0	--	--	--	--	--
TOTAL	2034	--	--	940.0	--	17.0	815.7	--	.37
TOTAL DISCHARGE FOR YEAR (CFS-DAYS)									91732.7
TOTAL SUSPENDED-SEDIMENT DISCHARGE FOR YEAR (TUNS)									26969.37

BED MATERIAL PARTICLE SIZE, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973  
 (METHODS OF ANALYSIS: B, BOTTOM WITHDRAWAL TUBE; C, CHEMICALLY DISPERSED; P, PIPET; S, SIEVE;  
 V, VISUAL ACCUMULATION TUBE; W, IN DISTILLED WATER)

DATE	TYPE	TIME	NUMBER OF SAMPLING POINTS	INSTAN- TANEOUS DIS- CHARGE (CFS)	BED MAT. FALL DIAM. % FINE THAN .062 MM	BED MAT. FALL DIAM. % FINE THAN .125 MM	BED MAT. FALL DIAM. % FINE THAN .250 MM	BED MAT. FALL DIAM. % FINE THAN .500 MM
AUG. 09...	2	1045	4	37	0	1	2	6
	BED MAT. FALL DIAM. % FINE THAN 1.00 MM	BED MAT. SIEVE DIAM. % FINE THAN 2.00 MM	BED MAT. SIEVE DIAM. % FINE THAN 4.00 MM	BED MAT. SIEVE DIAM. % FINE THAN 8.00 MM	METHOD OF ANALY- SIS			
	80162	80169	80170	80171				
AUG. 09...	14	21	40	65	SVW			





## MISCELLANEOUS ANALYSES OF STREAMS IN MINNESOTA

DATE	TIME	TEMPER- ATURE (DEG C)	DIS- CHARGE (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHO/S)	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)	COLOR (PLAT- INUM- COBALT UNITS)	TUR- BID- ITY (JTU)
04024000 - ST. LOUIS RIVER AT SCANLON, MINN. (LAT 46 42 12 LONG 092 25 07)										
OCT., 1972										
04...	1210	11.0	2820	134	144	86	1100	.20	200	
FEB., 1973										
22...	1305	1.0	1590	181	150	110	644	.20	100	
MAY										
03...	1010	8.0	3850	148	120	85	1250	.16	100	
AUG.										
16...	--	21.0	3990	157	160	102	1720	.22	200	
05030140 - OTTER TAIL R.N.W. OF LUCE, MN (LAT 46 40 20 LONG 095 39 51)										
NOV., 1972										
14...	0825	.0	65	388	226	217	39.8	.31	20	--
05030260 - TOAD RIVER NORTH OF PERHAM, MINN. (LAT 46 38 38 LONG 095 30 33)										
NOV., 1972										
14...	0920	.0	17	524	312	310	14.6	.42	20	--
05030300 - OTTER TAIL R. NR RICHVILLE, MN (LAT 46 30 50 LONG 095 31 03)										
NOV., 1972										
14...	1025	.0	106	377	234	207	67.0	.32	20	--
05030401 - OTTER TAIL RIVER SOUTH OF AMOR, MINN. (LAT 46 21 35 LONG 095 43 57)										
NOV., 1972										
14...	1205	.0	174	352	220	203	103	.30	10	--
05079000 - RED LAKE RIVER AT CROOKSTON, MINN. (LAT 47 46 32 LONG 096 36 33)										
OCT., 1972										
11...	1415	9.0	1060	343	230	182	658	.31	10	--
NOV.										
17...	0930	1.0	474	394	276	225	353	.38	20	--
DEC.										
14...	1430	.0	669	383	220	216	397	.30	20	--
JAN., 1973										
26...	1000	1.0	590	358	258	202	411	.35	9	--
MAR.										
01...	1600	.0	646	348	264	205	460	.36	4	--
SEP.										
27...	1710	14.5	4450	385	282	235	3390	.38	70	--
05129650 - LITTLE FORK RIVER AT COOK, MINN (LAT 47 51 16 LONG 092 41 56)										
OCT., 1972										
17...	1120	3.0	28	68	98	53	7.46	.13	200	--
05129690 - RICE RIVER NEAR ANGORA MINN (LAT 47 42 30 LONG 092 38 41)										
OCT., 1972										
17...	0850	2.0	22	47	67	37	4.11	.09	100	--
05129920 - LITTLE FORK RIVER NEAR GHEEN MINN (LAT 47 51 47 LONG 092 54 16)										
OCT., 1972										
19...	1220	13.0	110	74	106	63	31.5	.14	300	--
05130500 - STURGEON RIVER NEAR CHISHOLM, MINN. (LAT 47 40 25 LONG 092 54 00)										
OCT., 1972										
18...	1440	2.0	117	81	88	60	27.8	.12	100	--
05131000 - DARK RIVER NEAR CHISHOLM, MINNESOTA (LAT 47 41 27 LONG 092 49 15)										
OCT., 1972										
18...	1300	2.0	21	128	98	84	5.74	.13	100	--

DATE	DIS- SOLVED OXYGEN (MG/L)	PH (UNITS)	CAR- BONATE (CO3) (MG/L)	BICAR- BONATE (HCO3) (MG/L)	ALKA- LITY AS CACO3 (MG/L)	DIS- SOLVED CAL- CIUM (CA) (MG/L)	DIS- SOLVED MAG- NE- SIUM (MG) (MG/L)	HARD- NESS (CA, MG) (MG/L)	NUN- CAR- BONATE HARD- NESS (MG/L)	DIS- SOLVED SODIUM (NA) (MG/L)
04024000 - ST. LOUIS RIVER AT SCANLON, MINN. (LAT 46 42 12 LONG 092 25 07)										
OCT., 1972										
04...		6.5	0	52	43	15	5.5	60	17	6.4
FEB., 1973										
22...		6.8	0	65	53	17	6.3	48	15	11
MAY										
03...		7.1	0	56	46	14	5.5	58	12	6.6
AUG.										
16...		6.9	0	62	51	17	6.6	70	19	7.6
05030140 - OTTER TAIL R N.W. OF LUCE, MN (LAT 46 40 20 LONG 095 39 51)										
NOV., 1972	--	7.8	0	256	210	43	23	200	0	5.7
05030260 - TOAD RIVER NORTH OF PERHAM, MINN. (LAT 46 38 38 LONG 095 30 33)										
NOV., 1972	--	7.4	0	358	294	70	27	290	0	7.5
05030300 - OTTER TAIL R. NR RICHVILLE, MN (LAT 46 30 50 LONG 095 31 03)										
NOV., 1972	--	7.9	0	233	191	39	22	190	0	5.3
05030401 - OTTER TAIL RIVER SOUTH OF AMOR, MINN. (LAT 46 21 35 LONG 095 43 57)										
NOV., 1972	--	8.0	0	229	188	30	26	180	0	5.6
05079000 - RED LAKE RIVER AT CROOKSTON, MINN. (LAT 47 46 32 LONG 096 36 33)										
OCT., 1972	--	7.6	0	193	158	43	15	170	11	6.8
NOV.	--	7.8	0	229	188	51	19	210	18	5.7
DEC.	--	7.5	0	239	196	50	18	200	3	5.7
JAN., 1973	--	7.6	0	223	183	47	17	190	4	4.9
MAR.	--	7.5	0	228	187	46	16	180	0	5.6
SEP.	--	7.8	0	159	130	48	17	190	59	5.8
05129650 - LITTLE FORK RIVER AT COOK, MINN (LAT 47 51 16 LONG 092 41 56)										
OCT., 1972	--	7.4	0	29	24	8.9	3.2	35	12	2.8
05129690 - RICE RIVER NEAR ANGORA MINN (LAT 47 42 30 LONG 092 38 41)										
OCT., 1972	--	8.1	0	20	16	6.0	2.2	24	8	1.5
05129920 - LITTLE FORK RIVER NEAR GHEEN MINN (LAT 47 51 47 LONG 092 54 16)										
OCT., 1972	--	7.5	0	41	34	11	3.3	41	7	2.4
05130500 - STURGEON RIVER NEAR CHISHOLM, MINN. (LAT 47 40 25 LONG 092 54 00)										
OCT., 1972	--	7.4	0	44	36	10	3.4	39	3	1.9
05131000 - DARK RIVER NEAR CHISHOLM, MINNESOTA (LAT 47 41 27 LONG 092 49 15)										
OCT., 1972	--	7.5	0	56	46	13	6.0	57	11	3.7

## MISCELLANEOUS ANALYSES OF STREAMS IN MINNESOTA

DATE	SODIUM AD- SORP- TION RATIO	PERCENT SODIUM	DIS- SOLVED PO- TAS- SIUM (K) (MG/L)	DIS- SOLVED CALCI- UM (CL) (MG/L)	DIS- SOLVED SULFATE (SU4) (MG/L)	DIS- SOLVED FLUO- RIDE (F) (MG/L)	DIS- SOLVED BORON (B) (UG/L)	DIS- SOLVED IRON (FE) (UG/L)	DIS- SOLVED MANG- ANESE (MN) (UG/L)	DIS- SOLVED SILICA (SIO2) (MG/L)
04024000 - ST. LOUIS RIVER AT SCANLON, MINN. (LAT 46 42 12 LONG 092 25 07)										
OCT., 1972										
04...	.4	19	.4	8.2	12	.4	240	1000	50	10
FEB., 1973										
27...	.6	25	1.4	14	14	.4	200	740	50	12
MAY										
07...	.4	20	1.1	9.5	13	.2	120	400	40	6.2
AUG.										
14...	.4	19	1.2	9.0	20	.3	100	--	60	9.1
05030140 - OTTER TAIL R. N.W. OF LUCE, MN (LAT 46 40 20 LONG 095 39 51)										
NOV., 1972										
14...	.2	6	2.4	3.0	5.3	.2	30	40	0	8.4
05030260 - TOAD RIVER NORTH OF PERHAM, MINN. (LAT 46 38 38 LONG 095 30 33)										
NOV., 1972										
14...	.2	5	2.5	4.1	7.0	.2	40	70	30	15
05030300 - OTTER TAIL R. NR HIGHVILLE, MN (LAT 46 30 50 LONG 095 31 03)										
NOV., 1972										
14...	.2	6	2.6	3.0	7.3	.2	60	20	10	12
05030401 - OTTER TAIL RIVER SOUTH OF AMOR, MINN. (LAT 46 21 35 LONG 095 43 57)										
NOV., 1972										
14...	.2	6	3.2	3.1	6.5	.2	40	20	0	16
05079000 - RED LAKE RIVER AT CHOKKOSTON, MINN. (LAT 47 46 32 LONG 096 36 33)										
OCT., 1972										
11...	.2	8	3.0	3.4	14	.2	60	130	16	1.8
NOV.										
17...	.2	6	3.3	3.3	26	.3	40	60	30	3.4
DEC.										
14...	.2	6	3.2	3.6	14	.3	60	40	10	3.1
JAN., 1973										
26...	.2	5	3.2	3.1	13	.2	90	50	10	3.5
MAR.										
01...	.2	6	2.9	3.5	14	.2	40	40	20	3.4
SEP.										
27...	.2	6	4.0	5.1	61	.2	70	100	10	13
05129650 - LITTLE FORK RIVER AT COOK, MINN (LAT 47 51 16 LONG 092 41 56)										
OCT., 1972										
17...	.2	14	1.3	4.0	9.2	.4	250	800	16	8.0
05129690 - RICE RIVER NEAR ANGONA MINN (LAT 47 42 30 LONG 092 38 41)										
OCT., 1972										
17...	.1	11	1.0	1.3	6.1	.3	130	620	45	8.1
05129920 - LITTLE FORK RIVER NEAR GREEN MINN (LAT 47 51 47 LONG 092 54 16)										
OCT., 1972										
19...	.2	11	1.3	3.2	9.5	.3	150	820	40	11
05130500 - STURGEON RIVER NEAR CHISHULM, MINN. (LAT 47 40 25 LONG 092 54 00)										
OCT., 1972										
14...	.1	5	1.1	1.9	6.9	.3	110	1200	40	11
05131000 - DARK RIVER NEAR CHISHULM, MINNESOTA (LAT 47 41 27 LONG 092 49 15)										
OCT., 1972										
13...	.2	12	1.6	3.7	14	.3	100	930	50	13

DATE	ORGANIC NITRO- GEN (N) (MG/L)	DIS- SOLVED AMMONIA NITRO- GEN (N) (MG/L)	AMMONIA NITRO- GEN (N) (MG/L)	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)	TOTAL PHOS- PHORUS (P) (MG/L)	DIS- SOL- VED- PHOS- PHORUS (P) (MG/L)
------	---	---	---	--	--	---	---	---	--

## 04024000 - ST. LOUIS RIVER AT SCANLON, MINN. (LAT 46 42 12 LONG 092 25 07)

OCT., 1972									
04...	--	--	--	--	--	--	.08	.08	--
FEB., 1973									
22...	--	--	--	--	--	--	.19	.07	--
MAY									
03...	--	--	--	--	--	--	.17	.04	--
AUG.,									
16...	--	--	--	--	--	--	.01	.05	--

## 05030140 - OTTER TAIL R N.W. OF LUCE, MN (LAT 46 40 20 LONG 095 39 51)

NOV., 1972									
14...	--	--	--	--	--	--	.03	.02	--

## 05030260 - TOAD RIVER NORTH OF PERHAM, MINN. (LAT 46 38 38 LONG 095 30 33)

NOV., 1972									
14...	--	--	--	--	--	--	.09	.04	--

## 05030300 - OTTER TAIL R. NR RICHVILLE, MN (LAT 46 30.50 LONG 095 31 03)

NOV., 1972									
14...	--	--	--	--	--	--	.32	.03	--

## 05030401 - OTTER TAIL RIVER SOUTH OF AMOR, MINN. (LAT 46 21 35 LONG 095 43 57)

NOV., 1972									
14...	--	--	--	--	--	--	.04	.02	--

## 05079000 - RED LAKE RIVER AT CROOKSTON, MINN. (LAT 47 46 32 LONG 096 36 33)

OCT., 1972									
11...	--	--	--	--	--	--	.02	--	--
NOV.									
17...	--	--	--	--	--	--	.01	.27	--
DEC.									
14...	--	--	--	--	--	--	.08	.04	--
JAN., 1973									
26...	--	--	--	--	--	--	.07	.10	--
MAR.									
01...	--	--	--	--	--	--	.21	.13	--
SEP.									
27...	--	--	--	--	--	--	.46	.22	--

## 05129650 - LITTLE FORK RIVER AT COOK, MINN (LAT 47 51 16 LONG 092 41 56)

OCT., 1972									
17...	--	--	--	--	--	--	.02	.10	--

## 05129690 - RICE RIVER NEAR ANGONA MINN (LAT 47 42 30 LONG 092 38 41)

OCT., 1972									
17...	--	--	--	--	--	--	.02	.03	--

## 05129920 - LITTLE FORK RIVER NEAR GHEEN MINN (LAT 47 51 47 LONG 092 54 16)

OCT., 1972									
19...	--	--	--	--	--	--	.04	.09	--

## 05130500 - STURGEON RIVER NEAR CHISHOLM, MINN. (LAT 47 40 25 LONG 092 54 00)

OCT., 1972									
18...	--	--	--	--	--	--	.07	.05	--

## 05131000 - DARK RIVER NEAR CHISHOLM, MINNESOTA (LAT 47 41 27 LONG 092 49 15)

OCT., 1972									
18...	--	--	--	--	--	--	.12	.05	--

## MISCELLANEOUS ANALYSES OF STREAMS IN MINNESOTA

DATE	TIME	TEMPER- ATURE (DEG C)	DIS- CHARGE (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	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)	COLOR (PLAT- INUM- COBALT UNITS)	TUR- BID- ITY (JTU)	
05131310 - BEAR RIVER NEAR TOGO MINN (LAT 47 49 21 LONG 093 03 03)											
OCT., 1972	17...	1450	2.5	68	137	108	88	20.0	.15	90	--
05131320 - STURGEON RIVER NEAR TOGO MINN (LAT 47 51 57 LONG 093 02 07)											
OCT., 1972	19...	1245	8.0	146	118	116	80	45.7	.16	100	--
05131322 - WILLOW RIVER NEAR SILVERDALE, MINN. (LAT 47 58 11 LONG 093 04 51)											
OCT., 1972	19...	--	2.0	15	--	--	--	--	--	--	--
19...	1210	--	--	--	109	152	82	--	.21	300	--
05131470 - NETT LAKE RIVER NR LITTLEFORK MINN (LAT 48 13 00 LONG 093 26 41)											
OCT., 1972	17...	1830	2.0	71	128	124	76	23.9	.17	80	--
05131500 - LITTLE FORK RIVER AT LITTLEFORK, MINNESOTA (LAT 48 23 55 LONG 093 33 56)											
OCT., 1972	16...	1615	5.5	752	118	146	83	296	.20	200	--
05131510 - BEAVER BROOK NEAR LITTLEFORK MINN (LAT 48 24 12 LONG 093 30 56)											
OCT., 1972	16...	1520	5.0	30	234	198	140	16.0	.27	80	--
05132000 - BIG FORK RIVER AT BIG FALLS, MINN. (LAT 48 11 45 LONG 093 48 25)											
OCT., 1972	30...	1430	2.0	580	210	220	118	345	.30	100	--
DEC.	04...	1200	.5	328	254	202	154	179	.27	100	--
JAN., 1973	08...	1430	.5	163	298	184	181	81.0	.25	40	--
FEB.	12...	1530	.0	158	328	207	192	88.3	.28	30	--
APR.	03...	0930	.5	1170	174	148	96	468	.20	30	--
	03...	1415	--	--	--	--	--	--	--	--	--
	23...	1415	7.5	164	165	126	--	55.8	.17	100	--
MAY	28...	1620	15.0	1200	154	149	94	483	.20	200	--
JULY	02...	1330	21.5	502	159	152	94	206	.21	200	--
AUG.	06...	1510	--	455	17	183	113	225	.25	200	--
05267200 - N. BRANCH TWO RIVERS NR BOWLUS, MINN. (LAT 44 49 56 LONG 094 21 38)											
SEP., 1973	12...	1445	17.0	1.9	422	267	264	1.40	.36	10	--
05267880 - SKUNK RIVER NR LASTRUP, MINN. (LAT 46 01 02 LONG 094 01 09)											
OCT., 1972	19...	1355	1.0	9.0	280	168	164	4.08	.23	40	--
05267890 - SKUNK RIVER PIERZ, MINN. (LAT 45 59 02 LONG 094 04 52)											
OCT., 1972	19...	1210	1.5	16	302	192	179	8.76	.26	30	--
05267930 - SKUNK RIVER NR BUCKMAN, MINN. (LAT 45 55 37 LONG 094 10 41)											
OCT., 1972	18...	1550	3.5	33	286	180	169	16.2	.24	20	--

DATE	DIS- SOLVED OXYGEN (MG/L)	PH (UNITS)	CAR- BONATE (CU3) (MG/L)	OICAR- BONATE (MCU3) (MG/L)	ALAA- LINITY AS CACO3 (MG/L)	DIS- SOLVED CAL- CIUM (CA) (MG/L)	DIS- SOLVED MAG- NE- SIUM (MG) (MG/L)	HARD- NESS (CA, MG) (MG/L)	NON- CAR- BONATE HARD- NESS (MG/L)	DIS- SOLVED SODIUM (NA) (MG/L)
05131310 = BEAR RIVER NEAR TUGO MINN (LAT 47 49 21 LONG 093 03 03)										
OCT., 1972 17...	--	7.8	0	82	67	20	5.8	74	7	2.7
05131320 = STURGEON RIVER NEAR TUGO MINN (LAT 47 51 57 LONG 093 02 07)										
OCT., 1972 19...	--	7.7	0	60	49	15	4.8	57	8	2.8
05131322 = WILLOW RIVER NEAR SILVERDALE, MINN. (LAT 47 58 11 LONG 093 04 51)										
OCT., 1972 19...	--	--	--	--	--	--	--	--	--	--
19...	--	7.5	0	62	51	18	5.2	66	15	2.4
05131470 = NETT LAKE RIVER NR LITTLEFORK MINN (LAT 48 13 00 LONG 093 26 41)										
OCT., 1972 17...	--	7.4	0	71	58	17	6.3	68	10	1.4
05131500 = LITTLE FORK RIVER AT LITTLEFORK, MINNESOTA (LAT 48 23 55 LONG 093 33 56)										
OCT., 1972 16...	--	6.8	0	65	53	18	5.6	68	15	2.0
05131510 = BEAVER BROOK NEAR LITTLEFORK MINN (LAT 48 24 12 LONG 093 30 56)										
OCT., 1972 16...	--	7.4	0	145	119	32	12	130	10	1.6
05132000 = BIG FORK RIVER AT BIG FALLS, MINN. (LAT 48 11 45 LONG 093 48 25)										
OCT., 1972 30...	--	7.9	0	123	101	27	8.4	100	1	2.5
DEC. 04...	--	7.5	0	160	136	36	11	140	0	3.6
JAN., 1973 08...	--	7.4	0	198	162	44	12	160	0	3.9
FEB. 12...	--	7.5	0	212	174	46	13	170	0	4.0
APR. 03...	--	7.6	0	95	78	22	6.9	83	5	2.2
03...	--	--	--	--	--	22	6.9	83	--	2.0
23...	--	7.4	0	92	75	--	--	--	--	--
MAY 28...	--	7.3	0	87	71	22	7.0	84	12	1.8
JULY 02...	--	7.3	0	87	71	22	7.0	84	12	1.8
AUG. 06...	--	7.8	0	104	85	25	8.1	96	10	1.8
05267200 = N. BRANCH TWO RIVERS NR BOWLUS, MINN. (LAT 44 49 56 LONG 094 21 38)										
SEP., 1973 12...	--	8.8	16	238	222	65	18	240	15	4.8
05267880 = SKUNK RIVER NR LASTRUP, MINN. (LAT 46 01 02 LONG 094 01 09)										
OCT., 1972 19...	--	7.4	0	164	135	37	11	140	3	3.8
05267890 = SKUNK RIVER PIERZ, MINN. (LAT 45 59 02 LONG 094 04 52)										
OCT., 1972 19...	--	7.5	0	171	140	41	12	150	12	4.1
05267930 = SKUNK RIVER NR BUCKMAN, MINN. (LAT 45 55 37 LONG 094 10 41)										
OCT., 1972 18...	--	7.7	0	153	126	39	11	140	17	4.9

## MISCELLANEOUS ANALYSES OF STREAMS IN MINNESOTA

DATE	SODIUM AD- SOMP- TION RATIO	PERCENT SODIUM	SOLVED PU- TAS- SIUM (K) (MG/L)	DIS- SOLVED CHLU- MIDE (CL) (MG/L)	DIS- SOLVED SULFATE (SO4) (MG/L)	DIS- SOLVED FLUO- RIDE (F) (MG/L)	DIS- SOLVED BORON (B) (UG/L)	DIS- SOLVED IRON (FE) (UG/L)	DIS- SOLVED MANG- NESE (MN) (UG/L)	DIS- SOLVED SILICA (SiO2) (MG/L)
05131310 = BEAR RIVER NEAR TOGO MINN (LAT 47 49 21 LONG 093 03 03)										
OCT., 1972 17...	.1	7	1.4	1.3	7.1	.4	150	680	40	8.0
05131320 = STURGEON RIVER NEAR TUGO MINN (LAT 47 51 57 LONG 093 02 07)										
OCT., 1972 19...	.2	9	1.3	2.9	9.0	.3	80	1100	30	13
05131322 = WILLOW RIVER NEAR SILVERDALE, MINN. (LAT 47 58 11 LONG 093 04 51)										
OCT., 1972 19...	--	--	--	--	--	--	--	--	--	--
19...	.1	7	1.5	2.7	11	.5	230	900	40	9.0
05131470 = NETT LAKE RIVER NR LITTLEFORK MINN (LAT 48 13 00 LONG 093 26 41)										
OCT., 1972 17...	.1	4	1.3	1.0	9.4	.3	100	240	0	3.6
05131500 = LITTLE FORK RIVER AT LITTLEFORK, MINNESOTA (LAT 48 23 55 LONG 093 33 56)										
OCT., 1972 16...	.1	0	1.1	2.7	10	.3	190	780	24	10
05131510 = BEAVER BROOK NEAR LITTLEFORK MINN (LAT 48 24 12 LONG 093 30 56)										
OCT., 1972 10...	.1	5	1.2	1.5	7.0	.3	170	360	24	13
05132000 = BIG FORK RIVER AT BIG FALLS, MINN. (LAT 48 11 45 LONG 093 48 25)										
OCT., 1972 30...	.1	5	1.3	2.4	8.4	.3	80	190	0	7.4
DEC. 04...	.1	5	1.6	2.6	8.5	.2	70	150	10	8.2
JAN., 1973 08...	.1	5	2.2	2.4	6.9	.2	80	180	70	11
FEB. 12...	.1	5	2.0	1.8	6.3	.2	40	150	60	13
APR. 03...	.1	5	2.2	1.6	7.3	.1	130	200	50	6.4
03...	.1	5	1.3	2.2	7.8	.1	80	160	30	3.6
23...	--	--	--	--	--	--	--	--	--	--
MAY 28...	.1	4	.9	2.3	12	.3	120	290	30	3.8
JULY 02...	.1	4	.7	2.4	10	.4	180	340	70	6.5
AUG. 06...	.1	4	1.4	2.0	9.2	.3	180	460	40	12
05267200 = N. BRANCH TWO RIVERS NR BOWLUS, MINN. (LAT 44 49 56 LONG 094 21 38)										
SEP., 1973 12...	.1	4	2.0	4.9	16	.2	80	80	40	17
05267880 = SKUNK RIVER NR LASTRUP, MINN. (LAT 46 01 02 LONG 094 01 09)										
OCT., 1972 19...	.1	0	1.1	3.7	7.6	.2	20	160	100	17
05267890 = SKUNK RIVER PIERZ, MINN. (LAT 45 59 02 LONG 094 04 52)										
OCT., 1972 19...	.1	0	1.2	4.5	7.7	.2	40	100	90	16
05267930 = SKUNK RIVER NR BUCKMAN, MINN. (LAT 45 55 37 LONG 094 10 41)										
OCT., 1972 14...	.2	7	1.4	5.5	9.4	.2	40	110	110	14



DATE	ORGANIC NITRO- GEN (N) (MG/L)	DIS- SOLVED AMMONIA NITRO- GEN (N) (MG/L)	AMMONIA NITRO- GEN (N) (MG/L)	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)	TOTAL PHOS- PHORUS (P) (MG/L)	DIS- SOL- VED- PHOS- PHORUS (P) (MG/L)
05131310 - BEAR RIVER NEAR TOGO MINN (LAT 47 49 21 LONG 093 03 03)									
OCT., 1972 17...	--	--	--	--	--	--	.02	.04	--
05131320 - STURGEON RIVER NEAR TOGO MINN (LAT 47 51 57 LONG 093 02 07)									
OCT., 1972 19...	--	--	--	--	--	--	.06	.03	--
05131322 - WILLOW RIVER NEAR SILVERDALE, MINN. (LAT 47 58 11 LONG 093 04 51)									
OCT., 1972 19... 19...	-- --	-- --	-- --	-- --	-- --	-- --	-- .02	-- --	-- --
05131470 - NETT LAKE RIVER NR LITTLEFORK MINN (LAT 48 13 00 LONG 093 26 41)									
OCT., 1972 17...	--	--	--	--	--	--	.00	.01	--
05131500 - LITTLE FORK RIVER AT LITTLEFORK, MINNESOTA (LAT 48 23 55 LONG 093 33 56)									
OCT., 1972 16...	--	--	--	--	--	--	.00	--	--
05131510 - BEAVER BROOK NEAR LITTLEFORK MINN (LAT 48 24 12 LONG 093 30 56)									
OCT., 1972 16...	--	--	--	--	--	--	.00	--	--
05132000 - BIG FORK RIVER AT BIG FALLS, MINN. (LAT 48 11 45 LONG 093 48 25)									
OCT., 1972 30...	--	--	--	--	--	--	.00	.03	--
DEC. 04...	--	--	--	--	--	--	.04	.04	--
JAN., 1973 08...	--	--	--	--	--	--	.10	.05	--
FEB. 12...	--	--	--	--	--	--	.16	.04	--
APR. 03...	--	--	--	--	--	--	.09	.10	--
03...	--	--	--	--	--	--	.01	.04	--
23...	--	--	--	--	--	--	--	--	--
MAY 28...	--	--	--	--	--	--	.04	.01	--
JULY 02...	--	--	--	--	--	--	.01	.05	--
AUG. 06...	--	--	--	--	--	--	.17	.02	--
05267200 - N. BRANCH TWO RIVERS NR BOWLUS, MINN. (LAT 44 49 56 LONG 094 21 38)									
SEP., 1973 12...	--	--	--	--	--	--	.52	.06	--
05267880 - SKUNK RIVER NR LASTKUP, MINN. (LAT 46 01 02 LONG 094 01 09)									
OCT., 1972 19...	--	--	--	--	--	--	.48	.05	--
05267890 - SKUNK RIVER PIERZ, MINN. (LAT 45 59 02 LONG 094 04 52)									
OCT., 1972 19...	--	--	--	--	--	--	1.8	.04	--
05267930 - SKUNK RIVER NR BUCKMAN, MINN. (LAT 45 55 37 LONG 094 10 41)									
OCT., 1972 18...	--	--	--	--	--	--	1.8	.06	--

[illegible]

DATE	PH (UNITS)	CAR- BONATE (CO3) (MG/L)	BICAR- BONATE (HCO3) (MG/L)	ALKA- LITY AS CACU3 (MG/L)	DIS- SOLVED CAL- CIUM (CA) (MG/L)	DIS- SOLVED MAG- NE- SIUM (MG) (MG/L)	HARD- NESS (CA, MG) (MG/L)	NON- CAR- BONATE HARD- NESS (MG/L)	DIS- SOLVED SODIUM (NA) (MG/L)
05267920 = SKUNK CREEK NR GENOLA, MINN. (LAT 45 56 42 LONG 095 05 36)									
OCT., 1972 18...	7.7	0	198	162	43	15	170	7	7.8
05270130 = ASHLEY CR. AT WESTPORT, MINN. (LAT 45 43 07 LONG 095 09 36)									
NOV., 1972 15...	7.5	0	264	217	55	23	230	15	4.1
05275970 = R. FX. CROWN R. NR GEORGEVILLE, MN (LAT 45 29 07 LONG 094 55 37)									
NOV., 1972 13...	7.7	0	354	294	82	29	320	30	5.5
05276000 = NORTH FORK CROW RIVER NEAR WEGAL, MINN. (LAT 45 22 55 LONG 094 47 40)									
NOV., 1972 13...	7.7	0	360	300	84	30	330	33	6.2
05288500 = MISSISSIPPI RIVER NEAR ANOKA, MINN (LAT 45 07 36 LONG 093 17 48)									
OCT., 1972 04...	7.7	0	174	143	39	13	150	8	4.7
04...	--	--	--	--	--	--	--	--	--
NOV. 24...	6.5	--	189	155	45	16	180	25	5.7
24...	--	--	--	--	--	--	--	--	--
05289499 = UM847.7 FORD DAM ST PAUL (LAT 44 54 56 LONG 093 12 02)									
OCT., 1972 01-31	8.1	--	--	--	--	--	--	--	--
NOV. 01-30	7.8	--	--	--	--	--	--	--	--
DEC. 01-31	8.2	--	--	--	--	--	--	--	--
05303280 = E. BR. CHIPPEWA R. AT TERHACE, MN (LAT 45 30 34 LONG 095 19 24)									
NOV., 1972 13...	7.5	0	277	227	51	27	240	11	4.0
05331001 = UM 839.1 HUBERT STREET ST. PAUL (LAT 44 56 40 LONG 093 05 19.01)									
OCT., 1972 04...	8.1	--	--	--	--	--	--	--	--
NOV. 15...	8.0	--	--	--	--	--	--	--	--
DEC. 06...	8.1	--	--	--	--	--	--	--	--
05331575 = UM830.3 INVER GROVE BRIDGE (LAT 44 51 12 LONG 093 00 31)									
NOV., 1972 01-30	8.0	--	--	--	--	--	--	--	--
DEC. 01-31	7.9	--	--	--	--	--	--	--	--
05344981 = UM796.9 RED WING DAM (LAT 44 36 36 LONG 092 36 36)									
NOV., 1972 01-30	8.0	--	--	--	--	--	--	--	--
DEC. 01-31	7.9	--	--	--	--	--	--	--	--

[illegible]

DATE	ORGANIC NITRO- GEN (N) (MG/L)	DIS- SOLVED AMMONIA NITRO- GEN (N) (MG/L)	AMMONIA NITRO- GEN (N) (MG/L)	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)	TOTAL PHOS- PHORUS (P) (MG/L)	DIS- SOL- VED- PHOS- PHORUS (P) (MG/L)
05267920 = SKUNK CREEK NR GENULA, MINN. (LAT 45 56 42 LONG 095 05 36)									
OCT., 1972 18...	--	--	--	--	--	--	.68	.07	--
05270130 = ASHLEY CR, AT WESTPORT, MINN. (LAT 45 43 07 LONG 095 09 36)									
NOV., 1972 13...	--	--	--	--	--	--	.23	.03	--
05275970 = N. FK. CROW R. NR GEORGEVILLE, MN (LAT 45 29 07 LONG 094 55 37)									
NOV., 1972 13...	--	--	--	--	--	--	.43	.06	--
05276000 = NORTH FORK CROW RIVER NEAR REGAL, MINN. (LAT 45 22 55 LONG 094 47 40)									
NOV., 1972 13...	--	--	--	--	--	--	.55	.07	--
05288500 = MISSISSIPPI RIVER NEAR ANOKA, MINN (LAT 45 07 36 LONG 093 17 48)									
OCT., 1972 04...	.75	.06	--	.02	.17	.81	.19	--	.06
04...	--	--	--	--	--	--	--	--	--
NOV., 24...	.63	.04	.04	.00	.88	.67	.88	--	.07
24...	--	--	--	--	--	--	--	--	--
05289499 = UM847.7 FORD DAM ST PAUL (LAT 44 54 56 LONG 093 12 02)									
OCT., 1972 01-31	--	--	--	--	--	--	--	--	--
NOV., 01-30	--	--	--	--	--	1.1	--	.04	--
DEC., 01-31	--	--	--	--	--	.65	--	.09	--
05303280 = E. BR. CHIPPEWA R. AT TERRACE, MN (LAT 45 30 34 LONG 095 19 24)									
NOV., 1972 13...	--	--	--	--	--	--	.23	.03	--
05331001 = UM 839.1 ROBERT STREET ST. PAUL (LAT 44 56 40 LONG 093 05 19.01)									
OCT., 1972 04...	--	--	--	--	--	.70	--	.10	--
NOV., 15...	--	--	--	--	--	.70	--	.06	--
DEC., 06...	--	--	--	--	--	.60	--	.11	--
05331575 = UM830.3 INVER GROVE BRIDGE (LAT 44 51 12 LONG 093 00 31)									
NOV., 1972 01-30	--	--	--	--	--	.90	--	.15	--
DEC., 01-31	--	--	--	--	--	.95	--	.30	--
05344981 = UM796.9 RED WING DAM (LAT 44 36 36 LONG 092 36 36)									
NOV., 1972 01-30	--	--	--	--	--	.85	--	.15	--
DEC., 01-31	--	--	--	--	--	.95	--	.22	--

## MISCELLANEOUS ANALYSES OF STREAMS IN MINNESOTA

DATE	TIME	TEMPER- ATURE (DEG C)	DIS- CHARGE (CFS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	DIS- SOLVED SOLIDS (RESI- DUE AT 180 C) (MG/L)	DIS- SOLVED SOLIDS (SUM OF CONSTI- TUENTS) (MG/L)	DIS- SOLVED SOLIDS (TUNS PER DAY)	DIS- SOLVED SOLIDS (TUNS PER AC-FT)	COLOR (PLAT- INUM- CUBALT UNITS)	TUR- BID- ITY (JTU)	DIS- SOLVED OXYGEN (MG/L)
05374500 - MISSISSIPPI RIVER AT WINONA, MINNESOTA (LAT 44 03 20 LONG 091 38 15)											
JAN., 1973											
11...	1200	0.0 20700		394	278	233 15500		.38	50	--	--
APR.											
11...	--	4.0 59000		405	269	237 42900		.37	40	--	--
MAY											
17...	0855	12.5 62900		394	272	241 46200		.37	40	--	--
JUNE											
27...	0900	22.0 25700		390	245	225 17000		.33	40	--	--
JULY											
25...	1200	27.0 14500		353	227	208 8890		.31	40	--	--
AUG.											
27...	1700	25.0 27900		332	209	182 15700		.28	20	--	--
05475000 - HERON LAKE OUTLET NEAR HERON LAKE, MINN. (LAT 43 48 10 LONG 095 16 30)											
OCT., 1972											
11...	1300	13.0 8.3	--	--	--	--	--	--	--	--	--
11...	1305	13.0 8.3	1080	772	732	17.4	1.05	40	--	--	--
06480600 - FLANDREAU CREEK NEAR CAZENOVIA, MINN. (LAT 44 04 54 LONG 096 26 27)											
OCT., 1972											
14...	1330	10.0	--	1010	712	708	--	.97	30	--	--
06482945 - ROCK RIVER NEAR HARDWICK, MINN. (LAT 43 43 08 LONG 096 09 50)											
OCT., 1972											
14...	0930	9.0 14		692	452	428	18.1	.61	50	--	--
06483000 - ROCK RIVER AT LUVERNE, MINN. (LAT 43 39 15 LONG 096 12 03)											
OCT., 1972											
13...	1300	12.0 23		753	492	460	31.0	.67	20	--	--
06483240 - KANARANZI CREEK NEAR KANARANZI, MINN. (LAT 43 30 00 LONG 096 07 12)											
OCT., 1972											
13...	0930	8.0 7.0		854	500	448	9.48	.68	40	--	--

DATE	PH (UNITS)	CAR- BONATE (CO <sub>3</sub> ) (MG/L)	BICAR- BONATE (HCO <sub>3</sub> ) (MG/L)	ALKA- LITY AS CAO <sub>3</sub> (MG/L)	DIS- SOLVED CAL- CIUM (CA) (MG/L)	DIS- SOLVED MAG- NE- SIUM (MG) (MG/L)	HARD- NESS (CA, MG) (MG/L)	NON- CAR- BONATE HARD- NESS (MG/L)	DIS- SOLVED SODIUM (NA) (MG/L)	SODIUM AD- SORP- TION RATIO
05378500 - MISSISSIPPI RIVER AT WINONA, MINNESOTA (LAT 44 03 20 LONG 091 38 15)										
JAN., 1973										
11...	7.6	0	193	158	47	16	180	25	9.4	.3
APR.										
11...	8.0	0	167	137	46	17	180	48	7.3	.2
MAY										
17...	7.8	0	173	142	49	18	200	55	7.2	.2
JUNE										
27...	8.1	0	171	140	45	17	180	42	8.3	.3
JULY										
25...	8.1	0	177	145	44	17	180	35	8.6	.3
AUG.										
27...	7.7	0	162	133	38	14	150	20	8.4	.3
05475000 - HERON LAKE OUTLET NEAR HERON LAKE, MINN. (LAT 43 48 10 LONG 095 16 30)										
OCT., 1972										
11...	--	--	--	--	--	--	--	--	--	--
11...	7.9	0	225	185	110	56	500	320	40	.8
06480600 - FLANDREAU CREEK NEAR CAZENOVIA, MINN. (LAT 44 04 54 LONG 096 26 27)										
OCT., 1972										
14...	8.3	0	441	362	130	53	540	180	28	.5
06482945 - ROCK RIVER NEAR HARDWICK, MINN. (LAT 43 43 08 LONG 096 09 50)										
OCT., 1972										
14...	8.1	0	312	256	83	36	360	99	12	.3
06483000 - ROCK RIVER AT LUVERNE, MINN. (LAT 43 39 15 LONG 096 12 03)										
OCT., 1972										
13...	8.0	0	297	244	86	37	370	120	23	.5
06483240 - KANARANZI CREEK NEAR KANARANZI, MINN. (LAT 43 30 00 LONG 096 07 12)										
OCT., 1972										
13...	7.8	0	284	233	81	39	360	130	15	.3

## MISCELLANEOUS ANALYSES OF STREAMS IN MINNESOTA

DATE	PERCENT SODIUM	DIS- SOLVED PO- TAS- SIUM (K) (MG/L)	DIS- SOLVED CHLO- RIDE (CL) (MG/L)	DIS- SOLVED SULFATE (SO4) (MG/L)	DIS- SOLVED FLUO- RIDE (F) (MG/L)	DIS- SOLVED BORON (B) (UG/L)	DIS- SOLVED IRON (FE) (UG/L)	DIS- SOLVED MAN- GANESE (MN) (UG/L)	DIS- SOLVED SILICA (SIO2) (MG/L)	ORGANIC NITRO- GEN (N) (MG/L)
05378500 - MISSISSIPPI RIVER AT WINONA, MINNESOTA (LAT 44 03 20 LONG 091 38 15)										
JAN., 1973										
11...	10	2.2	11	31	.3	60	400	150	15	--
APR., 11...	8	3.2	8.8	53	.3	40	9	0	11	--
MAY 17...	7	2.5	10	51	.4	70	310	70	6.8	--
JUNE 27...	9	2.1	9.3	47	.3	50	40	10	6.2	--
JULY 25...	9	2.0	11	35	.3	70	20	20	1.9	--
AUG. 27...	11	2.1	9.5	21	.2	60	0	10	6.3	--
05475000 - HERON LAKE OUTLET NEAR HERON LAKE, MINN. (LAT 43 48 10 LONG 095 16 30)										
OCT., 1972	--	--	--	--	--	--	--	--	--	2.3
11...	15	5.1	52	330	.8	90	40	63	27	--
11...										
06480600 - FLANDREAU CREEK NEAR CAZENOVIA, MINN. (LAT 44 04 54 LONG 096 26 27)										
OCT., 1972										
14...	10	5.0	20	230	.5	150	40	130	24	--
06482945 - ROCK RIVER NEAR HARDWICK, MINN. (LAT 43 43 08 LONG 096 09 50)										
OCT., 1972										
14...	7	3.6	13	110	.4	70	20	120	11	--
06483000 - ROCK RIVER AT LUVERNE, MINN. (LAT 43 39 15 LONG 096 12 03)										
OCT., 1972										
13...	12	4.2	31	120	.4	80	30	120	12	2.0
06483240 - KANARANZI CREEK NEAR KANARANZI, MINN. (LAT 43 30 00 LONG 096 07 12)										
OCT., 1972										
13...	8	3.3	20	140	.4	90	30	180	9.1	--



DATE	DIS- SOLVED AMMONIA NITRO- GEN (N) (MG/L)	AMMONIA NITRO- GEN (N) (MG/L)	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 (P04) (MG/L)	TOTAL PHOS- PHORUS (P) (MG/L)	DIS- SOL- VED- PHOS- PHORUS (P) (MG/L)	DIS- SOLVED ORTHO. PHOS- PHORUS (P) (MG/L)
------	---	---	--	--	--	---	--	---	--	--

## 05378500 - MISSISSIPPI RIVER AT WINONA, MINNESOTA (LAT 44 03 20 LONG 091 38 15)

JAN., 1973										
11...	--	--	--	--	--	1.2	--	.17	--	--
APR.,										
11...	--	--	--	--	--	1.7	--	.13	--	--
MAY										
17...	--	--	--	--	--	2.4	--	.14	--	--
JUNE										
27...	--	--	--	--	--	1.2	--	.16	--	--
JULY										
25...	--	--	--	--	--	.16	--	.12	--	--
AUG.										
27...	--	--	--	--	--	.56	--	.26	--	--

## 05475000 - HERON LAKE OUTLET NEAR HERON LAKE, MINN. (LAT 43 48 10 LONG 095 16 30)

OCT., 1972										
11...	.11	--	.00	.04	2.4	.04	.77	.42	--	.25
11...	--	--	--	--	--	.01	--	--	--	--

## 06480600 - FLANDREAU CREEK NEAR CAZENOVIA, MINN. (LAT 44 04 54 LONG 096 26 27)

OCT., 1972										
14...	--	--	--	--	--	.16	--	.22	--	--

## 06482945 - ROCK RIVER NEAR HARDWICK, MINN. (LAT 43 43 08 LONG 096 09 50)

OCT., 1972										
14...	--	--	--	--	--	1.2	--	.17	--	--

## 06483000 - ROCK RIVER AT LUVERNE, MINN. (LAT 43 39 15 LONG 096 12 03)

OCT., 1972										
13...	.07	--	.07	.66	2.1	.73	.80	.54	--	.26

## 06483240 - KANARANZI CREEK NEAR KANARANZI, MINN. (LAT 43 30 00 LONG 096 07 12)

OCT., 1972										
13...	--	--	--	--	--	.01	--	.19	--	--

## MISCELLANEOUS ANALYSES OF STREAMS IN MINNESOTA

DATE	DEPTH OF RESE- VOIR (FT)	DEPTH (FT)	TEMPER- ATURE (DEG C)	DIS- SOLVED OXYGEN (MG/L)	CARBON DIOXIDE (CU2) (MG/L)	BIO- CHEM- ICAL OXYGEN DEMAND (MG/L)	PH (UNITS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	DIS- SOLVED SOLIDS (RESI- DUE AT 180 C) (MG/L)	DIS- SOLVED SOLIDS (TONS PER AC-FT)
444500093150000 - ALIMAGNET LAKE AT APPLE VALLEY, MINN (LAT 44 45 00 LONG 093 15 00)										
SEP., 1973										
26...	9.4	.1	17.5	10.2	3.6	8.3	7.6	185	111	.15
26...	--	9.4	--	--	--	--	--	185	--	--
444912093110000 - BLACKHAWK LAKE AT EAGAN VILLAGE, MINN (LAT 44 49 12 LONG 093 11 00)										
NOV., 1972										
09...	6.3	.5	5.5	11.7	1.1	--	8.3	233	180	.24
09...	--	6.3	--	11.7	--	4.6	--	233	--	--
JUNE, 1973										
21...	6.5	.5	20.0	6.3	.1	8.2	9.5	183	135	.18
21...	--	6.5	--	6.2	--	--	--	--	--	--
SEP.										
25...	6.7	6.7	17.5	11.4	7.5	>31	7.4	103	158	.21
25...	--	6.7	--	9.0	--	--	--	192	--	--
444733093120900 - ROESEL POND AT EAGAN VILLAGE, MINN (LAT 44 47 33 LONG 093 12 09)										
NOV., 1972										
02...	--	.5	6.5	--	2.1	--	7.5	110	96	.13
02...	--	10	--	9.4	--	2.0	--	110	--	--
JUNE, 1973										
19...	--	--	23.0	8.2	.0	1.7	9.4	112	98	.13
SEP.										
21...	6.5	.1	14.0	11.4	.1	17	9.3	136	98	.13
445026093065100 - BURVIEW PARK POND AT EAGAN VILLAGE, MINN (LAT 44 50 26 LONG 093 06 51)										
NOV., 1972										
02...	--	.5	6.5	9.8	5.1	--	7.6	246	178	.24
02...	6.1	6.1	--	9.7	--	2.3	--	246	--	--
JUNE, 1973										
14...	--	.5	25.0	8.6	.0	--	9.9	279	198	.27
14...	4.5	4.5	18.0	4.3	--	--	--	279	--	--
SEP.										
13...	7.7	.1	18.0	6.2	1.2	5.2	8.2	218	123	.17
444821093124500 - CEDAR GROVE POND AT EAGAN VILLAGE, MINN (LAT 44 48 21 LONG 093 12 45)										
OCT., 1972										
31...	--	.5	6.0	11.0	.4	--	8.5	158	118	.16
31...	--	7.5	--	10.8	--	1.7	--	158	--	--
JUNE, 1973										
13...	7.8	.5	26.0	--	.0	--	10.2	281	155	.21
13...	--	7.2	26.0	.0	--	--	--	265	--	--
SEP.										
18...	7.2	.1	15.5	6.5	.4	29	8.3	157	114	.16
445035093074600 - DONALDSON'S POND AT EAGAN VILLAGE, MINN (LAT 44 50 35 LONG 093 07 46)										
NOV., 1972										
03...	8.2	.5	6.0	9.5	1.4	--	8.0	171	116	.16
03...	--	8.2	--	9.6	--	1.9	--	171	--	--
JUNE, 1973										
20...	--	.5	23.0	7.2	.7	2.9	8.4	254	164	.22
20...	9.0	9.0	--	6.0	--	--	--	--	--	--
SEP.										
24...	7.5	.1	16.0	8.4	1.0	4.1	8.2	230	145	.20
444500093095200 - FARQUAR LAKE AT APPLE VALLEY, MINN (LAT 44 45 00 LONG 093 09 52)										
SEP., 1973										
25...	6.3	.1	16.0	10.4	.1	20	9.4	165	108	.15
25...	--	6.3	--	10.0	--	--	--	165	--	--

[illegible]



[illegible]

## MISCELLANEOUS ANALYSES OF STREAMS IN MINNESOTA

DATE	DEPTH OF NESTED- VULF (FT)	DEPTH (FT)	TEMPER- ATURE (DEG C)	DIST- SOLVED OXYGEN (MG/L)	CARBON DIOXIDE (MG/L)	BIO- CHEM- ICAL OXYGEN DEMAND (MG/L)	PH (UNITS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	DIST- SOLVED SOLIDS (RESI- DUE AT 180 C) (MG/L)	DIST- SOLVED SOLIDS (TONS PER AC-FT)
444923093095800 - FISH LAKE AT EAGAN VILLAGE, MINN (LAT 44 49 23 LONG 093 09 58)										
OCT., 1972										
30...	25	.5	6.5	10.2	1.9	--	8.0	215	142	.19
30...	--	25	--	10.1	--	3.5	--	220	--	--
JUNE, 1973										
14...	27	--	23.5	9.6	.0	--	10.2	180	131	.18
14...	--	27	23.5	2.0	--	--	--	255	--	--
SEP.										
20...	28	.1	16.0	6.0	1.9	3.5	8.0	205	136	.19
20...	--	28	--	4.0	--	--	--	280	--	--
445123093071400 - MAUSEN POND AT EAGAN VILLAGE, MINN (LAT 44 51 23 LONG 093 07 14)										
NOV., 1972										
10...	1.8	.5	5.0	10.1	5.6	--	7.6	243	198	.27
10...	--	1.8	--	--	--	3.0	--	--	--	--
JUNE, 1973										
15...	3.0	.5	30.5	13.8	.0	--	10.5	172	150	.20
SEP.										
12...	1.5	.1	17.0	4.8	7.9	8.0	7.5	290	183	.25
444717093083100 - MOLLAND LAKE AT EAGAN VILLAGE, MINN (LAT 44 47 17 LONG 093 08 31)										
NOV., 1972										
14...	--	.5	4.0	8.0	6.5	--	7.4	185	86	.12
14...	--	10	4.0	7.7	--	--	--	185	--	--
14...	--	20	4.5	7.7	--	--	--	188	--	--
14...	--	30	4.5	7.6	--	--	--	190	--	--
14...	--	40	4.5	7.5	--	--	--	190	--	--
14...	--	50	4.5	7.3	--	10	--	193	--	--
JUNE, 1973										
19...	--	8.1	--	8.3	--	--	--	--	--	--
22...	--	5.0	21.0	8.6	--	--	--	170	--	--
22...	--	10	20.0	8.7	--	--	--	170	--	--
22...	--	15	13.0	8.2	--	--	--	185	--	--
22...	--	20	9.0	6.7	--	--	--	185	--	--
22...	--	25	6.0	5.9	--	--	--	185	--	--
22...	--	30	5.0	5.4	--	--	--	190	--	--
22...	--	35	5.0	1.8	--	--	--	195	--	--
22...	--	40	5.0	1.6	--	--	--	205	--	--
22...	--	45	5.0	1.6	--	--	--	215	--	--
22...	--	50	5.0	1.6	--	--	--	235	--	--
22...	--	.5	22.0	6.5	.2	2.4	8.8	172	118	.16
SEP.										
20...	50	.1	17.0	9.4	.3	2.5	8.7	140	106	.14
20...	--	5.0	17.0	9.2	--	--	--	145	--	--
20...	--	10	17.0	9.1	--	--	--	145	--	--
20...	--	15	17.0	9.1	--	--	--	147	--	--
20...	--	20	16.5	8.6	--	--	--	170	--	--
20...	--	22	14.5	1.7	--	--	--	180	--	--
20...	--	25	12.0	.8	--	--	--	180	--	--
20...	--	30	10.0	.7	--	--	--	185	--	--
20...	--	40	6.0	.4	--	--	--	215	--	--
20...	--	50	5.0	.3	--	--	7.2	225	--	--
21...	--	--	--	--	--	--	--	--	--	--
444640093094700 - JENSEN LAKE AT EAGAN VILLAGE, MINN (LAT 44 46 40 LONG 093 09 47)										
NOV., 1972										
01...	--	.5	6.0	9.6	5.2	--	7.5	199	156	.21
01...	--	6.3	--	9.8	--	5.9	--	198	--	--
JUNE, 1973										
22...	--	.5	19.0	9.1	.1	25	9.2	178	137	.19
22...	--	6.9	18.0	6.3	--	--	--	175	--	--
SEP.										
19...	4.5	.1	15.5	9.1	7.3	29	7.4	190	149	.20
19...	--	4.5	--	8.4	--	--	--	--	--	--
26...	--	--	--	--	--	--	--	--	--	--
444859093122700 - LANGHOVEN LAKE AT EAGAN VILLAGE, MINN (LAT 44 48 59 LONG 093 12 27)										
OCT., 1972										
26...	1.6	.5	8.4	--	9.4	--	7.4	275	140	.19
26...	--	1.2	--	10.3	--	6.4	--	260	--	--
JUNE, 1973										
13...	2.0	.5	23.0	16.4	.0	--	11.5	230	194	.26
SEP.										
18...	1.6	.1	12.0	10.2	2.1	13	8.1	290	193	.26

DATE	SUS- PENDE SOLIDS (MG/L)	TUR- BID- ITY (JTU)	OIS- SOLVED CAL- CIUM (CA) (MG/L)	DIS- SOLVED MAG- NE- SIUM (MG) (MG/L)	HARD- NESS (CA, MG) (MG/L)	NON- CAR- BONATE HARD- NESS (MG/L)	OIS- SOLVED SODIUM (NA) (MG/L)	SODIUM AD- SUPP- TIUM RATIO	PERCENT SODIUM	DIS- SOLVED PO- TAS- SIUM (K) (MG/L)
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## 444923093095800 - FISH LAKE AT EAGAN VILLAGE, MINN (LAT 44 49 23 LONG 093 09 58)

OCT., 1972										
30...	106	2	26	9.6	110	7	2.0	.1	4	2.7
30...	--	--	--	--	--	--	--	--	--	--
JUNE, 1973										
14...	2	1	19	9.2	85	0	3.1	.1	7	2.4
14...	--	--	--	--	--	--	--	--	--	--
SEP.										
20...	6	1	22	10	96	0	3.2	.1	7	2.3
20...	--	--	--	--	--	--	--	--	--	--

## 445123093071400 - HAUSER POND AT EAGAN VILLAGE, MINN (LAT 44 51 23 LONG 093 07 14)

NOV., 1972										
10...	50	5	30	10	120	2	2.5	.1	4	3.8
10...	--	--	--	--	--	--	--	--	--	--
JUNE, 1973										
15...	32	20	18	4.4	65	0	2.0	.1	6	1.6
SEP.										
12...	13	10	37	12	140	14	3.2	.1	5	4.9

## 444717093083100 - HOLLAND LAKE AT EAGAN VILLAGE, MINN (LAT 44 47 17 LONG 093 08 31)

NOV., 1972										
14...	6	3	22	4.1	72	0	2.0	.1	6	2.4
14...	--	--	--	--	--	--	--	--	--	--
14...	--	--	--	--	--	--	--	--	--	--
14...	--	--	--	--	--	--	--	--	--	--
14...	--	--	--	--	--	--	--	--	--	--
JUNE, 1973										
19...	--	--	--	--	--	--	--	--	--	--
22...	--	--	--	--	--	--	--	--	--	--
22...	--	--	--	--	--	--	--	--	--	--
22...	--	--	--	--	--	--	--	--	--	--
22...	--	--	--	--	--	--	--	--	--	--
22...	--	--	--	--	--	--	--	--	--	--
22...	--	--	--	--	--	--	--	--	--	--
22...	--	--	--	--	--	--	--	--	--	--
22...	--	--	--	--	--	--	--	--	--	--
22...	--	--	--	--	--	--	--	--	--	--
22...	--	--	--	--	--	--	--	--	--	--
22...	10	2	20	8.0	83	6	2.5	.1	6	2.2
SEP.										
20...	1	1	17	7.7	74	9	2.5	.1	7	1.9
20...	--	--	--	--	--	--	--	--	--	--
20...	--	--	--	--	--	--	--	--	--	--
20...	--	--	--	--	--	--	--	--	--	--
20...	--	--	--	--	--	--	--	--	--	--
20...	--	--	--	--	--	--	--	--	--	--
20...	--	--	--	--	--	--	--	--	--	--
20...	--	--	--	--	--	--	--	--	--	--
20...	--	--	--	--	--	--	--	--	--	--
20...	--	--	--	--	--	--	--	--	--	--
21...	--	--	--	--	--	--	--	--	--	--

## 444640093094700 - JENSEN LAKE AT EAGAN VILLAGE, MINN (LAT 44 46 40 LONG 093 09 47)

NOV., 1972										
01...	106	5	24	8.6	95	11	3.1	.1	7	.8
01...	--	--	--	--	--	--	--	--	--	--
JUNE, 1973										
22...	24	6	19	8.8	84	7	3.9	.2	9	.6
22...	--	--	--	--	--	--	--	--	--	--
SEP.										
19...	17	7	23	9.3	96	1	3.9	.2	8	.4
19...	--	--	--	--	--	--	--	--	--	--
26...	--	--	--	--	--	--	--	--	--	--

## 444859093122700 - LANGHOVEN LAKE AT EAGAN VILLAGE, MINN (LAT 44 48 59 LONG 093 12 27)

OCT., 1972										
26...	44	30	37	9.9	130	12	3.8	.1	6	3.4
26...	--	--	--	--	--	--	--	--	--	--
JUNE, 1973										
13...	8	10	24	7.9	92	0	5.8	.3	12	3.6
SEP.										
18...	6	10	42	9.5	140	7	4.5	.2	6	5.4

## MISCELLANEOUS ANALYSES OF STREAMS IN MINNESOTA

DATE	CAN- BONATE (CO3) (MG/L)	BICAR- BONATE (HCO3) (MG/L)	ALKA- LITY AS CACO3 (MG/L)	DIS- SOLVED CHLO- RIDE (CL) (MG/L)	AMMONIA NITRO- GEN (N) (MG/L)	ORGANIC NITRO- GEN (N) (MG/L)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	DIS- SOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL NITRO- GEN (N) (MG/L)	DIS- SOLVED ORTHO, PHOS- PHORUS (P) (MG/L)
444923093095800 - FISH LAKE AT EAGAN VILLAGE, MINN (LAT 44 49 23 LONG 093 09 56)										
OCT., 1972										
30...	0	120	98	4.5	--	.64	--	.02	.71	.10
30...	--	--	--	--	--	--	--	--	--	--
JUNE, 1973										
14...	7	92	87	5.6	.03	.78	.00	.00	.81	.01
14...	--	--	--	--	--	--	--	--	--	--
SEP.										
20...	0	119	98	6.0	.04	.67	.01	.01	.72	.00
20...	--	--	--	--	--	--	--	--	--	--
445123093071400 - MAUSER POND AT EAGAN VILLAGE, MINN (LAT 44 51 23 LONG 093 07 14)										
NOV., 1972										
10...	0	139	114	3.1	--	.85	--	.01	.97	--
10...	--	--	--	--	--	--	--	--	--	--
JUNE, 1973										
15...	0	114	93	1.5	.17	2.2	.00	.00	2.4	.01
SEP.										
12...	0	156	128	4.1	1.4	1.9	.00	.00	3.3	.04
444717093083100 - MULLAND LAKE AT EAGAN VILLAGE, MINN (LAT 44 47 17 LONG 093 08 31)										
NOV., 1972										
14...	0	102	83	5.1	--	.71	--	.00	.81	.00
14...	--	--	--	--	--	--	--	--	--	--
14...	--	--	--	--	--	--	--	--	--	--
14...	--	--	--	--	--	--	--	--	--	--
14...	--	--	--	--	--	--	--	--	--	--
14...	--	--	--	--	--	--	--	--	--	--
JUNE, 1973										
19...	--	--	--	--	--	--	--	--	--	--
22...	--	--	--	--	--	--	--	--	--	--
22...	--	--	--	--	--	--	--	--	--	--
22...	--	--	--	--	--	--	--	--	--	--
22...	--	--	--	--	--	--	--	--	--	--
22...	--	--	--	--	--	--	--	--	--	--
22...	--	--	--	--	--	--	--	--	--	--
22...	--	--	--	--	--	--	--	--	--	--
22...	--	--	--	--	--	--	--	--	--	--
22...	0	94	77	4.1	.06	.69	.00	.00	.75	.00
SEP.										
20...	0	80	66	4.7	.04	.50	.00	.00	.54	.00
20...	--	--	--	--	--	--	--	--	--	--
20...	--	--	--	--	--	--	--	--	--	--
20...	--	--	--	--	--	--	--	--	--	--
20...	--	--	--	--	--	--	--	--	--	--
20...	--	--	--	--	--	--	--	--	--	--
20...	--	--	--	--	--	--	--	--	--	--
20...	--	--	--	--	--	--	--	--	--	--
20...	--	--	--	--	--	--	--	--	--	--
20...	--	--	--	--	--	--	--	--	--	--
21...	--	--	--	--	--	--	--	--	--	--
444640093094700 - JENSEN LAKE AT EAGAN VILLAGE, MINN (LAT 44 46 40 LONG 093 09 47)										
NOV., 1972										
01...	0	103	84	6.0	--	1.6	--	.01	1.7	.00
01...	--	--	--	--	--	--	--	--	--	--
JUNE, 1973										
22...	0	93	76	6.0	.07	1.9	.00	.00	2.0	.00
22...	--	--	--	--	--	--	--	--	--	--
SEP.										
19...	0	115	94	5.5	.05	1.7	.01	.01	1.7	.01
19...	--	--	--	--	--	--	--	--	--	--
26...	--	--	--	--	--	--	--	--	--	--
444459093122700 - LANGMUIR LAKE AT EAGAN VILLAGE, MINN (LAT 44 48 59 LONG 093 12 27)										
OCT., 1972										
26...	0	148	121	6.7	--	.13	--	.12	.34	.00
26...	--	--	--	--	--	--	--	--	--	--
JUNE, 1973										
13...	52	63	105	11	.07	1.4	.01	.02	1.5	.04
SEP.										
18...	0	167	137	7.6	.12	1.5	.00	.00	1.6	.02



DATE	DISE- SOL- VED- PHOS- PHORUS (P) (MG/L)	TOTAL PHOS- PHORUS (P) (MG/L)	IMME- DIATE COLI- FORM (COL. PER 100 ML)	TOTAL PHYTO- PLANK- TON (CELLS PER ML)	IN- ORGANIC CARBON IN BED MA- TERIAL (G/KG)	ORGANIC CARBON IN BED MA- TERIAL (C) (G/KG)	TOTAL NITRITE PLUS NITRATE IN BOT. DEP. (MG/KG)	TOTAL NITRO- GEN IN BOTTOM DEPOS- ITS (N) (MG/KG)	TOTAL PHOS- PHORUS IN BOT- TOM DE- POSITS (MG/KG)
444923093095800 = FISH LAKE AT EAGAN VILLAGE, MINN (LAT 44 49 23 LONG 093 09 58)									
OCT., 1972									
30...	.02	.02	92	810	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--
JUNE, 1973									
14...	.02	.05	87	940	--	--	--	--	--
14...	--	--	--	--	--	--	--	--	--
SEP.									
20...	.01	.01	410	190	--	--	--	--	--
20...	--	--	--	--	--	--	--	--	--
445123093071400 = HAUSER POND AT EAGAN VILLAGE, MINN (LAT 44 51 23 LONG 093 07 14)									
NOV., 1972									
10...	--	.05	816	290	--	--	--	--	--
10...	--	--	--	--	--	--	--	--	--
JUNE, 1973									
15...	.02	.12	90	7600	--	--	--	--	--
SEP.									
12...	.07	.10	156	1100	--	--	--	--	--
444717093083100 = HOLLAND LAKE AT EAGAN VILLAGE, MINN (LAT 44 47 17 LONG 093 08 31)									
NOV., 1972									
14...	.02	.05	810	520	--	--	--	--	--
14...	--	--	--	--	--	--	--	--	--
14...	--	--	--	--	--	--	--	--	--
14...	--	--	--	--	--	--	--	--	--
14...	--	--	--	--	--	--	--	--	--
14...	--	--	--	--	--	--	--	--	--
JUNE, 1973									
19...	--	--	--	--	--	--	--	--	--
22...	--	--	--	--	--	--	--	--	--
22...	--	--	--	--	--	--	--	--	--
22...	--	--	--	--	--	--	--	--	--
22...	--	--	--	--	--	--	--	--	--
22...	--	--	--	--	--	--	--	--	--
22...	--	--	--	--	--	--	--	--	--
22...	--	--	--	--	--	--	--	--	--
22...	--	--	--	--	--	--	--	--	--
22...	--	--	--	--	--	--	--	--	--
22...	.00	.01	8	110	--	--	--	--	--
SEP.									
20...	.00	.00	888	150	--	--	--	--	--
20...	--	--	--	--	--	--	--	--	--
20...	--	--	--	--	--	--	--	--	--
20...	--	--	--	--	--	--	--	--	--
20...	--	--	--	--	--	--	--	--	--
20...	--	--	--	--	--	--	--	--	--
20...	--	--	--	--	--	--	--	--	--
20...	--	--	--	--	--	--	--	--	--
20...	--	--	--	--	--	--	--	--	--
20...	--	--	--	--	--	--	--	--	--
21...	--	--	--	233000	--	--	--	--	--
444640093094700 = JENSEN LAKE AT EAGAN VILLAGE, MINN (LAT 44 46 40 LONG 093 09 47)									
NOV., 1972									
01...	.02	.06	876	5400	--	--	--	--	--
01...	--	--	--	--	--	--	--	--	--
JUNE, 1973									
22...	.01	.11	66	31000	--	--	--	--	--
22...	--	--	--	--	--	--	--	--	--
SEP.									
19...	.01	.10	--	2400000	--	--	2.7	390	92
19...	--	--	--	--	--	--	--	--	--
26...	--	--	--	4000000	--	--	--	--	--
444859093122700 = LANGHUVEN LAKE AT EAGAN VILLAGE, MINN (LAT 44 48 59 LONG 093 12 27)									
OCT., 1972									
26...	.01	.09	105	440	--	--	--	--	--
26...	--	--	--	--	--	--	--	--	--
JUNE, 1973									
13...	.12	.20	34	230	--	--	--	--	--
SEP.									
18...	.05	.23	--	26000	--	--	--	--	--

## MISCELLANEOUS ANALYSES OF STREAMS IN MINNESOTA

DATE	DEPTH OF RESER- VOIR (FT)	DEPTH (FT)	TEMPER- ATURE (DEG C)	DIS- SOLVED OXYGEN (MG/L)	CARBON DIOXIDE (CO <sub>2</sub> ) (MG/L)	BIO- CHEM- ICAL OXYGEN DEMAND (MG/L)	PH (UNITS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	DIS- SOLVED SOLIDS (RESI- DUE AT 180 C) (MG/L)	DIS- SOLVED SOLIDS (TONS PER AC-FT)
444738093065200 = LAKESIDE ESTATE LAKE AT EAGAN VILLAGE, MINN (LAT 44 47 38 LONG 093 06 52)										
NOV., 1972										
03...	--	.5	6.0	11.0	2.1	--	7.8	169	132	.18
03...	--	4.2	--	11.1	--	3.2	--	169	--	--
JUNE, 1973										
20...	--	.5	20.0	5.7	2.5	4.7	7.8	170	122	.17
20...	--	5.8	--	5.6	--	--	--	--	--	--
SEP.										
13...	--	.1	19.0	8.4	.7	--	8.4	184	117	.16
445042093094300 = LEMAY LAKE AT EAGAN VILLAGE, MINN (LAT 44 50 42 LONG 093 09 43)										
OCT., 1972										
26...	7.2	.5	6.5	10.7	1.3	--	8.3	335	178	.24
26...	--	6.6	--	10.9	--	4.1	--	335	--	--
JUNE, 1973										
12...	--	.5	24.0	13.2	.0	--	10.5	232	136	.19
12...	8.0	8.0	22.0	10.1	--	--	--	232	--	--
SEP.										
17...	6.1	.1	17.0	9.6	.2	16	9.1	262	178	.24
444522093102600 = LONG LAKE AT APPLE VALLEY, MINN (LAT 44 45 22 LONG 093 10 26)										
SEP., 1973										
26...	--	4.7	20.0	--	5.7	--	7.4	189	142	.19
26...	4.7	.1	--	7.6	--	20	9.6	--	--	--
444843093090500 = MCCARTHY LAKE AT EAGAN VILLAGE, MINN (LAT 44 48 43 LONG 093 09 05)										
NOV., 1972										
13...	3.2	.5	2.0	10.9	2.7	3.0	8.0	295	160	.22
JUNE, 1973										
21...	4.4	.5	19.5	7.5	.9	2.9	8.4	248	163	.22
SEP.										
26...	3.0	.1	17.5	7.7	.9	8.2	8.4	221	120	.16
445115093062100 = SHANAHAN POND AT EAGAN VILLAGE, MINN (LAT 44 51 15 LONG 093 06 21)										
NOV., 1972										
10...	6.5	.5	5.5	12.4	.6	--	8.2	120	106	.14
10...	--	6.5	--	12.5	--	10	--	120	--	--
JUNE, 1973										
15...	9.0	.5	24.5	7.6	.0	--	11.0	120	111	.15
15...	--	9.0	--	.0	--	--	--	170	--	--
SEP.										
12...	4.0	.1	22.0	10.5	.1	15	9.3	124	85	.12
12...	--	4.0	--	--	--	--	--	160	--	--
444652093131000 = SLATER'S ACRES POND AT EAGAN VILLAGE, MINN (LAT 44 46 52 LONG 093 13 10)										
OCT., 1972										
31...	--	.5	5.5	9.5	3.1	--	7.3	109	104	.14
31...	--	4.1	--	9.5	--	12	--	109	--	--
JUNE, 1973										
19...	--	.5	20.5	10.2	.1	9.5	9.0	112	101	.14
19...	--	6.0	18.0	6.0	--	--	--	210	--	--
SEP.										
21...	3.8	.1	12.0	5.9	8.1	3.3	7.1	132	90	.12
444735093100900 = THOMAS LAKE AT EAGAN VILLAGE, MINN (LAT 44 47 35 LONG 093 10 09)										
OCT., 1972										
30...	--	.5	6.0	11.2	.3	--	8.6	183	138	.19
30...	--	6.6	--	11.4	--	16	--	190	--	--
JUNE, 1973										
11...	--	.5	24.0	10.6	.0	--	9.8	174	128	.17
11...	--	8.2	18.0	.4	--	--	--	340	--	--
SEP.										
14...	7.0	.1	18.0	7.8	.2	23	8.8	197	130	.18
444745093095700 = WILDERNESS LAKE AT EAGAN VILLAGE, MINN (LAT 44 47 45 LONG 093 09 57)										
OCT., 1972										
30...	--	.5	6.0	11.0	.1	--	9.3	152	90	.12
30...	--	8.0	--	12.6	--	13	--	152	--	--
JUNE, 1973										
12...	--	--	23.0	7.7	.0	--	11.4	137	84	.11
12...	--	4.6	17.0	.0	--	--	--	167	--	--
SEP.										
19...	7.5	.1	15.0	8.2	.4	27	8.5	140	109	.15

DATE	SUS- PENDED SOLIDS (MG/L)	TUR- BID- ITY (JTU)	DIS- SOLVED CAL- CIUM (CA) (MG/L)	DIS- SOLVED MAG- NE- SIUM (MG) (MG/L)	HARD- NESS (CA, MG) (MG/L)	NON- CAR- BONATE HARD- NESS (MG/L)	DIS- SOLVED SODIUM (NA) (MG/L)	SODIUM AD- SORP- TION RATIO	PERCENT SODIUM	DIS- SOLVED PO- TAS- SIUM (K) (MG/L)
444738093065200 - LAKESIDE ESTATE LAKE AT EAGAN VILLAGE, MINN (LAT 44 47 38 LONG 093 06 52)										
NOV., 1972										
03...	13	6	24	6.1	85	18	2.9	.1	7	4.2
03...	--	--	--	--	--	--	--	--	--	--
JUNE, 1973										
20...	22	4	20	6.4	76	0	2.4	.1	6	3.6
20...	--	--	--	--	--	--	--	--	--	--
SEP.										
13...	9	4	22	7.1	84	0	3.6	.2	8	4.1
445042093094300 - LEMAY LAKE AT EAGAN VILLAGE, MINN (LAT 44 50 42 LONG 093 09 43)										
OCT., 1972										
26...	23	5	36	13	140	13	11	.4	14	4.3
26...	--	--	--	--	--	--	--	--	--	--
JUNE, 1973										
12...	4	3	14	11	80	9	12	.6	24	2.3
12...	--	--	--	--	--	--	--	--	--	--
SEP.										
17...	18	20	22	12	100	2	15	.6	23	4.9
444522093102600 - LONG LAKE AT APPLE VALLEY, MINN (LAT 44 45 22 LONG 093 10 26)										
SEP., 1973										
26...	32	20	19	6.9	76	3	6.3	.3	14	4.3
26...	--	--	--	--	--	--	--	--	--	--
444843093090500 - MCCARTHY LAKE AT EAGAN VILLAGE, MINN (LAT 44 48 43 LONG 093 09 05)										
NOV., 1972										
13...	8	3	39	12	150	7	3.5	.1	5	4.7
JUNE, 1973										
21...	6	2	30	11	120	0	3.1	.1	5	2.5
26...	3	2	25	11	110	0	2.9	.1	5	2.9
445115093062100 - SHANAHAN POND AT EAGAN VILLAGE, MINN (LAT 44 51 15 LONG 093 06 21)										
NOV., 1972										
10...	39	7	10	5.1	46	1	2.9	.2	11	4.6
10...	--	--	--	--	--	--	--	--	--	--
JUNE, 1973										
15...	18	8	12	2.7	41	0	2.8	.2	12	4.2
15...	--	--	--	--	--	--	--	--	--	--
SEP.										
12...	20	10	11	5.6	51	0	3.1	.2	11	4.5
12...	--	--	--	--	--	--	--	--	--	--
444652093131000 - SLATER'S ACRES POND AT EAGAN VILLAGE, MINN (LAT 44 46 52 LONG 093 13 10)										
OCT., 1972										
31...	114	3	10	3.4	39	7	1.9	.1	8	5.5
31...	--	--	--	--	--	--	--	--	--	--
JUNE, 1973										
19...	10	20	10	3.6	40	0	2.4	.2	10	7.6
19...	--	--	--	--	--	--	--	--	--	--
SEP.										
21...	5	6	13	4.2	50	0	2.9	.2	9	9.8
444735093100900 - THOMAS LAKE AT EAGAN VILLAGE, MINN (LAT 44 47 35 LONG 093 10 09)										
OCT., 1972										
30...	84	30	17	5.9	67	0	6.5	.3	16	4.4
30...	--	--	--	--	--	--	--	--	--	--
JUNE, 1973										
11...	26	30	19	5.9	72	8	7.4	.4	17	4.6
11...	--	--	--	--	--	--	--	--	--	--
SEP.										
14...	9	30	19	6.6	75	2	8.3	.4	18	5.3
444745093095700 - WILDERNESS LAKE AT EAGAN VILLAGE, MINN (LAT 44 47 45 LONG 093 09 57)										
OCT., 1972										
30...	98	8	17	4.8	62	0	3.1	.2	9	3.6
30...	--	--	--	--	--	--	--	--	--	--
JUNE, 1973										
12...	11	7	15	4.1	54	2	2.9	.2	9	5.0
12...	--	--	--	--	--	--	--	--	--	--
SEP.										
19...	18	20	16	4.2	57	0	4.1	.2	12	5.3

## MISCELLANEOUS ANALYSES OF STREAMS IN MINNESOTA

DATE	CAR- BONATE (CU3) (MG/L)	BICAR- BONATE (MCU3) (MG/L)	ALKA- LINITY AS CACU3 (MG/L)	DIS- SOLVED CHLO- RIDE (CL) (MG/L)	AMMONIA NITRO- GEN (N) (MG/L)	ORGANIC NITRO- GEN (N) (MG/L)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	DIS- SOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL NITRO- GEN (N) (MG/L)	DIS- SOLVED ORTHO. PHOS- PHORUS (P) (MG/L)
444738093065200 - LAKESIDE ESTATE LAKE AT EAGAN VILLAGE, MINN (LAT 44 47 38 LONG 093 06 52)										
NOV., 1972										
03...	0	82	67	4.9	--	1.1	--	.03	1.2	.25
03...	--	--	--	--	--	--	--	--	--	--
JUNE, 1973										
20...	0	97	79	4.4	.09	1.2	.00	.00	1.3	.00
20...	--	--	--	--	--	--	--	--	--	--
SEP.										
13...	0	107	88	5.1	.15	--	.01	.03	--	.01
445042093094300 - LEMAY LAKE AT EAGAN VILLAGE, MINN (LAT 44 50 42 LONG 093 09 43)										
OCT., 1972										
26...	0	159	130	17	--	.10	--	.13	.40	.00
26...	--	--	--	--	--	--	--	--	--	--
JUNE, 1973										
12...	29	28	71	19	.05	1.1	.00	.01	1.1	.00
12...	--	--	--	--	--	--	--	--	--	--
SEP.										
17...	5	114	102	22	.16	2.5	.13	.09	2.8	.03
444522093102600 - LONG LAKE AT APPLE VALLEY, MINN (LAT 44 45 22 LONG 093 10 26)										
SEP., 1973										
26...	0	89	73	15	.45	4.6	.03	.03	5.0	.00
26...	--	--	--	--	--	--	--	--	--	--
444843093090500 - MCCARTHY LAKE AT EAGAN VILLAGE, MINN (LAT 44 48 43 LONG 093 09 05)										
NOV., 1972										
13...	0	171	140	6.2	--	.88	--	.02	.97	.14
JUNE, 1973										
21...	0	147	121	3.5	.07	.70	.00	.00	.77	.01
SEP.										
26...	0	138	113	2.6	.07	.93	.02	.02	1.0	.03
445115093062100 - SHANAHAN POND AT EAGAN VILLAGE, MINN (LAT 44 51 15 LONG 093 06 21)										
NOV., 1972										
10...	0	55	45	3.2	--	1.8	--	.00	1.9	--
10...	--	--	--	--	--	--	--	--	--	--
JUNE, 1973										
15...	0	63	52	3.6	.15	2.2	.03	.01	2.3	.00
15...	--	--	--	--	--	--	--	--	--	--
SEP.										
12...	0	68	56	4.5	.13	2.7	.00	.00	2.8	.01
12...	--	--	--	--	--	--	--	--	--	--
444652093131000 - SLATER'S ACRES POND AT EAGAN VILLAGE, MINN (LAT 44 46 52 LONG 093 13 10)										
OCT., 1972										
31...	0	39	32	7.7	--	1.0	--	.32	1.5	.01
31...	--	--	--	--	--	--	--	--	--	--
JUNE, 1973										
19...	1	52	44	6.5	.26	2.5	.00	.00	2.8	.03
19...	--	--	--	--	--	--	--	--	--	--
SEP.										
21...	0	64	53	8.4	.98	1.0	.07	.00	2.1	.12
444735093100900 - THOMAS LAKE AT EAGAN VILLAGE, MINN (LAT 44 47 35 LONG 093 10 09)										
OCT., 1972										
30...	0	81	64	15	--	3.2	--	.08	3.7	.02
30...	--	--	--	--	--	--	--	--	--	--
JUNE, 1973										
11...	17	43	63	14	.09	3.0	.00	.00	3.1	.00
11...	--	--	--	--	--	--	--	--	--	--
SEP.										
14...	0	88	72	16	.65	5.1	.01	.10	5.7	.02
444745093095700 - WILDERNESS LAKE AT EAGAN VILLAGE, MINN (LAT 44 47 45 LONG 093 09 57)										
OCT., 1972										
30...	0	81	66	7.7	--	1.8	--	.02	2.0	.10
30...	--	--	--	--	--	--	--	--	--	--
JUNE, 1973										
12...	0	64	53	6.5	.08	1.6	.02	.00	1.7	.00
12...	--	--	--	--	--	--	--	--	--	--
SEP.										
19...	0	74	51	6.7	.46	3.6	.00	.00	4.1	.02

DATE	DIS- SOL- VED- PHOS- PHORUS (P) (MG/L)	TOTAL PHOS- PHORUS (P) (MG/L)	IMME- DIATE COLI- FORM (COL. PER 100 ML)	TOTAL PHYTO- PLANK- TON (CELLS PER ML)	IN- ORGANIC CARBON IN BED MA- TERIAL (G/KG)	ORGANIC CARBON IN BED MA- TERIAL (C) (G/KG)	TOTAL NITRITE PLUS NITRATE IN BOT. DEP. (MG/KG)	TOTAL NITRO- GEN IN BOTTOM DEPOS- ITS (N) (MG/KG)	TOTAL PHOS- PHORUS IN BOT- TOM DE- POSITS (MG/KG)
444738093065200 = LAKESIDE ESTATE LAKE AT EAGAN VILLAGE, MINN (LAT 44 47 38 LONG 093 06 52)									
NOV., 1972									
03...	.04	.30	72	410	--	--	--	--	--
03...	--	--	--	--	--	--	--	--	--
JUNE, 1973									
20...	.02	.06	36	6100	--	--	--	--	--
20...	--	--	--	--	--	--	--	--	--
SEP.									
13...	.01	.10	846	200000	--	--	--	--	--
445042093094300 = LEMAY LAKE AT EAGAN VILLAGE, MINN (LAT 44 50 42 LONG 093 09 43)									
OCT., 1972									
26...	.01	.06	810	3400	--	--	--	--	--
26...	--	--	--	--	--	--	--	--	--
JUNE, 1973									
12...	.01	.04	88	47000	--	--	--	--	--
12...	--	--	--	--	--	--	--	--	--
SEP.									
17...	.04	.16	840	6600000	--	--	--	--	--
444522093102600 = LONG LAKE AT APPLE VALLEY, MINN (LAT 44 45 22 LONG 093 10 26)									
SEP., 1973									
26...	.03	.25	--	--	--	--	--	--	--
26...	--	--	520	--	--	--	--	--	--
444843093090500 = MCCARTHY LAKE AT EAGAN VILLAGE, MINN (LAT 44 48 43 LONG 093 09 05)									
NOV., 1972									
13...	.03	.04	81	110	--	--	--	--	--
JUNE, 1973									
21...	.03	.05	813	2500	--	--	--	--	--
SEP.									
26...	.02	.09	--	740	--	--	--	--	--
445115093062100 = SHANAHAN POND AT EAGAN VILLAGE, MINN (LAT 44 51 15 LONG 093 06 21)									
NOV., 1972									
10...	--	.05	64	6300	--	--	--	--	--
10...	--	--	--	--	--	--	--	--	--
JUNE, 1973									
15...	.00	.08	20	210000	--	--	--	--	--
15...	--	--	--	--	--	--	--	--	--
SEP.									
12...	.03	.12	833	5200000	--	--	--	--	--
12...	--	--	--	--	--	--	--	--	--
444652093131000 = SLATER'S ACRES POND AT EAGAN VILLAGE, MINN (LAT 44 46 52 LONG 093 13 10)									
OCT., 1972									
31...	.04	.04	836	21	--	--	--	--	--
31...	--	--	--	--	--	--	--	--	--
JUNE, 1973									
19...	.08	.25	15	540000	--	--	--	--	--
19...	--	--	--	--	--	--	--	--	--
SEP.									
21...	.16	.20	840	190	--	--	--	--	--
444735093100900 = THOMAS LAKE AT EAGAN VILLAGE, MINN (LAT 44 47 35 LONG 093 10 09)									
OCT., 1972									
30...	.02	.11	818	13000	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--
JUNE, 1973									
11...	.03	.15	818	1000000	--	--	--	--	--
11...	--	--	--	--	--	--	--	--	--
SEP.									
14...	.00	.18	855	18000000	.1	196	2.7	4050	80
444745093095700 = WILDERNESS LAKE AT EAGAN VILLAGE, MINN (LAT 44 47 45 LONG 093 09 57)									
OCT., 1972									
30...	.02	.05	88	7400	--	--	--	--	--
30...	--	--	--	--	--	--	--	--	--
JUNE, 1973									
12...	.01	.08	85	870000	--	--	--	--	--
12...	--	--	--	--	--	--	--	--	--
SEP.									
19...	.01	.13	8130	13000000	--	--	--	--	--

05062000 BUFFALO RIVER NEAR DILWORTH, MINN.

## SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	JANUARY			FEBRUARY			MARCH		
	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	20	--	--	15	--	--	21	--	--
2	19	--	--	15	--	--	24	--	--
3	19	--	--	15	--	--	27	--	--
4	19	--	--	15	--	--	30	--	--
5	18	--	--	15	--	--	34	--	--
6	18	--	--	15	--	--	40	--	--
7	18	--	--	15	--	--	45	--	--
8	17	--	--	15	--	--	51	--	--
9	17	--	--	15	--	--	60	--	--
10	16	--	--	15	--	--	68	--	--
11	16	--	--	15	--	--	80	--	--
12	16	--	--	15	--	--	96	--	--
13	15	--	--	15	--	--	110	--	--
14	15	--	--	15	--	--	130	33	12
15	15	--	--	15	--	--	125	58	20
16	14	--	--	15	--	--	170	56	26
17	14	--	--	15	--	--	195	34	18
18	14	--	--	15	--	--	205	20	11
19	14	--	--	15	--	--	195	19	10
20	14	--	--	16	--	--	180	15	7.3
21	14	--	--	16	--	--	170	16	7.3
22	14	--	--	16	--	--	160	18	7.8
23	14	--	--	16	--	--	160	23	9.9
24	14	--	--	17	--	--	175	26	12
25	14	--	--	17	--	--	190	29	15
26	14	--	--	18	--	--	195	32	17
27	14	--	--	19	--	--	185	46	23
28	15	--	--	20	--	--	180	45	22
29	15	--	--	--	--	--	172	41	19
30	15	--	--	--	--	--	163	45	20
31	15	--	--	--	--	--	151	69	28
DAY	APRIL			MAY			JUNE		
	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	140	103	39	82	--	--	54	--	--
2	130	72	25	78	--	--	51	--	--
3	122	53	17	74	--	--	46	--	--
4	116	45	14	75	--	--	43	--	--
5	112	45	14	70	--	--	40	--	--
6	109	45	13	64	--	--	38	--	--
7	103	39	11	63	--	--	42	--	--
8	98	36	9.5	61	224	37	43	--	--
9	92	37	9.2	59	--	--	41	--	--
10	88	--	--	57	--	--	39	--	--
11	86	--	--	60	--	--	35	--	--
12	82	--	--	65	--	--	35	--	--
13	80	--	--	73	--	--	32	69	6.0
14	78	--	--	84	--	--	29	--	--
15	77	--	--	85	--	--	26	--	--
16	77	--	--	81	--	--	24	--	--
17	81	--	--	78	--	--	24	--	--
18	87	--	--	74	--	--	30	--	--
19	87	--	--	68	--	--	38	--	--
20	87	--	--	63	--	--	40	--	--
21	93	51	13	61	--	--	45	--	--
22	99	39	10	59	--	--	42	--	--
23	108	38	11	56	--	--	40	--	--
24	112	68	21	56	--	--	39	--	--
25	108	36	11	57	--	--	35	--	--
26	104	25	7.0	59	--	--	32	--	--
27	100	36	9.7	60	--	--	27	--	--
28	94	--	--	61	--	--	26	--	--
29	90	--	--	63	--	--	25	--	--
30	87	--	--	64	--	--	24	--	--
31	--	--	--	60	--	--	--	--	--

05062000 BUFFALO RIVER NEAR DILWORTH, MINN.--Continued

## SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	JULY			AUGUST			SEPTEMBER		
	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	23	--	--	34	--	--	31	--	--
2	25	--	--	32	--	--	48	--	--
3	25	--	--	29	--	--	73	--	--
4	21	--	--	28	--	--	126	115	39
5	20	--	--	25	--	--	152	80	33
6	19	--	--	28	--	--	150	70	28
7	17	--	--	25	--	--	143	72	28
8	15	--	--	21	96	5.4	143	74	29
9	20	--	--	24	--	--	152	72	30
10	19	--	--	30	--	--	165	70	31
11	22	--	--	29	--	--	169	67	31
12	27	--	--	25	--	--	168	63	29
13	28	--	--	24	--	--	163	60	26
14	25	--	--	21	--	--	156	49	21
15	23	--	--	21	--	--	150	38	15
16	24	--	--	20	--	--	142	34	13
17	20	67	3.6	22	--	--	133	35	13
18	19	--	--	22	--	--	121	37	12
19	17	--	--	18	--	--	112	38	11
20	16	--	--	16	--	--	103	40	11
21	14	--	--	18	--	--	102	58	16
22	17	--	--	19	62	3.2	101	69	19
23	19	--	--	22	--	--	97	73	19
24	21	--	--	22	--	--	107	70	20
25	21	--	--	24	--	--	129	58	20
26	24	--	--	25	--	--	149	46	19
27	31	--	--	23	--	--	159	40	17
28	34	--	--	21	--	--	166	37	17
29	35	--	--	21	--	--	170	35	16
30	35	--	--	20	--	--	171	35	16
31	35	--	--	20	--	--	--	--	--

BED MATERIAL PARTICLE SIZE, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973  
(METHODS OF ANALYSIS: B, BOTTOM WITHDRAWAL TUBE; C, CHEMICALLY DISPERSED; P, PIPET; S, SIEVE;  
V, VISUAL ACCUMULATION TUBE; W, IN DISTILLED WATER)

DATE	TYPE	TIME	NUMBER OF SAM- PLING POINTS	INSTAN- TANEOUS DIS- CHARGE (CFS)	BED MAT. FALL DIAM. % FINER THAN .062 MM	BED MAT. FALL DIAM. % FINER THAN .125 MM	BED MAT. FALL DIAM. % FINER THAN .250 MM	BED MAT. FALL DIAM. % FINER THAN .500 MM	BED MAT. FALL DIAM. % FINER THAN 1.00 MM	BED MAT. FALL DIAM. % FINER THAN 2.00 MM	METHOD OF ANALY- SIS
			00063	00061	80158	80159	80160	80161	80162	80169	
AUG. 08...	2	1135	4	22	77	91	94	96	98	99	SVW

## SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

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	--	--	40	--	--	44	--	--
2	34	--	--	40	--	--	44	--	--
3	34	--	--	40	--	--	44	--	--
4	34	--	--	40	--	--	44	--	--
5	35	--	--	40	--	--	45	--	--
6	35	--	--	39	--	--	49	--	--
7	35	--	--	39	--	--	70	--	--
8	35	--	--	39	--	--	96	--	--
9	36	--	--	39	--	--	170	--	--
10	36	--	--	39	--	--	230	--	--
11	36	--	--	38	--	--	320	191	165
12	36	--	--	38	--	--	440	143	170
13	36	--	--	38	--	--	530	98	140
14	36	--	--	38	--	--	540	236	500
15	37	--	--	38	--	--	560	226	342
16	37	--	--	39	--	--	540	173	252
17	37	--	--	39	--	--	470	205	260
18	37	--	--	39	--	--	400	236	255
19	38	--	--	40	--	--	350	201	190
20	38	--	--	40	--	--	320	139	120
21	39	--	--	40	--	--	290	166	130
22	39	--	--	41	--	--	280	239	181
23	40	--	--	41	--	--	280	266	201
24	41	--	--	42	--	--	280	264	200
25	41	--	--	42	--	--	290	250	196
26	40	--	--	43	--	--	310	235	197
27	40	--	--	43	--	--	330	214	191
28	40	--	--	44	--	--	320	165	143
29	40	--	--	--	--	--	304	110	90
30	40	--	--	--	--	--	306	107	88
31	40	--	--	--	--	--	276	103	77
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	260	90	63	186	--	--	129	--	--
2	254	79	54	180	--	--	126	--	--
3	240	70	45	170	--	--	129	--	--
4	227	58	36	162	--	--	134	--	--
5	226	53	32	154	--	--	148	--	--
6	218	64	38	156	--	--	140	--	--
7	211	70	40	156	--	--	129	--	--
8	198	43	23	164	--	--	124	--	--
9	190	33	17	150	25	10	114	--	--
10	182	--	--	162	--	--	109	--	--
11	175	--	--	188	--	--	114	--	--
12	166	--	--	250	--	--	106	--	--
13	166	--	--	254	--	--	97	10	2.6
14	158	--	--	233	--	--	88	--	--
15	169	--	--	213	--	--	87	--	--
16	185	--	--	202	--	--	106	--	--
17	186	--	--	198	--	--	137	--	--
18	180	--	--	185	--	--	172	--	--
19	185	--	--	167	--	--	175	--	--
20	201	--	--	174	--	--	166	--	--
21	229	--	--	159	--	--	170	--	--
22	208	--	--	167	--	--	170	--	--
23	254	--	--	180	--	--	156	--	--
24	246	--	--	191	--	--	138	--	--
25	242	--	--	186	--	--	129	--	--
26	229	--	--	182	--	--	121	--	--
27	215	--	--	177	--	--	129	--	--
28	202	--	--	169	--	--	150	--	--
29	193	--	--	162	--	--	151	--	--
30	191	--	--	154	--	--	135	--	--
31	--	--	--	142	--	--	--	--	--



05062500 WILD RICE RIVER AT TWIN VALLEY, MINN.--Continued

## SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	JULY			AUGUST			SEPTEMBER		
	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	118	--	--	84	--	--	213	--	--
2	114	--	--	84	--	--	742	645	1290
3	109	--	--	81	--	--	1230	538	1790
4	105	--	--	81	--	--	1560	663	2700
5	100	--	--	81	--	--	1470	285	1130
6	99	--	--	86	--	--	1190	144	463
7	94	--	--	94	--	--	1040	142	399
8	96	--	--	88	22	5.2	960	126	327
9	94	--	--	94	--	--	915	126	311
10	93	--	--	94	--	--	986	126	301
11	84	--	--	93	--	--	858	129	299
12	79	--	--	94	--	--	830	127	285
13	72	--	--	93	--	--	786	116	246
14	67	--	--	93	--	--	747	104	210
15	65	--	--	94	--	--	711	94	180
16	62	--	--	93	--	--	672	84	152
17	56	--	--	88	--	--	635	75	129
18	51	10	1.4	87	--	--	596	70	113
19	50	--	--	84	--	--	560	74	112
20	51	--	--	77	--	--	532	83	119
21	46	--	--	81	--	--	522	86	121
22	42	--	--	79	--	--	537	85	123
23	44	--	--	70	9	1.7	563	93	141
24	47	--	--	67	--	--	560	105	159
25	48	--	--	69	--	--	620	121	203
26	56	--	--	69	--	--	771	148	308
27	64	--	--	67	--	--	789	94	200
28	67	--	--	70	--	--	763	85	175
29	74	--	--	70	--	--	721	73	142
30	81	--	--	64	--	--	674	67	122
31	81	--	--	67	--	--	--	--	--

BED MATERIAL PARTICLE SIZE, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973  
(METHODS OF ANALYSIS: B, BOTTOM WITHDRAWAL TUBE; C, CHEMICALLY DISPERSED; P, PIPET; S, SIEVE;  
V, VISUAL ACCUMULATION TUBE; W, IN DISTILLED WATER)

DATE	TYPE	TIME	NUMBER OF SAM- PLING POINTS	INSTAN- TANEOUS DIS- CHARGE (CFS)	BED MAT. FALL DIAM. X FINER THAN .062 MM	BED MAT. FALL DIAM. X FINER THAN .125 MM	BED MAT. FALL DIAM. X FINER THAN .250 MM	BED MAT. FALL DIAM. X FINER THAN .500 MM	BED MAT. FALL DIAM. X FINER THAN 1.00 MM	BED MAT. FALL DIAM. X FINER THAN 2.00 MM	METHOD OF ANALY- SIS
00063			00061		80158	80159	80160	80161	80162	80169	
AUG. 08...	2	0940	4	92	1	2	15	79	97	100	SVW

## MISCELLANEOUS ANALYSES OF STREAMS IN MINNESOTA

05131500 LITTLE FORK RIVER AT LITTLEFORK, MINN.

## SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	APRIL			MAY			JUNE		
	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	1900	0	0	1480	20	80	1500	21	85
2	1650	102	454	1340	19	69	1290	17	59
3	1440	60	233	1260	19	65	1140	15	46
4	1270	40	137	1230	14	46	1020	15	41
5	1160	37	116	1230	7	23	934	--	--
6	1080	32	93	1200	10	32	858	--	--
7	1020	26	72	1150	15	47	796	--	--
8	975	27	71	1110	13	39	740	--	--
9	913	--	--	1180	14	45	690	--	--
10	854	--	--	1480	16	64	641	--	--
11	796	--	--	1900	22	113	607	--	--
12	734	--	--	2230	28	169	576	--	--
13	684	--	--	2380	31	199	528	--	--
14	653	--	--	2250	32	194	484	--	--
15	715	--	--	2000	28	151	446	--	--
16	864	--	--	1750	23	109	440	--	--
17	1250	35	118	1520	18	74	437	--	--
18	1520	40	164	1330	15	54	543	--	--
19	1630	43	189	1180	18	57	755	--	--
20	1760	51	242	1050	14	40	1050	--	--
21	2230	74	446	961	7	18	1240	32	107
22	3060	168	1390	897	5	12	1350	33	120
23	3650	215	2120	927	5	13	1440	33	128
24	3670	168	1660	1050	6	17	1370	30	111
25	3350	116	1050	1160	10	31	1280	27	93
26	2960	78	623	1590	20	86	1220	25	82
27	2600	53	372	2380	42	270	1630	30	132
28	2220	37	222	2660	63	452	2380	66	424
29	1910	30	155	2500	57	385	2580	93	648
30	1660	24	108	2130	40	230	2490	84	565
31	--	--	--	1780	27	130	--	--	--

TEMPERATURE (DEG. C) OF WATER , WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973  
(ONCE=DAILY)

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	---	---	2.0	8.0	---	19.0	19.0	22.0
2	---	---	---	---	---	---	2.5	8.0	---	17.5	19.5	21.0
3	---	---	---	---	---	---	4.5	9.0	18.0	20.0	20.5	20.5
4	---	---	---	---	---	---	4.5	11.5	17.0	19.5	20.0	19.5
5	---	---	---	---	---	---	4.0	---	---	19.0	---	18.5
6	---	---	---	---	---	---	5.0	9.5	---	24.0	22.5	17.5
7	---	---	---	---	---	---	5.0	10.5	---	---	23.0	16.5
8	---	---	---	---	---	---	4.5	13.0	---	---	---	15.0
9	---	---	---	---	---	---	---	12.0	---	---	21.0	18.0
10	---	---	---	---	---	---	---	12.0	---	---	19.5	18.0
11	---	---	---	---	---	---	---	11.0	---	---	19.5	16.0
12	---	---	---	---	---	---	---	10.0	---	24.0	20.5	---
13	---	---	---	---	---	---	---	10.0	---	---	20.0	---
14	---	---	---	---	---	---	---	12.0	---	---	20.5	---
15	---	---	---	---	---	---	---	12.0	---	---	20.0	13.0
16	---	---	---	---	---	---	---	11.5	---	---	---	---
17	---	---	---	---	---	---	6.0	13.0	---	---	---	---
18	---	---	---	---	---	---	6.5	14.0	---	---	---	---
19	---	---	---	---	---	---	8.0	16.5	---	---	---	---
20	---	---	---	---	---	---	10.0	17.0	---	---	---	---
21	---	---	---	---	---	---	10.0	18.0	17.5	---	---	---
22	---	---	---	---	---	---	8.0	---	18.0	---	---	10.0
23	---	---	---	---	---	---	7.0	---	19.0	---	---	---
24	---	---	---	---	---	---	7.0	---	21.0	---	20.0	---
25	---	---	---	---	---	---	7.0	---	22.0	---	---	13.0
26	---	---	---	---	---	---	6.5	15.0	21.0	22.0	---	13.0
27	---	---	---	---	---	---	6.0	14.5	18.5	---	---	11.5
28	---	---	---	---	---	---	5.0	15.5	17.5	21.0	---	12.5
29	---	---	---	---	---	---	5.5	15.5	18.0	19.0	---	13.0
30	---	---	---	---	---	---	9.0	15.0	18.0	19.0	23.0	12.0
31	---	---	---	---	---	---	---	16.0	---	19.5	---	---

## 05131500 LITTLE FORK RIVER AT LITTLEFORK, MINN.--Continued

## SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

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	2180	69	406	1600	50	216	329	14	12
2	1810	50	244	1570	46	203	650	25	44
3	1460	37	146	1280	36	124	1330	54	194
4	1140	28	86	985	28	74	2140	90	520
5	891	17	41	790	25	53	2340	100	632
6	715	14	27	681	35	83	2210	80	477
7	585	--	--	768	45	93	1810	52	254
8	489	--	--	700	35	66	1410	30	114
9	418	--	--	703	21	40	1100	19	56
10	364	--	--	989	27	72	888	16	43
11	324	--	--	1650	62	276	740	17	34
12	315	19	16	1970	77	410	626	--	--
13	305	--	--	1890	67	342	539	--	--
14	303	--	--	1750	54	255	473	--	--
15	388	--	--	1460	44	173	425	13	15
16	454	--	--	1180	--	--	385	--	--
17	446	--	--	971	--	--	354	--	--
18	396	--	--	812	--	--	327	--	--
19	352	--	--	693	--	--	307	--	--
20	324	--	--	564	--	--	288	--	--
21	301	--	--	516	--	--	263	--	--
22	301	--	--	440	--	--	332	10	9.0
23	301	--	--	423	--	--	446	--	--
24	296	--	--	385	20	21	588	--	--
25	247	--	--	362	--	--	783	15	32
26	283	20	15	439	--	--	1040	19	53
27	315	20	17	322	--	--	1260	21	71
28	687	25	46	308	--	--	1310	21	74
29	1280	60	207	298	--	--	1250	16	54
30	1510	65	265	289	16	12	1120	15	45
31	1570	62	263	283	12	9.2	--	--	--

## BED MATERIAL PARTICLE SIZE, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

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

DATE	TYPE	TIME	NUMBER OF SAMPLING POINTS	INSTANTANEOUS DISCHARGE (CFS)	BED MAT. FALL DIAM. % FINER THAN .062 MM	BED MAT. FALL DIAM. % FINER THAN .125 MM	BED MAT. FALL DIAM. % FINER THAN .250 MM	BED MAT. FALL DIAM. % FINER THAN .500 MM	BED MAT. FALL DIAM. % FINER THAN 1.00 MM	BED MAT. FALL DIAM. % FINER THAN 2.00 MM	BED MAT. FALL DIAM. % FINER THAN 4.00 MM	METHOD OF ANALYSIS
					80158	80159	80160	80161	80162	80169	80170	
AUG. 07...	2	1645	4	737	0	1	8	39	73	80	93	SVW

## 05132000 BIG FORK RIVER AT BIG FALLS, MINN.

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C) , WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
1	190	189	205	205	245	240	---	---	318	314	334	332
2	190	188	205	205	250	245	---	---	320	320	334	332
3	190	188	205	205	255	250	---	---	320	320	335	333
4	196	188	205	205	260	255	---	---	320	320	335	335
5	195	185	205	205	260	255	---	---	---	---	335	335
6	205	191	205	205	268	260	---	---	---	---	336	336
7	202	198	205	200	275	268	---	---	---	---	338	338
8	202	197	202	200	280	270	310	310	---	---	339	339
9	202	206	200	200	282	278	310	310	---	---	340	340
10	205	205	200	200	288	282	310	310	---	---	340	340
11	205	205	200	200	292	285	310	310	---	---	340	340
12	205	200	200	195	298	292	310	310	325	325	340	338
13	200	195	198	198	300	295	310	310	325	325	338	336
14	197	197	200	198	300	300	310	310	325	325	335	322
15	195	195	200	200	302	299	315	310	325	325	322	302
16	195	195	202	200	300	300	315	315	325	325	302	240
17	195	195	202	200	300	300	315	315	325	325	238	200
18	195	195	210	200	305	302	315	315	330	325	200	189
19	196	196	215	210	305	302	318	318	330	330	190	188
20	200	197	220	215	300	300	318	318	335	330	190	190
21	200	200	220	220	300	300	318	316	335	335	190	190
22	208	200	220	220	300	300	315	315	335	335	193	190
23	208	200	222	220	310	300	315	312	335	335	196	193
24	200	200	225	222	310	310	315	315	335	335	195	195
25	200	200	230	225	---	---	312	312	335	335	195	195
26	200	200	230	230	---	---	312	312	335	335	196	194
27	200	200	235	230	---	---	312	310	332	332	195	191
28	200	200	235	235	---	---	310	310	332	332	191	181
29	200	200	238	234	---	---	310	310	---	---	180	180
30	205	200	240	238	---	---	315	312	---	---	---	---
31	205	205	---	---	---	---	315	315	---	---	---	---
DAY	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
1	---	---	181	175	170	165	---	---	156	156	---	---
2	---	---	181	181	172	172	171	171	159	155	---	---
3	---	---	182	181	180	172	171	170	160	160	215	150
4	---	---	183	182	182	180	175	171	162	160	150	149
5	---	---	183	183	182	182	180	175	162	162	164	149
6	---	---	188	183	186	182	182	181	180	162	172	164
7	---	---	192	188	192	186	188	184	180	154	183	173
8	---	---	192	191	195	192	198	188	152	146	184	183
9	---	---	192	192	196	195	200	199	147	147	185	184
10	---	---	192	172	198	198	203	200	147	147	188	184
11	---	---	170	160	---	---	213	205	152	147	188	188
12	---	---	161	160	---	---	216	210	151	151	188	188
13	---	---	161	161	---	---	220	218	155	151	192	188
14	---	---	161	161	---	---	220	210	162	155	194	190
15	---	---	162	161	---	---	210	202	---	---	197	194
16	---	---	163	162	---	---	202	201	---	---	201	198
17	---	---	167	164	---	---	201	199	---	---	208	201
18	---	---	172	167	---	---	199	199	---	---	---	---
19	---	---	173	171	---	---	200	199	---	---	---	---
20	---	---	174	172	---	---	208	200	---	---	---	---
21	---	---	181	179	---	---	218	207	---	---	226	226
22	---	---	183	181	---	---	218	216	---	---	226	226
23	175	175	182	179	---	---	222	216	---	---	222	175
24	172	168	178	178	---	---	230	224	---	---	172	165
25	168	168	178	177	---	---	230	230	---	---	165	160
26	168	168	177	172	---	---	230	230	---	---	---	---
27	168	168	---	---	---	---	230	210	---	---	---	---
28	170	168	158	158	---	---	208	175	---	---	---	---
29	171	170	158	158	---	---	175	155	---	---	---	---
30	174	172	159	158	---	---	157	155	---	---	---	---
31	---	---	162	159	---	---	156	156	---	---	---	---

## 05288500 MISSISSIPPI RIVER NEAR ANOKA, MINN.

## WATER QUALITY DATA, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	DTS- SOLVED ALUM- INUM (AL) (UG/L)	TOTAL ALUM- INUM (AL) (UG/L)	DTS- SOLVED ARSENIC (AS) (UG/L)	DIS- SOLVED BARTUM (BA) (UG/L)	DTS- SOLVED BERYL- LIUM (RE) (UG/L)	TOTAL BERYL- LIUM (BE) (UG/L)	DIS- SOLVED BORON (B) (UG/L)	DIS- SOLVED CAD- MIUM (CD) (UG/L)	TOTAL CAD- MIUM (CD) (UG/L)	DIS- SOLVED CHRO- MIUM (CR) (UG/L)	HEXA- VALFNT CHRO- MIUM (CR6) (UG/L)	DIS- SOLVED COBALT (CO) (UG/L)
NOV. 24...	90	160	0	0	0	0	50	0	0	0	0	0
DATE	TOTAL CORALY (CO) (UG/L)	DIS- SOLVED COPPER (CU) (UG/L)	TOTAL COPPER (CU) (UG/L)	CYANIDE (CN) (MG/L)	DIS- SOLVED IRON (FE) (UG/L)	TOTAL IRON (FF) (UG/L)	DTS- SOLVED LEAD (PB) (UG/L)	TOTAL LEAD (PB) (UG/L)	DIS- SOLVED LITHIUM (LI) (UG/L)	DIS- SOLVED MAN- GANESE (MN) (UG/L)	TOTAL MAN- GANESE (MN) (UG/L)	DIS- SOLVED MERCURY (HG) (UG/L)
NOV. 24...	1	17	32	.00	220	470	3	3	0	30	150	.2
DATE	TOTAL MERCURY (HG) (UG/L)	DIS- SOLVED MOLYB- DENUM (MO) (UG/L)	DIS- SOLVED NICKEL (NI) (UG/L)	TOTAL NICKEL (NI) (UG/L)	OIL AND GREASE (MG/L)	DIS- SOLVED SELE- NIUM (SE) (UG/L)	DIS- SOLVED SILVER (AG) (UG/L)	TOTAL SILVER (AG) (UG/L)	DIS- SOLVED STRON- TIUM (SR) (UG/L)	DIS- SOLVED VANA- DIUM (V) (UG/L)	DIS- SOLVED ZINC (ZN) (UG/L)	TOTAL ZINC (ZN) (UG/L)
NOV. 24...	.2	0	4	53	3	4	0	5	90	2.0	10	30

## 05304500 CHIPPEWA RIVER NEAR MILAN, MINN.

BED MATERIAL PARTICLE SIZE, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973  
 (METHODS OF ANALYSIS: B, BOTTOM WITHDRAWAL TUBE; C, CHEMICALLY DISPERSED; P, PIPET; S, SIEVE  
 V, VISUAL ACCUMULATION TUBE; W, IN DISTILLED WATER)

DATE	TYPE	TIME	NUMBER OF SAMP- PLING POINTS	INSTAN- TANEOUS DIS- CHARGE (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. FALL DIAM. % FINER THAN 2.00 MM 80169
AUG. 08...	2	1725	4	100	3	6	20	35	41	41
DATE					BED MAT. SIEVE DIAM. % FINER THAN 4.00 MM 80170	BED MAT. SIEVE DIAM. % FINER THAN 8.00 MM 80171	METHOD OF ANALY- SIS			
AUG. 08...					51	65	SVW			

## MISCELLANEOUS ANALYSES OF STREAMS IN MINNESOTA

05304500 CHIPPEWA RIVER NEAR MILAN, MINN.

SPECIFIC CONDUCTANCE (MICROHMS/CM AT 25 DEG. C) , WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973  
(ONCE-DAILY)

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	---	---	611	---	---	---	---	---
2	---	---	---	---	---	---	635	651	---	---	---	---
3	---	---	---	---	---	---	635	668	---	---	---	---
4	---	---	---	---	---	---	610	688	---	---	---	---
5	---	---	---	---	---	---	602	591	---	---	---	---
6	---	---	---	---	---	---	---	---	---	---	---	---
7	---	---	---	---	---	---	605	---	---	---	---	---
8	---	---	---	---	---	---	611	665	---	---	648	---
9	---	---	---	---	---	---	602	---	---	---	---	---
10	---	---	---	---	---	---	---	651	---	---	614	---
11	---	---	---	---	---	---	597	---	---	---	---	---
12	---	---	---	---	---	---	583	611	---	---	---	664
13	---	---	---	---	---	---	668	---	---	---	---	---
14	---	---	---	---	---	---	605	574	---	---	---	---
15	---	---	---	---	---	706	602	583	---	---	---	---
16	---	---	---	---	---	668	583	583	---	---	---	---
17	---	---	---	---	---	605	570	583	---	---	---	---
18	---	---	---	---	---	580	591	---	---	---	---	---
19	---	---	---	---	---	577	668	---	---	---	---	---
20	---	---	---	---	---	549	632	---	---	---	---	---
21	---	---	---	---	---	564	---	---	---	---	---	---
22	---	---	---	---	---	564	610	---	---	---	---	---
23	---	---	---	---	---	564	610	---	---	---	---	---
24	---	---	---	---	---	591	632	---	---	---	---	---
25	---	---	---	---	---	623	629	---	---	---	---	---
26	---	---	---	---	---	651	608	---	---	---	---	---
27	---	---	---	---	---	635	---	---	---	---	---	---
28	---	---	---	---	---	641	555	---	---	---	---	---
29	---	---	---	---	---	641	591	---	---	---	---	---
30	---	---	---	---	---	648	605	---	---	---	---	---
31	---	---	---	---	---	635	---	---	---	---	---	---
MONTH	---	---	---	---	---	---	610	---	---	---	---	---

TEMPERATURE (DEG. C) OF WATER , WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973  
(ONCE-DAILY)

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	---	---	8.0	---	---	---	---	---
2	---	---	---	---	---	---	7.0	10.0	---	---	---	---
3	---	---	---	---	---	---	9.0	13.0	---	---	---	---
4	---	---	---	---	---	---	9.0	14.0	---	---	---	---
5	---	---	---	---	---	---	10.0	14.0	---	---	---	---
6	---	---	---	---	---	---	---	---	---	---	---	---
7	---	---	---	---	---	---	7.0	---	---	---	---	---
8	---	---	---	---	---	---	7.0	19.0	---	---	26.0	---
9	---	---	---	---	---	---	5.0	19.0	---	---	---	---
10	---	---	---	---	---	---	---	17.0	---	---	26.0	---
11	---	---	---	---	---	---	5.0	---	---	---	---	---
12	---	---	---	---	---	---	8.0	14.0	---	---	---	18.0
13	---	---	---	---	---	---	17.0	---	---	---	---	---
14	---	---	---	---	---	---	13.0	12.5	---	---	---	---
15	---	---	---	---	---	4.0	9.0	18.0	---	---	---	---
16	---	---	---	---	---	4.5	11.0	16.0	---	---	---	---
17	---	---	---	---	---	4.0	14.0	19.0	---	---	---	---
18	---	---	---	---	---	6.0	16.0	---	---	---	---	---
19	---	---	---	---	---	5.0	19.0	---	---	---	---	---
20	---	---	---	---	---	5.0	16.0	---	---	---	---	---
21	---	---	---	---	---	6.0	---	---	---	---	---	---
22	---	---	---	---	---	5.0	11.0	---	---	---	---	---
23	---	---	---	---	---	6.5	12.0	---	---	---	---	---
24	---	---	---	---	---	7.0	10.0	---	---	---	---	---
25	---	---	---	---	---	8.0	13.0	---	---	---	---	---
26	---	---	---	---	---	9.0	12.0	---	---	---	---	---
27	---	---	---	---	---	10.0	---	---	---	---	---	---
28	---	---	---	---	---	7.0	11.0	---	---	---	---	---
29	---	---	---	---	---	5.0	12.0	---	---	---	---	---
30	---	---	---	---	---	6.5	11.0	---	---	---	---	---
31	---	---	---	---	---	7.0	---	---	---	---	---	---
MONTH	---	---	---	---	---	---	11.0	---	---	---	---	---

SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	MARCH			APRIL			MAY		
	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	136	--	--	1100	36	107	627	--	--
2	137	--	--	1080	39	114	706	63	120
3	139	--	--	1060	41	117	728	52	102
4	144	--	--	1030	42	117	701	45	85
5	150	--	--	1010	43	117	688	--	--
6	168	--	--	990	43	115	697	--	--
7	220	--	--	973	42	110	735	--	--
8	315	--	--	956	38	98	719	75	146
9	465	--	--	924	37	92	674	78	142
10	700	--	--	890	37	89	628	80	136
11	1040	--	--	868	39	91	589	85	135
12	1460	--	--	823	40	89	552	90	134
13	1720	--	--	794	43	92	520	100	140
14	2100	--	--	779	50	105	493	108	144
15	2430	--	--	770	59	123	464	--	--
16	2180	100	589	740	60	120	438	--	--
17	1820	51	251	740	54	108	413	--	--
18	1670	43	194	729	53	104	395	--	--
19	1560	47	198	719	61	118	378	--	--
20	1460	47	185	712	75	144	366	--	--
21	1380	43	160	716	84	162	365	--	--
22	1290	42	146	695	85	160	363	--	--
23	1220	35	115	673	85	154	358	--	--
24	1210	39	127	657	84	149	381	--	--
25	1280	43	149	654	81	143	496	--	--
26	1260	36	122	637	78	134	569	--	--
27	1210	33	108	618	73	122	564	--	--
28	1180	31	99	603	64	104	542	--	--
29	1160	37	116	590	63	100	523	--	--
30	1130	33	101	572	67	103	490	--	--
31	1120	32	97	--	--	--	459	--	--
DAY	JULY			AUGUST			SEPTEMBER		
	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	118	--	--	104	--	--	106	--	--
2	131	--	--	99	--	--	106	--	--
3	130	--	--	94	--	--	103	--	--
4	124	--	--	89	--	--	106	--	--
5	115	--	--	84	--	--	100	--	--
6	111	--	--	86	--	--	95	--	--
7	105	--	--	88	--	--	92	--	--
8	102	--	--	96	62	16	88	--	--
9	97	--	--	105	--	--	86	--	--
10	91	--	--	139	137	51	82	--	--
11	89	--	--	140	--	--	79	--	--
12	85	--	--	133	--	--	74	135	27
13	83	--	--	124	--	--	71	--	--
14	78	--	--	115	--	--	69	--	--
15	81	--	--	117	--	--	70	--	--
16	77	--	--	126	--	--	69	--	--
17	72	--	--	120	--	--	71	--	--
18	67	--	--	113	--	--	69	--	--
19	68	--	--	108	--	--	67	--	--
20	65	--	--	101	--	--	65	--	--
21	61	--	--	96	--	--	63	--	--
22	62	--	--	122	--	--	64	--	--
23	82	--	--	175	--	--	64	--	--
24	96	--	--	175	--	--	69	--	--
25	95	--	--	171	--	--	72	--	--
26	98	--	--	158	--	--	90	--	--
27	93	--	--	145	--	--	100	--	--
28	84	--	--	136	--	--	101	--	--
29	82	--	--	126	--	--	101	--	--
30	91	--	--	116	--	--	99	--	--
31	99	--	--	111	--	--	--	--	--

## MISCELLANEOUS ANALYSES OF STREAMS IN MINNESOTA

05317000 COTTONWOOD RIVER NEAR NEW ULM, MINN.

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C) , WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973  
(ONCE-DAILY)

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	740	---	---	---	---	---	1090	---	---	913	---	---
2	---	995	---	---	---	---	1060	---	---	---	920	724
3	---	---	1390	---	---	---	1060	---	1130	---	---	---
4	---	---	---	---	798	---	1150	---	---	---	743	---
5	---	1040	---	---	---	---	1110	---	---	---	---	---
6	---	---	1090	---	---	---	1150	1120	---	---	---	---
7	---	---	---	---	---	599	1150	992	---	---	---	747
8	820	---	---	650	---	605	1110	1210	---	854	---	---
9	---	---	---	---	---	591	1130	---	---	---	---	639
10	---	---	1200	940	---	602	---	---	1070	---	---	---
11	---	---	1180	---	1000	603	---	---	---	---	---	---
12	---	1350	---	---	---	581	---	---	---	---	690	---
13	---	---	---	---	---	542	---	1120	---	---	800	---
14	---	---	---	---	---	577	---	---	---	---	---	---
15	958	---	---	665	---	549	1090	---	---	746	---	---
16	---	---	---	---	---	710	---	---	---	---	---	630
17	---	---	---	---	---	897	1100	---	961	---	---	---
18	---	---	---	---	974	909	---	---	---	---	---	---
19	---	1240	---	---	---	954	---	---	---	---	715	---
20	---	---	---	---	---	996	---	1120	---	---	---	---
21	---	---	---	665	---	1030	---	---	---	---	---	---
22	987	---	---	505	---	1040	1140	---	---	774	---	---
23	---	---	---	496	---	1050	---	---	---	---	---	765
24	---	---	1030	590	---	1070	---	1160	910	---	---	---
25	---	---	---	593	---	1060	---	---	---	---	---	---
26	---	1270	---	---	---	1070	---	---	---	---	707	---
27	---	---	---	---	---	1080	---	759	---	---	---	---
28	---	---	---	590	---	1050	---	---	---	---	---	---
29	1010	---	---	573	---	1110	1060	---	917	802	---	---
30	---	---	---	---	---	1110	---	---	---	---	---	696
31	---	---	642	---	---	1080	---	---	---	---	---	---
MONTH	---	---	---	---	---	858	---	---	---	---	---	---

TEMPERATURE (DEG. C) OF WATER , WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973  
(ONCE-DAILY)

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	---	---	6.0	---	---	22.0	---	---
2	---	6.0	---	---	---	---	6.0	---	---	---	26.0	---
3	---	---	0.0	---	---	---	6.0	---	20.0	---	---	---
4	---	---	---	---	0.0	---	8.0	---	---	---	---	---
5	---	7.0	---	---	---	---	8.0	---	---	---	---	---
6	---	---	0.5	---	---	---	9.0	13.0	---	---	---	---
7	---	---	---	---	---	2.0	7.0	14.0	---	---	---	---
8	---	---	---	0.0	---	2.0	5.0	18.0	---	25.0	---	---
9	---	---	---	---	---	2.0	3.0	---	---	---	---	18.0
10	---	---	0.0	0.0	---	2.0	---	---	24.0	---	---	---
11	---	---	0.0	---	0.0	2.0	---	---	---	---	---	---
12	---	4.0	---	---	---	3.0	---	---	---	---	---	---
13	---	---	---	---	---	1.0	---	14.0	---	---	23.5	---
14	---	---	---	---	---	3.0	---	---	---	---	---	---
15	8.0	---	---	0.0	---	3.0	9.0	---	---	19.0	---	---
16	---	---	---	---	---	3.5	---	---	---	---	---	15.0
17	---	---	---	---	---	2.0	9.5	---	23.0	---	---	---
18	---	---	---	---	0.0	2.5	---	---	---	---	---	---
19	---	1.0	---	---	---	4.5	---	---	---	---	---	---
20	---	---	---	---	---	5.0	---	20.0	---	---	---	---
21	---	---	---	0.0	---	5.0	---	---	---	---	---	---
22	7.0	---	---	0.0	---	5.0	12.0	---	---	21.0	---	---
23	---	---	---	0.0	---	5.0	---	---	---	---	---	17.0
24	---	---	0.0	1.0	---	6.0	---	19.5	23.0	---	---	---
25	---	---	---	0.0	---	6.0	---	---	---	---	---	---
26	---	1.0	---	---	---	7.0	---	---	---	---	---	---
27	---	---	---	---	---	6.0	---	13.0	---	---	---	---
28	---	---	---	0.0	---	8.0	---	---	---	---	---	---
29	8.0	---	---	0.0	---	7.0	10.0	---	21.0	28.0	---	---
30	---	---	---	---	---	7.0	---	---	---	---	---	18.0
31	---	---	0.0	---	---	6.0	---	---	---	---	---	---
MONTH	---	---	---	---	---	4.0	---	---	---	---	---	---



05317000 COTTONWOOD RIVER NEAR NEW ULM, MINN.--Continued

## SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

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	89	207	50	124	--	--	110	--	--
2	85	--	--	193	118	61	138	--	--
3	83	--	--	238	--	--	175	178	64
4	79	--	--	291	--	--	210	--	--
5	75	--	--	362	442	432	225	--	--
6	81	--	--	398	--	--	230	95	59
7	74	--	--	389	--	--	210	--	--
8	73	78	15	362	--	--	190	--	--
9	75	--	--	333	--	--	170	--	--
10	88	--	--	307	--	--	156	108	45
11	110	--	--	281	--	--	140	--	--
12	111	--	--	259	240	168	130	--	--
13	108	--	--	245	--	--	118	--	--
14	99	--	--	231	--	--	110	--	--
15	94	71	18	199	--	--	107	--	--
16	89	--	--	196	--	--	105	--	--
17	86	--	--	193	--	--	101	208	57
18	82	--	--	190	--	--	98	--	--
19	79	--	--	190	76	39	95	--	--
20	82	--	--	190	--	--	93	--	--
21	86	--	--	186	--	--	90	--	--
22	85	40	9.2	180	--	--	88	--	--
23	91	--	--	173	--	--	86	--	--
24	90	--	--	166	--	--	83	81	18
25	89	--	--	160	--	--	81	--	--
26	92	--	--	155	178	74	79	--	--
27	94	--	--	145	--	--	77	--	--
28	98	--	--	130	--	--	75	--	--
29	97	--	--	110	--	--	73	--	--
30	103	--	--	90	--	--	71	--	--
31	116	--	--	--	--	--	69	36	6.7
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	67	--	--	69	--	--	78	--	--
2	65	--	--	68	--	--	90	--	--
3	63	--	--	67	--	--	110	--	--
4	62	--	--	66	44	7.8	140	--	--
5	60	--	--	66	--	--	190	--	--
6	59	--	--	66	--	--	240	--	--
7	57	--	--	66	--	--	320	707	611
8	55	22	3.3	66	--	--	385	715	743
9	54	--	--	65	--	--	460	840	1040
10	53	155	22	65	--	--	550	1000	1490
11	53	--	--	64	33	5.7	650	1110	1950
12	53	--	--	64	--	--	787	710	1510
13	54	--	--	64	--	--	1140	992	3050
14	54	--	--	64	--	--	2260	3650	22300
15	55	32	4.8	64	--	--	2030	2960	16200
16	57	--	--	64	--	--	2060	2350	13100
17	59	--	--	64	--	--	1910	2150	11100
18	62	--	--	64	38	6.6	1650	2060	9180
19	62	--	--	64	--	--	1420	1960	7510
20	62	--	--	65	--	--	1170	1600	5050
21	63	42	7.1	65	--	--	970	1080	2830
22	65	121	21	65	--	--	822	880	1950
23	68	76	14	66	--	--	726	760	1490
24	73	32	6.3	66	--	--	689	670	1250
25	77	18	3.7	67	--	--	668	580	1050
26	78	--	--	68	--	--	677	430	786
27	76	--	--	68	--	--	709	250	479
28	74	43	8.6	70	--	--	715	240	463
29	74	26	5.2	--	--	--	689	460	856
30	72	--	--	--	--	--	657	240	426
31	70	--	--	--	--	--	625	150	253

## MISCELLANEOUS ANALYSES OF STREAMS IN MINNESOTA

05317000 COTTONWOOD RIVER NEAR NEW ULM, MINN.--Continued

SUSPENDED-SOLID DISCHARGE, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	APRIL			MAY			JUNE		
	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TUNS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TUNS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TUNS/DAY)
1	607	380	623	379	--	--	523	--	--
2	613	180	265	424	--	--	468	--	--
3	650	420	737	585	--	--	433	214	250
4	693	500	936	710	--	--	390	--	--
5	696	270	507	704	--	--	365	--	--
6	661	350	625	657	216	367	337	--	--
7	513	200	331	605	185	302	311	--	--
8	571	110	170	556	170	255	287	--	--
9	536	--	--	509	--	--	261	--	--
10	502	--	--	469	--	--	238	137	88
11	462	--	--	435	--	--	219	--	--
12	446	--	--	400	--	--	222	--	--
13	437	--	--	364	107	105	204	--	--
14	414	--	--	340	--	--	194	--	--
15	429	190	220	314	--	--	186	--	--
16	432	--	--	299	--	--	201	--	--
17	462	92	115	283	--	--	199	149	80
18	533	--	--	274	--	--	221	--	--
19	564	--	--	258	--	--	231	--	--
20	544	--	--	247	66	44	229	--	--
21	532	--	--	254	--	--	217	--	--
22	521	213	300	242	--	--	204	--	--
23	507	--	--	234	--	--	188	--	--
24	479	--	--	234	44	28	173	66	31
25	450	--	--	248	--	--	158	--	--
26	418	--	--	247	--	--	146	--	--
27	369	--	--	272	181	133	133	--	--
28	370	--	--	317	--	--	121	--	--
29	353	55	52	407	--	--	111	43	13
30	344	--	--	524	--	--	107	--	--
31	--	--	--	566	--	--	--	--	--
DAY	JULY			AUGUST			SEPTEMBER		
	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TUNS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TUNS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TUNS/DAY)
1	102	47	13	34	--	--	20	--	--
2	111	--	--	32	130	11	22	--	--
3	101	--	--	30	--	--	22	--	--
4	100	--	--	29	--	--	21	--	--
5	95	--	--	28	40	3.0	19	--	--
6	109	--	--	31	--	--	18	--	--
7	100	--	--	30	--	--	16	42	1.8
8	80	67	14	33	--	--	20	--	--
9	73	--	--	29	--	--	22	96	5.7
10	71	--	--	27	--	--	22	--	--
11	73	--	--	27	--	--	20	--	--
12	66	--	--	25	104	7.0	20	--	--
13	62	--	--	26	93	6.5	20	--	--
14	59	--	--	24	--	--	19	--	--
15	57	52	8.0	23	--	--	20	--	--
16	53	--	--	26	--	--	21	71	4.0
17	49	--	--	29	--	--	22	--	--
18	46	--	--	27	--	--	22	--	--
19	43	--	--	26	62	4.4	20	--	--
20	40	--	--	21	--	--	19	--	--
21	36	--	--	40	--	--	21	--	--
22	36	38	3.7	36	--	--	20	--	--
23	43	--	--	31	--	--	18	87	4.2
24	66	--	--	29	--	--	25	--	--
25	52	--	--	29	--	--	30	--	--
26	49	--	--	31	48	4.0	35	--	--
27	46	--	--	27	--	--	34	--	--
28	43	--	--	24	--	--	27	--	--
29	41	36	4.2	22	--	--	26	--	--
30	38	--	--	22	--	--	25	62	4.2
31	36	--	--	24	--	--	--	--	--

## 05317000 COTTONWOOD RIVER NEAR NEW ULM, MINN.--Continued

BED MATERIAL PARTICLE SIZE, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973  
(METHODS OF ANALYSIS: B, BOTTOM WITHDRAWAL TUBE; C, CHEMICALLY DISPERSED; P, PIPET; S, SIEVE;  
V, VISUAL ACCUMULATION TUBE; W, IN DISTILLED WATER)

DATE	TYPE	TIME	NUMBER OF SAM- PLING POINTS	INSTAN- TANEOUS DIS- CHARGE (CFS)	BED MAT. FALL DIAM. % FINER THAN .125 MM	BED MAT. FALL DIAM. % FINER THAN .250 MM	BED MAT. FALL DIAM. % FINER THAN .500 MM	BED MAT. FALL DIAM. % FINER THAN 1.00 MM	BED MAT. SIEVE DIAM. % FINER THAN 2.00 MM	BED MAT. SIEVE DIAM. % FINER THAN 4.00 MM	BED MAT. SIEVE DIAM. % FINER THAN 8.00 MM	METHOD OF ANALY- SIS
			00063	00061	80159	80160	80161	80162	80169	80170	80171	
MAR. 27...	2	1000	4	698	1	5	26	79	85	92	95	SVW
AUG. 13...	2	1335	4	26	2	7	32	65	93	99	--	SVW

## 05374000 ZUMBRO RIVER AT ZUMBRO FALLS, MINN.

SUSPENDED SEDIMENT PARTICLE SIZE, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973  
(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)	INSTAN- TANEOUS DIS- CHARGE (CFS)	SUS- PENDE DIAM. % FINER THAN (MG/L)	SUS- PENDE DIAM. % FINER THAN (T/DAY)	SUS. SED. FALL DIAM. % FINER THAN .002 MM	SUS. SED. FALL DIAM. % FINER THAN .004 MM	SUS. SED. FALL DIAM. % FINER THAN .008 MM	SUS. SED. FALL DIAM. % FINER THAN .016 MM	SUS. SED. FALL DIAM. % FINER THAN .062 MM
MAR. 12...	1500	5.0	13200	463	16500	53	65	72	81	87

DATE	SUS. SED. FALL DIAM. % FINER THAN .125 MM	SUS. SED. FALL DIAM. % FINER THAN .250 MM	METHOD OF ANALY- SIS
MAR. 12...	89	97	VPWC

BED MATERIAL PARTICLE SIZE, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973  
(METHODS OF ANALYSIS: B, BOTTOM WITHDRAWAL TUBE; C, CHEMICALLY DISPERSED; P, PIPET; S, SIEVE;  
V, VISUAL ACCUMULATION TUBE; W, IN DISTILLED WATER)

DATE	TIME	NUMBER OF SAM- PLING POINTS	INSTAN- TANEOUS DIS- CHARGE (CFS)	BED MAT. FALL DIAM. % FINER THAN .125 MM	BED MAT. FALL DIAM. % FINER THAN .250 MM	BED MAT. FALL DIAM. % FINER THAN .500 MM	BED MAT. FALL DIAM. % FINER THAN 1.00 MM	BED MAT. SIEVE DIAM. % FINER THAN 2.00 MM	BED MAT. SIEVE DIAM. % FINER THAN 4.00 MM	BED MAT. SIEVE DIAM. % FINER THAN 8.00 MM	METHOD OF ANALY- SIS
AUG. 10...	1400	3	749	1	2	18	36	40	50	60	SVW

## MISCELLANEOUS ANALYSES OF STREAMS IN MINNESOTA

05374000 ZUMBRO RIVER AT ZUMBRO FALLS, MINN.

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C) , WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973  
(ONCE=DAILY)

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	---	---	---	394	---	---	---	---
2	---	---	---	---	---	---	---	234	---	---	---	---
3	---	---	---	---	---	---	515	295	---	---	---	---
4	---	---	---	---	---	---	520	326	---	---	---	490
5	---	---	---	---	---	---	528	---	487	---	---	---
6	---	---	---	---	---	---	518	---	476	---	---	---
7	---	---	---	---	---	---	---	---	---	---	---	---
8	---	---	---	---	---	---	511	397	---	---	---	---
9	---	---	---	---	---	---	---	469	---	---	---	---
10	---	---	---	---	---	---	518	458	---	---	518	---
11	---	---	---	---	---	---	---	452	---	---	---	---
12	---	---	---	---	---	203	520	---	---	---	---	---
13	---	---	---	---	---	219	507	---	---	---	---	---
14	---	---	---	---	---	257	492	428	---	---	505	---
15	---	---	---	---	---	322	---	361	---	---	---	---
16	---	---	---	---	---	338	405	---	---	---	---	---
17	---	---	---	---	---	374	---	375	---	---	---	---
18	---	---	---	---	---	387	337	374	---	---	---	---
19	---	---	---	---	---	424	373	411	---	---	---	---
20	---	---	---	---	---	450	418	---	514	534	---	---
21	---	---	---	---	---	---	---	---	---	509	---	---
22	---	---	---	---	---	---	---	395	---	---	---	---
23	502	---	---	---	---	---	455	397	329	---	---	---
24	---	---	---	---	---	479	470	---	---	---	---	---
25	---	---	---	---	---	---	487	343	---	---	---	---
26	---	---	---	---	---	---	487	---	540	---	---	---
27	---	---	---	---	---	527	508	---	---	---	---	---
28	---	---	---	---	---	---	---	---	---	---	---	---
29	---	---	---	---	---	---	---	---	---	---	---	---
30	---	---	---	---	---	542	---	316	---	---	---	---
31	---	---	---	---	---	---	---	361	---	---	---	---

TEMPERATURE (DEG. C) OF WATER , WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973  
(ONCE=DAILY)

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	---	---	---	12.0	---	---	---	---
2	---	---	---	---	---	---	---	8.5	---	---	---	---
3	---	---	---	---	---	---	9.0	11.0	---	---	---	---
4	---	---	---	---	---	---	10.0	11.0	---	---	---	22.0
5	---	---	---	---	---	---	10.0	---	22.0	---	---	---
6	---	---	---	---	---	---	8.0	---	22.0	---	---	---
7	---	---	---	---	---	---	---	---	---	---	---	---
8	---	---	---	---	---	---	10.0	14.0	---	---	---	---
9	---	---	---	---	---	---	---	15.0	---	---	---	---
10	---	---	---	---	---	---	9.0	15.0	---	---	21.0	---
11	---	---	---	---	---	---	---	15.0	---	---	---	---
12	---	---	---	---	---	4.5	7.5	---	---	---	---	---
13	---	---	---	---	---	4.0	10.0	---	---	---	---	---
14	---	---	---	---	---	4.5	11.0	13.5	---	---	26.0	---
15	---	---	---	---	---	5.0	---	17.0	---	---	---	---
16	---	---	---	---	---	5.0	8.0	---	---	---	---	---
17	---	---	---	---	---	6.0	---	13.0	---	---	---	---
18	---	---	---	---	---	6.0	10.0	14.0	---	---	---	---
19	---	---	---	---	---	7.0	12.0	13.5	---	---	---	---
20	---	---	---	---	---	6.5	14.0	---	18.0	18.5	18.5	---
21	---	---	---	---	---	---	---	---	---	27.5	---	---
22	---	---	---	---	---	---	---	16.0	---	---	---	---
23	5.5	---	---	---	---	---	14.0	16.0	24.0	---	---	---
24	---	---	---	---	---	7.0	15.0	---	---	---	---	---
25	---	---	---	---	---	---	15.0	17.0	---	---	---	---
26	---	---	---	---	---	---	15.0	---	21.0	---	---	---
27	---	---	---	---	---	10.0	14.0	---	---	---	---	---
28	---	---	---	---	---	---	---	---	---	---	---	---
29	---	---	---	---	---	---	---	---	---	---	---	---
30	---	---	---	---	---	11.0	---	20.0	---	---	---	---
31	---	---	---	---	---	---	---	19.0	---	---	---	---

05374000 ZUMBRO RIVER AT ZUMBRO FALLS, MINN.--Continued

## SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	JANUARY			FEBRUARY			MARCH		
	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	790	--	--	585	--	--	432	--	--
2	585	--	--	620	--	--	483	--	--
3	523	--	--	565	--	--	1160	--	--
4	585	--	--	478	--	--	2820	--	--
5	436	--	--	469	--	--	3780	--	--
6	625	--	--	514	--	--	3550	--	--
7	3940	--	--	452	--	--	6600	--	--
8	2700	--	--	416	--	--	6100	--	--
9	1800	--	--	370	--	--	3510	--	--
10	1300	--	--	415	--	--	2660	--	--
11	900	--	--	390	--	--	14900	--	--
12	640	--	--	376	--	--	14000	670	25300
13	448	--	--	420	--	--	5800	560	8770
14	474	--	--	436	--	--	5960	1000	16100
15	428	--	--	430	--	--	6870	370	6860
16	460	--	--	335	--	--	4170	220	2480
17	465	--	--	360	--	--	2860	155	1200
18	2340	--	--	392	--	--	2240	116	702
19	4310	--	--	352	--	--	1950	102	537
20	2380	--	--	370	--	--	1680	84	381
21	1390	--	--	365	--	--	1520	--	--
22	1170	--	--	368	--	--	1360	--	--
23	997	--	--	388	--	--	1260	--	--
24	900	--	--	388	--	--	1220	--	--
25	868	--	--	225	--	--	1240	--	--
26	850	--	--	410	--	--	1320	--	--
27	838	--	--	523	--	--	1280	--	--
28	469	--	--	412	--	--	1190	--	--
29	615	--	--	--	--	--	1120	--	--
30	656	--	--	--	--	--	1060	--	--
31	590	--	--	--	--	--	1010	--	--
DAY	APRIL			MAY			JUNE		
	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	984	--	--	7650	1240	25600	1020	--	--
2	1020	--	--	19500	875	46100	971	--	--
3	1110	35	105	10800	320	9330	978	--	--
4	1080	62	181	4560	220	2710	1020	--	--
5	991	76	203	3350	--	--	1030	38	106
6	924	55	138	2810	--	--	1020	60	165
7	913	28	69	2530	--	--	926	--	--
8	913	42	104	4030	495	5390	880	--	--
9	900	50	122	4560	205	2520	856	--	--
10	844	43	98	2970	115	922	850	--	--
11	844	51	116	2310	78	486	850	--	--
12	893	37	89	1910	--	--	661	--	--
13	1020	38	105	1670	--	--	832	--	--
14	1080	27	79	1520	96	394	560	--	--
15	2340	88	556	1410	150	571	716	--	--
16	7610	315	6470	1290	117	408	610	--	--
17	8070	350	7630	1330	100	359	635	--	--
18	3330	271	2440	1060	97	278	625	--	--
19	2430	200	1310	1020	84	231	620	--	--
20	2080	117	657	997	--	--	600	42	68
21	1760	--	--	984	--	--	625	--	--
22	1650	--	--	1010	120	327	600	--	--
23	1440	34	132	1000	103	278	478	93	120
24	1290	37	129	978	--	--	478	--	--
25	1170	37	117	965	--	--	550	--	--
26	1100	33	98	971	--	--	590	28	45
27	1020	27	74	971	--	--	537	--	--
28	971	--	--	1180	--	--	546	--	--
29	1010	--	--	1510	--	--	420	--	--
30	1690	--	--	1290	44	153	408	--	--
31	--	--	--	1100	87	258	--	--	--

05374000 ZUMBRO RIVER AT ZUMBRO FALLS, MINN.--Continued

SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DAY	JULY			AUGUST			SEPTEMBER		
	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	368	--	--	916	--	--	626	--	--
2	501	--	--	787	--	--	731	--	--
3	716	--	--	604	--	--	862	--	--
4	550	--	--	560	--	--	854	21	48
5	967	--	--	535	--	--	624	--	--
6	873	--	--	519	--	--	623	--	--
7	800	--	--	548	--	--	474	--	--
8	531	--	--	540	--	--	461	--	--
9	489	--	--	615	--	--	681	--	--
10	561	--	--	638	--	--	517	--	--
11	449	--	--	496	--	--	395	--	--
12	455	--	--	495	--	--	634	--	--
13	433	--	--	600	--	--	505	--	--
14	392	--	--	513	40	55	461	--	--
15	388	--	--	472	--	--	439	--	--
16	409	--	--	545	--	--	429	--	--
17	510	--	--	460	--	--	517	--	--
18	325	--	--	436	--	--	424	--	--
19	321	--	--	420	--	--	484	--	--
20	372	7	7.0	492	--	--	477	--	--
21	372	33	33	627	--	--	406	--	--
22	378	--	--	513	--	--	393	--	--
23	486	--	--	1300	--	--	332	--	--
24	1140	--	--	4070	--	--	465	--	--
25	1040	--	--	2900	--	--	380	--	--
26	913	--	--	1760	--	--	1270	--	--
27	864	--	--	1230	--	--	3500	--	--
28	777	--	--	1030	--	--	2950	--	--
29	476	--	--	957	--	--	1880	--	--
30	1070	--	--	892	--	--	2140	--	--
31	802	--	--	874	--	--	--	--	--

05385000 ROOT RIVER NEAR HOUSTON, MINN.

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C) , WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973  
(ONCE-DAILY)

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	---	---	497	379	349	336	---	---
2	---	---	---	---	---	---	460	486	340	336	---	---
3	---	---	---	---	---	---	491	487	270	342	---	333
4	---	---	---	---	---	---	474	429	288	336	338	324
5	---	---	---	---	---	---	476	358	338	232	---	389
6	---	---	---	---	---	---	460	423	395	303	---	---
7	---	---	---	---	---	---	476	426	362	407	382	---
8	---	---	---	---	---	---	460	363	349	407	402	---
9	---	---	---	---	---	---	---	462	336	385	402	---
10	---	---	---	---	---	---	460	397	338	385	425	---
11	---	---	---	---	---	---	460	391	338	392	440	---
12	---	---	---	---	---	---	460	374	361	385	395	---
13	---	---	---	---	---	276	438	374	338	378	402	---
14	---	---	---	---	---	347	419	291	338	365	359	---
15	---	---	---	---	---	321	363	299	362	365	---	---
16	---	---	---	---	---	351	508	344	349	392	364	---
17	---	---	---	---	---	412	484	290	377	---	---	---
18	---	---	---	---	---	439	438	316	361	---	---	---
19	---	---	---	---	---	454	372	295	403	---	---	---
20	---	---	---	---	---	454	357	294	391	---	---	---
21	---	---	---	---	---	469	374	298	403	---	---	---
22	---	---	---	---	---	479	368	308	436	---	---	---
23	---	---	---	---	---	481	363	313	431	---	320	---
24	---	---	---	---	---	470	374	291	342	405	353	---
25	---	---	---	---	---	460	374	293	336	---	440	---
26	438	---	---	---	---	474	374	301	369	333	416	448
27	---	---	---	---	---	497	385	336	336	---	381	432
28	---	---	---	---	---	488	400	349	336	---	---	376
29	---	---	---	---	---	470	368	290	307	---	---	389
30	---	---	---	---	---	470	375	366	331	---	443	324
31	---	---	---	---	---	474	---	364	---	328	---	---

TEMPERATURE (DEG. C) OF WATER , WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973  
(ONCE-DAILY)

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	---	---	7.0	10.0	20.0	22.0	---	---
2	---	---	---	---	---	---	6.0	8.0	20.0	24.0	---	---
3	---	---	---	---	---	---	5.0	9.0	20.0	24.0	---	22.0
4	---	---	---	---	---	---	7.0	11.0	20.0	24.0	22.0	22.0
5	---	---	---	---	---	---	8.0	10.0	20.0	24.0	---	22.0
6	---	---	---	---	---	---	8.0	10.0	21.0	24.0	---	---
7	---	---	---	---	---	---	6.0	10.0	22.0	25.0	23.0	---
8	---	---	---	---	---	---	5.0	12.0	22.0	27.0	23.0	---
9	---	---	---	---	---	---	---	14.0	23.0	24.0	24.0	---
10	---	---	---	---	---	---	4.0	14.0	24.0	25.0	22.0	---
11	---	---	---	---	---	---	4.0	14.0	24.0	25.0	23.0	---
12	---	---	---	---	---	---	7.0	13.0	23.0	26.0	23.0	---
13	---	---	---	---	---	5.0	8.0	12.0	23.0	24.0	20.0	---
14	---	---	---	---	---	7.0	11.0	13.0	24.0	24.0	21.0	---
15	---	---	---	---	---	7.0	10.0	15.0	23.0	23.0	---	---
16	---	---	---	---	---	6.0	8.0	14.0	24.0	24.0	22.0	---
17	---	---	---	---	---	5.0	8.0	15.0	22.0	---	---	---
18	---	---	---	---	---	6.0	11.0	16.0	22.0	---	---	---
19	---	---	---	---	---	5.0	12.0	17.0	22.0	---	---	---
20	---	---	---	---	---	6.0	15.0	17.0	20.0	---	---	---
21	---	---	---	---	---	6.0	15.0	17.0	19.0	---	---	---
22	---	---	---	---	---	7.0	14.0	15.0	21.0	---	---	---
23	---	---	---	---	---	8.0	12.0	17.0	22.0	---	16.5	---
24	---	---	---	---	---	7.0	14.0	15.0	23.0	23.0	17.0	---
25	---	---	---	---	---	8.0	12.0	14.0	22.0	---	20.0	---
26	7.0	---	---	---	---	10.0	12.0	15.0	21.5	23.0	24.0	18.0
27	---	---	---	---	---	10.5	12.0	12.0	20.0	---	25.0	17.0
28	---	---	---	---	---	10.0	13.0	13.0	17.0	---	---	16.0
29	---	---	---	---	---	10.0	10.0	15.0	18.0	---	---	15.0
30	---	---	---	---	---	10.0	10.0	17.0	20.0	---	24.5	15.0
31	---	---	---	---	---	8.0	---	18.0	---	22.0	---	---

MISCELLANEOUS ANALYSES OF STREAMS IN MINNESOTA  
05385000 ROOT RIVER NEAR HOUSTON, MINN.--Continued

## SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

OCTOBER				FEBRUARY			MARCH		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	2730	--	--	960	--	--	660	--	--
2	2010	--	--	940	--	--	1610	--	--
3	1700	--	--	920	--	--	2600	--	--
4	1610	--	--	874	--	--	3930	--	--
5	1410	--	--	863	--	--	3430	--	--
6	1320	--	--	825	--	--	2430	--	--
7	1220	--	--	755	--	--	3980	--	--
8	1170	--	--	680	--	--	4000	--	--
9	1070	--	--	625	--	--	2500	--	--
10	994	--	--	680	--	--	1950	--	--
11	929	--	--	695	--	--	7390	--	--
12	863	--	--	670	--	--	9430	--	--
13	825	--	--	650	--	--	4270	985	11400
14	795	--	--	630	--	--	3810	1260	13000
15	765	--	--	600	--	--	5250	1640	23200
16	735	--	--	490	--	--	3900	1010	10600
17	720	--	--	440	--	--	2880	610	4740
18	695	--	--	565	--	--	2300	400	2480
19	670	--	--	610	--	--	1920	350	1810
20	665	--	--	590	--	--	1660	330	1480
21	705	--	--	565	--	--	1510	245	999
22	725	--	--	550	--	--	1430	220	849
23	970	--	--	555	--	--	1340	221	800
24	1950	--	--	580	--	--	1280	195	674
25	2760	--	--	590	--	--	1250	215	726
26	1940	336	1760	560	--	--	1280	178	615
27	1610	--	--	545	--	--	1320	180	642
28	1420	--	--	560	--	--	1250	168	567
29	1280	--	--	--	--	--	1180	140	446
30	1160	--	--	--	--	--	1130	148	452
31	1150	--	--	--	--	--	1120	148	448
APRIL				MAY			JUNE		
DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN- TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
1	1130	150	458	2210	1280	8010	1560	184	775
2	1170	187	591	6350	2120	36300	1460	167	658
3	1370	245	906	6620	1200	21400	1390	170	638
4	1390	205	769	4480	800	9680	1410	176	670
5	1230	220	731	3250	485	4260	1830	228	1130
6	1140	178	548	2770	345	2580	1630	538	2370
7	1070	135	390	2570	290	2010	1500	295	1190
8	1040	141	396	3530	495	4720	1380	217	809
9	1060	160	458	5250	778	11000	1300	193	677
10	1030	175	487	3410	538	4950	1230	178	591
11	935	154	389	2700	345	2520	1180	179	570
12	982	112	297	2320	258	1620	1160	230	720
13	988	88	235	2080	175	983	1120	222	671
14	1030	128	356	1920	210	1090	1090	170	500
15	2370	433	3170	1790	240	1160	1050	143	405
16	6860	1660	30700	1670	195	879	1070	140	404
17	10600	1560	44600	1570	158	670	1060	149	426
18	5700	1030	15900	1500	168	680	1360	329	1320
19	3670	700	6940	1430	200	772	1640	662	2930
20	2960	465	3720	1370	198	732	1720	532	2470
21	2530	440	5010	1330	180	646	1390	372	1400
22	2240	345	2090	1350	171	623	1210	237	774
23	1990	320	1720	1340	147	532	1120	177	535
24	1790	280	1350	1300	162	569	1060	193	552
25	1650	225	1000	1290	150	522	1010	228	622
26	1540	200	832	1270	120	411	973	188	494
27	1440	180	700	1280	298	1030	986	177	471
28	1360	180	661	1660	420	1880	969	161	421
29	1430	510	1970	2070	388	2170	932	160	403
30	1600	360	1560	2190	302	1790	905	169	413
31	--	--	--	1770	210	1000	--	--	--



SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

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	883	165	393	790	--	--	742	--	--
2	907	169	414	744	--	--	744	--	--
3	918	153	379	722	--	--	799	300	647
4	1380	313	1450	967	4910	12800	878	250	593
5	5440	1550	22800	871	--	--	824	165	367
6	2460	1240	8300	808	--	--	802	--	--
7	1630	534	2350	949	350	897	746	--	--
8	1380	369	1370	951	354	909	712	--	--
9	1230	344	1140	1500	980	3970	710	--	--
10	1130	260	793	1180	670	2130	698	--	--
11	1050	192	544	1010	383	1040	690	--	--
12	987	184	490	886	552	1320	671	--	--
13	936	178	450	859	302	700	647	--	--
14	890	158	380	875	275	650	646	--	--
15	852	140	322	824	265	590	644	--	--
16	821	177	392	852	235	541	640	--	--
17	788	--	--	809	--	--	662	--	--
18	770	--	--	770	--	--	679	--	--
19	757	--	--	758	--	--	673	--	--
20	755	--	--	730	--	--	670	--	--
21	747	--	--	702	--	--	672	--	--
22	751	--	--	781	--	--	766	--	--
23	753	--	--	2790	2700	22700	712	--	--
24	757	105	215	1680	960	4350	689	--	--
25	793	--	--	1270	495	1700	752	--	--
26	879	107	254	1090	285	839	958	340	879
27	816	--	--	1000	235	635	1310	620	2190
28	773	--	--	921	--	--	1640	690	3060
29	749	--	--	895	--	--	1380	480	1790
30	799	--	--	811	161	353	2680	1220	12000
31	857	192	444	769	--	--	--	--	--

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

DATE	TIME	NUMBER OF SAM- PLING POINTS	BED MAT. FALL DIAM.	BED MAT. FALL DIAM.	BED MAT. FALL DIAM.	BED MAT. FALL DIAM.	BED MAT. FALL DIAM.	BED MAT. FALL DIAM.	METHOD OF ANALY- SIS
			% FINER THAN .125 MM	% FINER THAN .250 MM	% FINER THAN .500 MM	% FINER THAN 1.00 MM	% FINER THAN 2.00 MM	% FINER THAN 4.00 MM	
AUG. 10...	0930	4	1	5	62	90	93	96	SVW

(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)	INSTAN- TANEOUS DIS- CHARGE (CFS)	BUS- PENDED SEDI- MENT (MG/L)	SUS- PENDED 8EDI- MENT CHARGE (T/DAY)	SUS- SED. FALL DIAM. % FINER THAN .002 MM	SUS- SED. FALL DIAM. % FINER THAN .004 MM	SUS- SED. FALL DIAM. % FINER THAN .008 MM	SUS- SED. FALL DIAM. % FINER THAN .016 MM	SUS- SED. FALL DIAM. % FINER THAN .062 MM
AUG. 04...	1745	22.0	1390	4910	18400	27	42	45	51	99
23...	0830	16.0	4900	4780	63200	17	21	29	41	90
			SUS. SED. FALL DIAM. % FINER THAN .125 MM	SUS. SED. FALL DIAM. % FINER THAN .250 MM	METHOD OF ANALY- SIS					
AUG. 04...			--	--	VPWC					
23...			98	100	VPWC					

05457000 CEDAR RIVER NEAR AUSTIN, MINN.

SPECIFIC CONDUCTANCE (MICROMHNS/CM AT 25 DEG. C) , WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973  
(UNCF=DAILY)

[illegible]

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973  
(UNCE-DAILY)

[illegible]

05457000 CEDAR RIVER NEAR AUSTIN, MINN.--Continued

## SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

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	302	--	--	134	--	--	170	--	--
2	249	--	--	128	--	--	583	--	--
3	198	--	--	127	--	--	1660	--	--
4	160	--	--	129	--	--	2150	--	--
5	143	--	--	129	--	--	2140	--	--
6	130	--	--	129	--	--	1760	--	--
7	125	--	--	121	--	--	2360	--	--
8	121	--	--	116	--	--	1980	--	--
9	116	--	--	103	--	--	1180	--	--
10	107	--	--	111	--	--	1130	--	--
11	100	--	--	109	--	--	6760	--	--
12	97	--	--	92	--	--	4190	--	--
13	96	--	--	90	--	--	1840	82	407
14	95	--	--	86	--	--	2910	272	2280
15	95	--	--	81	--	--	2900	198	1610
16	101	--	--	80	--	--	1720	55	255
17	115	--	--	78	--	--	1170	30	95
18	1140	--	--	78	--	--	868	23	54
19	1450	--	--	78	--	--	671	23	42
20	779	--	--	78	--	--	563	25	38
21	455	--	--	78	--	--	500	22	30
22	316	--	--	79	--	--	447	20	24
23	235	--	--	81	--	--	439	--	--
24	215	--	--	84	--	--	483	--	--
25	198	--	--	88	--	--	659	--	--
26	184	--	--	94	--	--	716	--	--
27	176	--	--	100	--	--	575	--	--
28	156	--	--	132	--	--	492	--	--
29	150	--	--	--	--	--	455	--	--
30	142	--	--	--	--	--	423	--	--
31	139	--	--	--	--	--	384	--	--
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	400	26	28	2730	427	3270	292	--	--
2	508	24	33	4990	334	4660	262	--	--
3	500	5	6.8	2640	120	855	281	--	--
4	392	7	7.4	1200	65	211	285	--	--
5	331	--	--	795	53	114	271	--	--
6	299	--	--	639	44	76	249	--	--
7	278	--	--	711	1170	324	229	--	--
8	265	--	--	2120	3160	1320	218	--	--
9	232	--	--	1570	95	403	201	--	--
10	151	--	--	835	90	203	187	--	--
11	190	--	--	587	87	138	176	--	--
12	258	--	--	475	--	--	176	--	--
13	500	47	63	411	--	--	165	--	--
14	1220	55	181	368	--	--	156	--	--
15	2410	109	804	342	--	--	159	--	--
16	5920	380	6050	323	--	--	204	--	--
17	2320	148	987	292	--	--	407	--	--
18	1100	65	193	278	--	--	571	--	--
19	752	60	122	265	--	--	852	--	--
20	620	76	127	249	--	--	431	--	--
21	592	70	112	268	62	45	278	--	--
22	504	50	68	271	--	--	232	--	--
23	419	43	49	255	--	--	204	--	--
24	353	--	--	243	--	--	181	--	--
25	327	--	--	240	--	--	165	--	--
26	312	--	--	240	--	--	187	--	--
27	288	--	--	271	--	--	243	138	91
28	265	--	--	435	--	--	212	--	--
29	265	--	--	587	--	--	170	--	--
30	361	--	--	447	--	--	151	--	--
31	--	--	--	345	--	--	--	--	--

MISCELLANEOUS ANALYSES OF STREAMS IN MINNESOTA  
05457000 CEDAR RIVER NEAR AUSTIN, MINN.--Continued

## SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

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	137	--	--	145	--	--	148	--	--
2	235	--	--	134	--	--	142	--	--
3	262	--	--	127	--	--	140	--	--
4	1610	610	3790	119	--	--	137	--	--
5	1570	420	1930	109	--	--	104	30	8.4
6	527	165	235	119	--	--	116	--	--
7	276	115	89	119	--	--	109	--	--
8	218	--	--	116	--	--	114	--	--
9	190	--	--	198	87	47	111	--	--
10	173	--	--	220	--	--	111	--	--
11	156	--	--	184	--	--	109	--	--
12	142	--	--	142	--	--	102	--	--
13	134	--	--	151	--	--	100	--	--
14	124	--	--	153	--	--	100	--	--
15	116	--	--	156	--	--	97	--	--
16	111	--	--	148	--	--	95	--	--
17	107	--	--	140	--	--	102	--	--
18	107	--	--	132	--	--	100	--	--
19	102	--	--	121	--	--	97	--	--
20	97	--	--	114	--	--	93	--	--
21	107	--	--	111	--	--	89	--	--
22	121	--	--	173	--	--	91	--	--
23	127	--	--	249	--	--	87	--	--
24	919	--	--	1130	--	--	102	--	--
25	2160	--	--	799	--	--	159	--	--
26	539	--	--	327	--	--	771	--	--
27	262	--	--	240	--	--	2800	--	--
28	215	--	--	198	--	--	1370	--	--
29	187	--	--	170	--	--	1190	--	--
30	184	28	14	151	--	--	3110	--	--
31	159	--	--	140	--	--	--	--	--

BED MATERIAL PARTICLE SIZE, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973  
(METHODS OF ANALYSIS: B, BOTTOM WITHDRAWAL TUBE; C, CHEMICALLY DISPERSED; P, PIPET; S, SIEVE;  
V, VISUAL ACCUMULATION TUBE; W, IN DISTILLED WATER)

DATE	TYPE	TIME	NUMBER OF SAMPLING POINTS	INSTANTANEOUS DISCHARGE (CFS)	BED MAT. FALL DIAM. % FINER THAN .125 MM	BED MAT. FALL DIAM. % FINER THAN .250 MM	BED MAT. FALL DIAM. % FINER THAN .500 MM	BED MAT. FALL DIAM. % FINER THAN 1.00 MM	BED MAT. SIEVE DIAM. % FINER THAN 2.00 MM	BED MAT. SIEVE DIAM. % FINER THAN 4.00 MM	BED MAT. SIEVE DIAM. % FINER THAN 8.00 MM	METHOD OF ANALYSIS
AUG. 09...	2	1725	4	192	1	1	3	7	11	23	47	SVW

## 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 1972 TO SEPTEMBER 1973

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.							
OCT. 25, 1972...	128	6	70	APR. 18.....	1420	2.5	60
NOV. 28.....	115	0	100	MAY 22.....	762	11	63
JAN. 03, 1973...	72	1	112	JUNE 21.....	652	19	--
FEB. 06.....	100	0	100	JULY 18.....	365	21	--
MAR. 13.....	162	.5	100	AUG. 01.....	661	17.5	78
				SEPT. 05.....	1090	19	80
04014500 BAPTISM RIVER NEAR BEAVER BAY, MINN.							
OCT. 25, 1972...	150	2	70	APR. 17.....	489	1	60
NOV. 27.....	69	0	80	MAY 22.....	164	11.5	60
JAN. 02, 1973...	18	1	105	JUNE 29.....	522	14	50
FEB. 05.....	22	.5	110	JULY 31.....	266	17	68
MAR. 13.....	131	1	180	SEPT. 06.....	246	18	70
04015500 SECOND CREEK NEAR AURORA, MINN.							
OCT. 05, 1972...	14	11.5	625	MAR. 30.....	26	1	510
NOV. 08.....	15	2	610	MAY 03.....	23	8.5	440
DEC. 15.....	6.6	.5	630	JUNE 07.....	21	15	600
JAN. 18, 1973...	9.1	0	--	JULY 11.....	19	24.5	--
FEB. 23.....	5.5	.5	--	AUG. 17.....	28	18	750
MAR. 15.....	36	0	580	SEPT. 19.....	32	11	610
04016000 PARTRIDGE RIVER NEAR AURORA, MINN.							
OCT. 05, 1972...	86	13.5	215	MAR. 30.....	76	5	375
NOV. 08.....	80	4	300	MAY 03.....	124	11	210
DEC. 15.....	21	.5	420	JUNE 07.....	128	17	270
JAN. 18, 1973...	31	.5	--	JULY 11.....	69	27	290
FEB. 23.....	33	.5	--	AUG. 17.....	186	23	230
				SEPT. 19.....	61	13	380
04016500 ST. LOUIS RIVER NEAR AURORA, MINN.							
OCT. 05, 1972...	233	12	55	MAR. 30.....	270	3	120
NOV. 08.....	216	2.5	85	MAY 04.....	484	8.5	60
DEC. 15.....	56	.5	240	JUNE 07.....	266	17	120
JAN. 18, 1973...	51	0	--	JULY 12.....	236	22	180
FEB. 26.....	49	.5	290	AUG. 17.....	381	23	110
				SEPT. 19.....	167	11.5	170

## MISCELLANEOUS ANALYSES OF STREAMS IN MINNESOTA

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)	DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)
04018750 ST. LOUIS RIVER AT FORBES, MINN.							
OCT. 06, 1972...	472	11	125	JUNE 06.....	692	19	140
NOV. 07.....	524	4	140	JULY 12.....	460	22	110
DEC. 14.....	129	.5	180	AUG. 15.....	1160	21.0	160
JAN. 19, 1973...	130	0	--	AUG. 17.....	786	21.5	160
FEB. 26.....	87	.5	50	SEPT. 20.....	311	10	160
APR. 02.....	679	3	190				
04018900 EAST TWO RIVER NEAR IRON JUNCTION, MINN.							
OCT. 24, 1972...	20	0	420	MAY 07.....	198	10	--
NOV. 03.....	21	2	--	MAY 14.....	67	12	300
NOV. 28.....	8.7	0	--	MAY 18.....	35	17	--
JAN. 01, 1973...	8.8	0	--	MAY 25.....	62	11	--
JAN. 29.....	8.6	0	--	JULY 20.....	16	23	--
FEB. 12.....	9.2	0	--	AUG. 10.....	68	20	--
FEB. 27.....	9.8	0	--	AUG. 24.....	21	17	--
MAR. 30.....	52	6	--	SEPT. 07.....	31	17	--
APR. 12.....	19	7	--	SEPT. 20.....	13	12	--
APR. 17.....	36	7	--	SEPT. 25.....	20	12.5	410
04019000 WEST TWO RIVER NEAR IRON JUNCTION, MINN.							
OCT. 03, 1972...	20	14	--	APR. 24.....	86	7	--
OCT. 24.....	15	.5	200	MAY 07.....	196	10	--
NOV. 03.....	20	3	--	MAY 14.....	93	11.5	120
NOV. 28.....	9.0	0	--	MAY 18.....	39	17	--
DEC. 15.....	7.2	0	--	MAY 25.....	69	11	--
JAN. 24, 1973...	7.4	0	--	JUNE 22.....	40	19	--
JAN. 29.....	8.5	0	--	JULY 20.....	12	23	--
FEB. 12.....	8.3	0	--	AUG. 10.....	35	20	--
FEB. 27.....	7.7	0	--	AUG. 24.....	36	17	--
MAR. 30.....	39	6	--	SEPT. 07.....	20	17	--
APR. 12.....	13	7	--	SEPT. 20.....	9.3	9	--
APR. 17.....	35	7	--	SEPT. 25.....	11	12	--
04019300 WEST SWAN RIVER NEAR SILICA, MINN.							
OCT. 06, 1972...	1.6	8	175	MAY 07.....	54	6.5	50
NOV. 08.....	4.7	2	140	JUNE 07.....	4.0	14.5	600
JAN. 22, 1973...	.45	0	--	JULY 12.....	2.3	22	210
FEB. 27.....	.19	.5	--	AUG. 14.....	1.6	18	170
MAR. 16.....	76	0	60	SEPT. 20.....	0.4	5.5	225
APR. 02.....	6.8	1	90				

## WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)	DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)
04024000 ST. LOUIS RIVER AT SCANLON, MINN.							
OCT. 04, 1972...	2820	11	135	MAY 03.....	3850	8	115
NOV. 06.....	4220	6	180	JUNE 06.....	2360	18	150
DEC. 14.....	1420	.5	150	JULY 11.....	1470	26	200
JAN. 17, 1973...	1660	.5	--	AUG. 16.....	3990	21	180
FEB. 22.....	1590	1	190	SEPT. 19.....	1120	12.5	200
MAR. 29.....	3700	1	--				
05034100 PELICAN RIVER AT DETROIT LAKE OUTLET NEAR DETROIT LAKES, MINN.							
OCT. 18, 1972...	7.4	2.5	360	APR. 24.....	24	7	390
NOV. 22.....	12	.5	400	MAY 31.....	7.4	19	420
JAN. 10, 1973...	13	1	440	JULY 06.....	11	24.5	370
FEB. 21.....	10	1.5	470	AUG. 08.....	19	24.5	325
MAR. 21.....	26	4.5	350	SEPT. 12.....	39	17.5	335
05035500 ST. CLAIR LAKE OUTLET NEAR DETROIT LAKES, MINN.							
OCT. 18, 1972...	2.9	1.5	770	APR. 24.....	7.6	6.5	500
NOV. 22.....	3.2	2.5	740	MAY 31.....	5.6	20.5	690
JAN. 10, 1973...	3.9	.5	710	JULY 06.....	4.2	25	580
FEB. 21.....	4.3	.5	1010	AUG. 08.....	4.4	24	660
MAR. 21.....	9.4	3	540	SEPT. 12.....	9.2	16.5	700
05035600 PELICAN RIVER AT MUSKRAT LAKE OUTLET NEAR DETROIT LAKES, MINN.							
OCT. 18, 1972...	8.8	4	460	MAY 31.....	10	21	480
NOV. 22.....	13	1	390	JULY 06.....	9.8	24	460
JAN. 10, 1973...	16	.5	425	AUG. 08.....	16	27	390
MAR. 21.....	30	4	380	SEPT. 12.....	44	19.5	420
APR. 24.....	28	9	430				
05037100 PELICAN RIVER AT SALLIE LAKE OUTLET NEAR DETROIT LAKES, MINN.							
OCT. 18, 1972...	7.8	1	350	APR. 24.....	36	9	410
NOV. 22.....	16	1.5	340	MAY 31.....	14	20.5	420
JAN. 10, 1973...	21	1.5	390	JULY 06.....	9.9	22	390
FEB. 21.....	16	1.5	420	AUG. 08.....	23	25	350
MAR. 21.....	33	5.5	310	SEPT. 11.....	36	19.5	470

## MISCELLANEOUS ANALYSES OF STREAMS IN MINNESOTA

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)	DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)
05040500 PELICAN RIVER NEAR FERGUS FALLS, MINN.							
OCT. 18, 1972...	49	1	470	APR. 24.....	121	9	460
NOV. 28.....	40	0	520	JUNE 01.....	72	26	420
JAN. 10, 1973...	46	0	435	JULY 05.....	33	27	460
FEB. 21.....	51	0	420	AUG. 10.....	25	21	505
MAR. 13.....	105	0	430	SEPT. 11.....	45	15	480
MAR. 21.....	140	7	440				
05046000 OTTER TAIL RIVER BELOW ORWELL DAM NEAR FERGUS FALLS, MINN.							
OCT. 18, 1972...	414	8	340	APR. 27.....	334	11	395
NOV. 28.....	378	2.5	370	JUNE 12.....	252	22	380
JAN. 08, 1973...	335	0	370	JULY 05.....	200	25	380
FEB. 22.....	334	1	430	AUG. 10.....	208	24	395
MAR. 13.....	525	3	400	SEPT. 11.....	74	21	480
APR. 24.....	459	11	395				
05050000 BOIS DE SIOUX RIVER NEAR WHITE ROCK, S. DAK.							
NOV. 03, 1972...	.29	--	--	APR. 06.....	181	8	980
NOV. 28.....	.81	2.5	1450	APR. 30.....	2.5	9	1280
JAN. 15, 1973...	4.7	0	--	JUNE 01.....	58	21	825
FEB. 22.....	9.2	0	2800	JULY 06.....	.02	33.5	1320
MAR. 08.....	21	1	1720	AUG. 09.....	.04	--	--
MAR. 13.....	22	3	970	SEPT. 12.....	.02	--	--
MAR. 27.....	330	8	830				
05061000 BUFFALO RIVER NEAR HAWLEY, MINN.							
OCT. 19, 1972...	15	.5	700	APR. 04.....	56	6	630
NOV. 14.....	24	1	690	MAY 08.....	34	14	700
DEC. 12.....	16	0	700	JUNE 12.....	26	18	660
JAN. 23, 1973...	39	1	550	JULY 18.....	18	19	680
FEB. 28.....	21	0	730	AUG. 22.....	20	18	600
MAR. 14.....	117	2	510	SEPT. 25.....	114	12	630
05061500 SOUTH BRANCH BUFFALO RIVER AT SABIN, MINN.							
OCT. 12, 1972...	5.3	15	800	APR. 03.....	30	6	690
NOV. 14.....	12	1	800	MAY 08.....	17	19	930
DEC. 12.....	4.0	0	460	JUNE 12.....	2.9	20	1130
JAN. 23, 1973...	6.0	1	1400	JULY 17.....	3.9	23	820
FEB. 27.....	3.8	0	440	AUG. 21.....	2.2	22	745
MAR. 22.....	43	0.5	270	SEPT. 25.....	20	14.5	850



## WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

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.							
OCT. 02, 1972...	20	10	750	MAY 08.....	61	15.5	770
NOV. 15.....	38	1	700	JUNE 13.....	32	19	680
DEC. 12.....	27	0	780	JULY 17.....	20	23	600
JAN. 23, 1973...	14	0	740	AUG. 22.....	17	19.5	525
FEB. 27.....	19	0	880	SEPT. 25.....	127	12	565
APR. 03.....	118	2	590				
05062500 WILD RICE RIVER AT TWIN VALLEY, MINN.							
OCT. 13, 1972...	109	8	530	APR. 05.....	231	5.5	370
NOV. 15.....	50	0	560	MAY 09.....	145	14.5	410
DEC. 13.....	35	0	600	JUNE 13.....	93	23.5	610
JAN. 24, 1973...	42	--	500	JULY 18.....	51	23	390
FEB. 28.....	44	0	580	AUG. 23.....	71	19	360
MAR. 15.....	559	0	510	SEPT. 05.....	1430	18	340
MAR. 21.....	293	5	340	SEPT. 26.....	787	13.5	515
05064000 WILD RICE RIVER AT HENDRUM, MINN.							
OCT. 12, 1972...	80	10	450	APR. 05.....	268	8	375
NOV. 16.....	63	.5	560	MAY 09.....	190	15.0	520
DEC. 13.....	36	0	700	JUNE 14.....	103	19.5	520
JAN. 24, 1973...	41	1	650	JULY 18.....	63	24.5	440
FEB. 28.....	45	0	660	AUG. 22.....	80	21	325
MAR. 16.....	1050	.5	460	SEPT. 27.....	850	13	490
MAR. 21.....	489	.5	430				
05067500 MARSH RIVER NEAR SHELLY, MINN.							
OCT. 12, 1972...	.7	7.5	660	APR. 05.....	17	9	700
DEC. 13.....	.5	0	830	MAY 09.....	2.6	14	650
JAN. 25, 1973...	.07	1	--	JUNE 14.....	.3	23	850
MAR. 16.....	347	.5	455	SEPT. 27.....	98	13	330
MAR. 21.....	62	.5	490				
05069000 SANDHILL RIVER AT CLIMAX, MINN.							
OCT. 12, 1972...	21	8	650	APR. 05.....	60	6.5	590
NOV. 16.....	44	.5	700	MAY 10.....	35	12	650
DEC. 14.....	11	0	860	JUNE 14.....	18	23	660
JAN. 01, 1973...	11	1	700	JULY 19.....	9.9	19.5	540
MAR. 01.....	16	0	690	AUG. 23.....	13	22	520
MAR. 15.....	628	1	390	SEPT. 27.....	103	13	585

## MISCELLANEOUS ANALYSES OF STREAMS IN MINNESOTA

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)	DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)
05074500 RED LAKE RIVER NEAR RED LAKE, MINN.							
NOV. 06, 1972...	536	20	--	APR. 27.....	168	5.5	240
DEC. 08.....	480	1	270	JUNE 04.....	378	18	150
JAN. 12, 1973...	518	.5	285	JULY 06.....	188	26	230
FEB. 16.....	536	.5	340	AUG. 10.....	223	19.5	260
MAR. 22.....	108	1	300	SEPT. 14.....	430	14	240
APR. 17.....	111	2.5	260				
05075000 RED LAKE RIVER AT HIGH LANDING NEAR GOODRIDGE, MINN.							
NOV. 06, 1972...	652	2	300	APR. 17.....	160	5	315
DEC. 13.....	561	0	--	APR. 27.....	259	7	280
JAN. 15, 1973...	512	0	275	JUNE 04.....	412	17	260
FEB. 20.....	572	0	350	JULY 05.....	176	20	260
MAR. 22.....	359	.5	275	AUG. 09.....	234	21.5	300
APR. 05.....	204	6.5	265	SEPT. 13.....	577	11	280
05076000 THIEF RIVER NEAR THIEF RIVER FALLS, MINN.							
NOV. 03, 1972...	11	--	540	JUNE 05.....	12	16.5	650
DEC. 07.....	.09	.5	1530	JULY 05.....	.9	20	530
MAR. 15, 1973...	385	.5	380	AUG. 09.....	14	20	750
APR. 05.....	28	6	500	SEPT. 13.....	45	15.5	500
APR. 26.....	43	11.5	550				
05077700 RUFFY BROOK NEAR GONVICK, MINN.							
OCT. 10, 1972...	3.6	11.5	650	APR. 09.....	9.2	4.5	430
NOV. 21.....	8.4	1	470	MAY 11.....	26	7	560
DEC. 18.....	3.1	0	625	JUNE 15.....	1.7	24.5	620
JAN. 29, 1973...	8.5	1	510	JULY 20.....	.85	15	600
MAR. 02.....	5.0	0	510	AUG. 27.....	2.0	25	520
MAR. 19.....	28	1	340	SEPT. 05.....	113	--	--
05078000 CLEARWATER RIVER AT PLUMMER, MINN.							
OCT. 11, 1972...	75	10	500	APR. 09.....	54	5	490
NOV. 20.....	91	.5	460	MAY 10.....	33	13	630
DEC. 15.....	84	0	490	JUNE 15.....	13	22.5	590
JAN. 30, 1973...	43	1	470	JULY 19.....	14	24	480
MAR. 02.....	54	0	500	AUG. 27.....	130	23	610
MAR. 20.....	422	1	350	SEPT. 28.....	1030	13	500

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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)
05078230 LOST RIVER AT OKLEE, MINN.							
OCT. 10, 1972...	16	13	590	MAR. 19.....	194	1	410
NOV. 20.....	23	1	610	APR. 09.....	63	5	540
DEC. 18.....	4.2	0	750	MAY 11.....	94	9	680
JAN. 29, 1973...	4.0	1	600	JUNE 15.....	5.3	25	640
FEB. 16.....	9.0	0	750	JULY 19.....	2.4	24	560
MAR. 02.....	8.9	0	670	AUG. 27.....	19	24.5	640
MAR. 14.....	522	0	385	SEPT. 28.....	326	14	620
05078500 CLEARWATER RIVER AT RED LAKE FALLS, MINN.							
OCT. 11, 1972...	129	10	580	MAY 10.....	112	14	580
NOV. 17.....	170	.5	530	JUNE 15.....	26	24	590
DEC. 15.....	83	0	460	JULY 19.....	20	24	440
JAN. 30, 1973...	64	1	500	AUG. 24.....	168	20	525
MAR. 01.....	65	0	540	SEPT. 28.....	1900	12.5	520
MAR. 20.....	1210	.5	385				
05079000 RED LAKE RIVER AT CROOKSTON, MINN.							
OCT. 11, 1972...	1060	9	345	MAR. 20.....	2350	.5	340
NOV. 17.....	474	1	360	MAY 10.....	734	14	420
DEC. 14.....	669	0	385	JUNE 14.....	419	24	360
JAN. 25, 1973...	590	2	350	JULY 19.....	200	24.5	340
MAR. 01.....	646	0	--	AUG. 23.....	428	23	410
MAR. 15.....	3390	0	285	SEPT. 27.....	4450	14.5	410
05087500 MIDDLE RIVER AT ARGYLE, MINN.							
NOV. 03, 1972...	.03	2.5	590	APR. 26.....	22	9.5	500
MAR. 15, 1973...	90	.5	--	JUNE 01.....	1.1	21.5	390
MAR. 21.....	54	.5	265	AUG. 09.....	.11	18	250
05094000 S. BRANCH TWO RIVERS AT LAKE BRONSON, MINN.							
NOV. 02, 1972...	2.6	2	460	APR. 26.....	4.5	7	400
DEC. 07.....	2.0	1	430	JUNE 01.....	5.1	19	260
JAN. 11, 1973...	1.4	.5	425	JULY 05.....	1.8	19	440
FEB. 15.....	2.0	.5	590	AUG. 08.....	9	23	390
MAR. 21.....	70	.5	285	SEPT. 13.....	2.4	15	300

## MISCELLANEOUS ANALYSES OF STREAMS IN MINNESOTA

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)	DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)
05104500 ROSEAU RIVER BELOW SOUTH FORK NEAR MALUNG, MINN.							
NOV. 02, 1972...	2.7	1	510	APR. 25.....	43	7	380
DEC. 06.....	3.8	.5	380	MAY 31.....	35	20	350
JAN. 10, 1973...	4.0	0	370	JULY 04.....	4.5	19	420
FEB. 14.....	2.4	0	490	SEPT. 12.....	--	17	280
MAR. 20.....	51	0	295				
05106000 SPRAGUE CREEK NEAR SPRAGUE, MANITOBA							
DEC. 06, 1972...	3.6	.5	460	MAY 31.....	31	17	--
JAN. 10, 1973...	.54	0	580	JULY 04.....	15	18	290
FEB. 14.....	1.2	0	650	AUG. 08.....	43	19	220
MAR. 20.....	30	0	205	SEPT. 12.....	23	12.5	255
APR. 25.....	64	4.5	255				
05107500 ROSEAU RIVER AT ROSS, MINN.							
NOV. 02, 1972...	31	1.5	390	APR. 25.....	152	7.5	320
DEC. 05.....	10	.5	430	MAY 31.....	104	19	320
JAN. 10, 1973...	4.5	0	580	JULY 04.....	39	20.5	380
FEB. 15.....	5.3	0	800	AUG. 08.....	89	22	280
APR. 04.....	79	3	265	SEPT. 12.....	146	17	265
05112000 ROSEAU RIVER BELOW STATE DITCH 51 NEAR CARIBOU, MINN.							
OCT. 25, 1972...	28	4.5	405	MAY 16.....	120	10	330
JAN. 03, 1973...	11	0	725	JUNE 27.....	108	19	302
FEB. 06.....	9.0	0	--	JULY 25.....	18	21	287
MAR. 13.....	174	1.5	--	AUG. 28.....	42	24.5	305
APR. 18.....	52	6	300				
05124480 KAWISHIWI RIVER NEAR ELY, MINN.							
OCT. 26, 1972...	115	4	--	MAY 24.....	482	14	50
JAN. 04, 1973...	84	.5	--	JUNE 26.....	289	21	50
FEB. 07.....	58	.5	50	AUG. 03.....	221	20.5	50
MAR. 13.....	58	1	50	SEPT. 11.....	457	18	50
APR. 24.....	474	5.5	50				
05127000 KAWISHIWI RIVER NEAR WINTON, MINN.							
OCT. 26, 1972...	854	6.5	50	MAY 23, 1973...	2000	13.5	60

## WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

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05127205 BURNTSIDE RIVER NEAR ELY, MINN.							
OCT. 27, 1972...	8.8	8	80	APR. 19.....	42	9	55
NOV. 29.....	5.4	1.0	50	MAY 25.....	129	14	65
JAN. 17, 1973...	8.8	1.5	50	JUNE 25.....	78	19.5	50
JAN. 19.....	6.1	0	65	AUG. 03.....	123	23	50
FEB. 07.....	4.0	.5	50	SEPT. 10.....	83	19	50
MAR. 14.....	17	0	68				
05127207 BJORKMAN'S CREEK NEAR ELY, MINN.							
OCT. 27, 1972...	.18	6	50	JUNE 25.....	.93	16	50
NOV. 29.....	.06	0	70	AUG. 03.....	.55	15.5	50
APR. 19, 1973...	2.7	2.5	50	SEPT. 10.....	.76	15	55
MAY 25.....	2.2	14	55				
05127210 ARMSTRONG CREEK NEAR ELY, MINN.							
OCT. 26, 1972...	1.3	5.5	170	APR. 19.....	6.7	4	90
NOV. 29.....	.79	0	170	MAY 25.....	11	14	100
JAN. 09, 1973...	.35	.5	--	JUNE 25.....	7.2	17	50
JAN. 19.....	.46	0	102	AUG. 03.....	1.8	18.5	50
FEB. 06.....	.20	0	175	SEPT. 10.....	4.3	14	130
MAR. 14.....	1.9	0	220				
05127215 LONGSTORFF CREEK NEAR ELY, MINN.							
OCT. 26, 1972...	1.4	7	140	APR. 19.....	16	5	80
NOV. 29.....	89	0	140	MAY 25.....	16	13	80
JAN. 11, 1973...	1.8	.5	65	JUNE 25.....	6.8	19	50
JAN. 19.....	1.9	0	70	AUG. 03.....	6.4	19.5	--
FEB. 06.....	1.4	0	90	SEPT. 10.....	9.9	15	90
MAR. 14.....	4.3	0	100				
05127219 SHAGAWA LAKE TRIBUTARY AT ELY, MINN.							
MAR. 12, 1973...	.02	0	110	MAY 03.....	.02	5.5	300
APR. 18.....	.02	8	340				
05127230 SHAGAWA RIVER AT ELY, MINN							
OCT. 25, 1972...	16	5	70	APR. 18.....	62	6	80
NOV. 30.....	17	1	75	MAY 24.....	150	15	65
JAN. 09, 1973...	17	.5	--	JUNE 25.....	120	20	70
FEB. 07.....	16	.5	--	AUG. 03.....	156	24	--
MAR. 12.....	20	2	80	SEPT. 10.....	157	19.5	75

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## WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

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05127500 BASSWOOD RIVER NEAR WINTON, MINN.							
MAR. 13, 1973...	469	1	50	AUG. 02.....	1550	21	55
MAY 24.....	3420	--	50				
05128000 NAMAKAN RIVER AT OUTLET OF LAC LA CROIX, ONTARIO							
JULY 26, 1973	3870	19.5	--				
05129000 VERMILION RIVER BELOW VERMILION LAKE, NEAR TOWER, MINN.							
OCT. 25, 1972...	190	3.5	62	APR. 20.....	334	6	60
NOV. 30.....	137	1	65	MAY 29.....	607	14.5	65
JAN. 12, 1973...	124	1	60	JUNE 27.....	677	17	50
FEB. 08.....	98	.5	50	AUG. 01.....	620	21	50
MAR. 14.....	106	1.5	76	SEPT. 07.....	473	19	70
05130500 STURGEON RIVER NEAR CHISHOLM, MINN.							
OCT. 18, 1972...	109	2	42	APR. 20.....	212	10	70
DEC. 01.....	54	0	80	MAY 30.....	250	10	72
JAN. 15, 1973...	19	1	70	JULY 31.....	166	17.5	55
FEB. 09.....	21	0	95	SEPT. 07.....	143	15	80
MAR. 16.....	160	0	100				
05131000 DARK RIVER NEAR CHISHOLM, MINN.							
OCT. 03, 1972...	26	11	--	MAY 14.....	79	8.5	--
OCT. 18.....	22	20	--	MAY 15.....	62	10	--
OCT. 23.....	25	3	--	MAY 29.....	56	14	--
NOV. 10.....	25	3	--	JUNE 08.....	33	16	--
NOV. 27.....	16	0	--	JULY 06.....	38	22	--
JAN. 22, 1973...	14	0	--	AUG. 17.....	46	20	--
FEB. 19.....	13	0	--	AUG. 30.....	26	20	--
APR. 06.....	29	4	--	SEPT. 07.....	37	14	--
APR. 24.....	96	6	--	SEPT. 21.....	14	9	--
MAY 07.....	62	9	--				
05131500 LITTLE FORK RIVER AT LITTLE FORK, MINN.							
OCT. 31, 1972...	624	2.5	120	APR. 03.....	1450	3	95
DEC. 04.....	362	.5	160	APR. 23.....	3750	6.5	120
JAN. 09, 1973...	113	.5	180	MAY 29.....	2510	16.5	95
FEB. 13.....	106	0	275	AUG. 06.....	883	25	110
MAR. 26.....	1200	.5	105	SEPT. 11.....	782	16	105

## WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

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05132000 BIG FORK RIVER AT BIG FALLS, MINN.							
OCT. 30, 1972...	580	2	210	APR. 23.....	1640	7.5	175
DEC. 04.....	328	.5	240	MAY 28.....	1200	15	150
JAN. 08, 1973...	162	.5	300	JULY 02.....	502	21.5	205
FEB. 12.....	158	0	310	AUG. 06.....	455	22	170
MAR. 26.....	816	.5	175	SEPT. 10.....	754	14	180
05133500 RAINY RIVER AT MANITOU RAPIDS, MINN.							
OCT. 31, 1972...	8270	3.5	130	AUG. 07.....	15600	20	130
MAY 30, 1973...	9460	16	80				
05134200 RAPID RIVER NEAR BAUDETTE, MINN.							
NOV. 01, 1972...	119	1	165	APR. 24.....	386	5.5	180
DEC. 05.....	22	.5	140	MAY 30.....	132	19	195
JAN. 09, 1973...	7.6	0	180	JULY 03.....	84	24	200
FEB. 13.....	8.2	0	340	AUG. 07.....	547	22	190
APR. 04.....	125	2.5	155	SEPT. 11.....	851	16	145
05139500 WEST BRANCH WARROAD RIVER NEAR WARROAD, MINN.							
NOV. 01, 1972...	2.9	--	380	MAY 31.....	14	16	395
FEB. 14, 1973...	.90	.5	650	JULY 03.....	6.1	21	430
MAR. 14.....	16	.5	--	AUG. 07.....	3.0	23	410
MAR. 20.....	12	.5	275	SEPT. 12.....	25	.5	230
APR. 24.....	30	7	300				
05140000 BULLDOG RUN NEAR WARROAD, MINN.							
MAR. 14, 1973...	4.5	.5	--	APR. 24.....	.58	7	520
MAR. 20.....	.29	0	300	MAY 31.....	.12	15	640
05140500 EAST BRANCH WARROAD RIVER NEAR WARROAD, MINN.							
NOV. 01, 1972...	1.5	1.5	500	JULY 03.....	6.5	21	380
MAR. 20, 1973...	7.2	0	270	AUG. 07.....	2.3	22	380
APR. 24.....	16	6.5	340	SEPT. 12.....	18	13.5	255
MAY 30	9.7	18.5	330				
05201500 MISSISSIPPI RIVER AT WINNIBIGOSHISH DAM NEAR DEER RIVER, MINN.							
OCT. 11, 1972...	576	10	280	MAR. 27.....	127	--	--
NOV. 07.....	456	1.5	--	APR. 30.....	129	10.5	215
FEB. 07, 1973...	794	1	300	JUNE 04.....	129	16	280

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05211000 MISSISSIPPI RIVER AT GRAND RAPIDS, MINN.							
OCT. 10, 1972...	1630	11	275	MAY 08.....	415	13.5	230
NOV. 09.....	1850	3	270	JUNE 08.....	448	20.5	280
DEC. 19.....	1600	1	290	JULY 06.....	275	24	150
JAN. 23, 1973...	1620	--	--	AUG. 15.....	518	22	280
FEB. 19.....	1640	0	230	SEPT. 14.....	312	18	275
APR. 03.....	684	6	250	SEPT. 25.....	385	15	285
05212700 PRAIRIE RIVER NEAR TACONITE, MINN.							
OCT. 10, 1972...	142	8.5	130	APR. 02.....	295	3	110
NOV. 09.....	164	2	130	MAY 07.....	287	10.5	95
DEC. 18.....	39	.5	140	JUNE 08.....	251	16	110
JAN. 22, 1973...	81	0	--	AUG. 14.....	194	20	130
FEB. 27.....	58	.5	270	SEPT. 20.....	103	12.5	120
05216860 SWAN RIVER NEAR CALUMET, MINN.							
OCT. 06, 1972...	31	11	220	MAY 07.....	87	11.5	200
NOV. 09.....	47	2.5	200	JUNE 08.....	99	17	220
DEC. 18.....	38	1	210	JULY 06.....	44	25	150
JAN. 19, 1973...	46	1	--	AUG. 14.....	54	22.5	220
FEB. 27.....	33	1	210	SEPT. 20.....	12	12	225
APR. 04.....	77	6	220				
05220500 MISSISSIPPI RIVER BELOW SANDY RIVER NEAR LIBBY, MINN.							
OCT. 02, 1972...	2610	11	200	JUNE 01.....	2200	17	170
NOV. 03.....	3070	3	210	JULY 10.....		24	
JAN. 15, 1973...	1860	1	--	AUG. 16.....	1760	22	120
FEB. 19.....	1670	1	--	SEPT. 17.....	925	14.5	150
MAR. 26.....	2190	4.5	160				
05227500 MISSISSIPPI RIVER AT AITKIN, MINN.							
OCT. 03, 1972...	2840	11.5	205	MAR. 27.....	3270	4	195
OCT. 20.....	2450	4	240	MAY 01.....	2370	8	--
NOV. 02.....	2920	--	--	JUNE 04.....	2550	18	200
DEC. 13.....	1980	.5	250	JULY 09.....	1380	25	50
JAN. 16, 1973...	2070	0	--	AUG. 09.....	3210	22.5	210
FEB. 21.....	1560	1	180	SEPT. 17.....	1250	15	215
05231000 PINE RIVER AT CROSS LAKE, MINN.							
OCT. 12, 1972...	266	10.5	220	APR. 30.....	265	6.5	220
NOV. 07.....	387	5.5	230	JUNE 04.....	202	11.5	260
MAR. 26, 1973...	138	4	223				



## WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

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05244000 CROW WING RIVER AT NIMROD, MINN.							
OCT. 18, 1972...	387	1	300	MAY 07.....	462	13	310
NOV. 13.....	517	1	170	JUNE 11.....	468	21	310
DEC. 11.....	384	0	350	JULY 16.....	292	24	220
JAN. 22, 1973...	338	1	370	AUG. 20.....	473	22	275
FEB. 26.....	296	0	380	SEPT. 24.....	465	12	350
APR. 02.....	528	6	300				
05245100 LONG PRAIRIE RIVER AT LONG PRAIRIE, MINN.							
OCT. 11, 1972...	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, 1973...	111	0	460				
05247500 CROW WING RIVER NEAR PILLAGER, MINN.							
OCT. 13, 1972...	1280	11	350	MAY 02.....	1600	--	--
NOV. 16.....	1510	1.0	320	JUNE 13.....	1250	--	--
DEC. 13.....	923	--	--	JULY 20.....	452	--	--
JAN. 17, 1973...	979	--	--	AUG. 14.....	1320	--	--
FEB. 21.....	756	0	400	SEPT. 19.....	820	--	--
MAR. 22.....	4090	--	--				
05267000 MISSISSIPPI RIVER NEAR ROYALTON, MINN.							
OCT. 12, 1972...	5440	11	280	MAY 02.....	6290	--	--
DEC. 12.....	4930	--	--	JUNE 14.....	4360	--	--
FEB. 20, 1973...	3050	--	--	SEPT. 19.....	2650	--	--
05270500 SAUK RIVER NEAR ST. CLOUD, MINN.							
OCT. 10, 1972...	431	11.5	440	MAY 01.....	557	8	440
NOV. 15.....	526	0	380	JUNE 21.....	139	16	440
DEC. 11.....	314	0	490	JULY 17.....	129	22	400
JAN. 16, 1973...	223	0	520	AUG. 10.....	227	23	385
FEB. 19.....	135	0	535	SEPT. 18.....	196	15	453
MAR. 21.....	1810	2	350				
05275000 ELK RIVER NEAR BIG LAKE, MINN.							
OCT. 09, 1972...	315	10	340	APR. 30.....	286	10.5	320
NOV. 14.....	493	2	280	JUNE 06.....	545	13.5	--
DEC. 11.....	143	0	350	JUNE 21.....	238	17	--
JAN. 15, 1973...	150	0	365	JULY 16.....	124	--	--
FEB. 19.....	146	0	350	AUG. 09.....	142	--	--
MAR. 16.....	1320	2	185	SEPT. 17.....	124	--	--

## MISCELLANEOUS ANALYSES OF STREAMS IN MINNESOTA

## WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)	DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)
05278000 MIDDLE FORK CROW RIVER NEAR SPICER, MINN.							
OCT. 19, 1972...	56	5	380	MAY 02.....	141	10.5	--
NOV. 29.....	80	2	420	JUNE 11.....	82	23	360
DEC. 12.....	65	.5	--	JULY 16.....	20	25	320
JAN. 17, 1973...	43	.5	--	AUG. 21.....	21	18.5	340
FEB. 28.....	47	.5	--	SEPT. 24.....	5.9	19	--
MAR. 15.....	140	1	--				
05278930 BUFFALO CREEK NEAR GLENCOE, MINN.							
OCT. 20, 1972...	32	3	2100	MAR. 23.....	237	1.5	--
NOV. 29.....	81	0.5	1260	MAY 03.....	147	9.5	--
DEC. 14.....	22	0	--	JUNE 12.....	85	20.5	1000
JAN. 18, 1973...	17	0	--	JULY 17.....	14	24	950
FEB. 28.....	4.6	0	--	AUG. 21.....	25	19.5	3000
MAR. 13.....	305	3	460	SEPT. 25.....	13	19	725
05279000 SOUTH FORK CROW RIVER NEAR MAYER, MINN.							
OCT. 17, 1972...	111	5	--	MAY 16.....	315	13.5	--
NOV. 20.....	312	2.5	--	JUNE 11.....	350	25	825
DEC. 19.....	67	0	--	JULY 09.....	112	--	--
JAN. 15, 1973...	67	0	--	AUG. 01.....	72	19.5	--
FEB. 15.....	57	0	--	AUG. 21.....	46	20.5	750
MAR. 15.....	1950	4.5	--	SEPT. 03.....	319	25	--
APR. 10.....	575	2.5	--	SEPT. 25.....	55	19	750
05280000 CROW RIVER AT ROCKFORD, MINN.							
OCT. 17, 1972...	528	5	800	MAR. 29.....	2910	5	--
OCT. 27.....	534	7	--	APR. 10.....	2130	1	520
NOV. 27.....	840	1	--	APR. 27.....	1590	10.5	--
DEC. 15.....	406	0	700	MAY 30.....	1840	18	660
DEC. 27.....	320	0	--	JUNE 27.....	557	20.5	--
JAN. 15, 1973...	292	0	--	JULY 09.....	338	25	630
JAN. 30.....	345	0	--	JULY 27.....	186	22.5	610
FEB. 15.....	244	0	705	AUG. 29.....	383	25	560
FEB. 27.....	269	.5	--	SEPT. 27.....	342	14	610
MAR. 14.....	3020	2.5	390				

## WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCTANCE (MICRO- MHOS)	DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCTANCE (MICRO- MHOS)
05286000 RUM RIVER NEAR ST. FRANCIS, MINN.							
OCT. 09, 1972...	928	9.5	300	APR. 30.....	890	11	250
NOV. 14.....	1350	2	235	MAY 18.....	1160	--	--
DEC. 15.....	634	0	285	JUNE 06.....	1200	--	--
JAN. 15, 1973...	519	0	275	JULY 16.....	434	--	--
FEB. 13.....	519	0	--	AUG. 02.....	474	--	--
MAR. 16.....	3010	--	--	AUG. 09.....	410	--	--
MAR. 19.....	5390	1	--	AUG. 30.....	506	--	--
APR. 11.....	1170	4	--	SEPT. 17.....	421	--	--
05288500 MISSISSIPPI RIVER AT ANOKA, MINN.							
OCT. 16, 1972...	9570	9	380	JUNE 25.....	6310	--	--
NOV. 24.....	9140	1	--	JULY 12.....	4780	26.5	350
MAR. 19, 1973...	35000	1.5	--	AUG. 14.....	8240	25	280
APR. 30.....	11400	10.5	360	SEPT. 19.....	4950	16	320
JUNE 06.....	13300	21	400				
05290000 LITTLE MINNESOTA RIVER NEAR PEEVER, S. DAK.							
NOV. 03, 1972...	5.5	3	1420	MAR. 27.....	92	7	980
DEC. 01.....	5.3	0	1680	APR. 27.....	33	10	1450
JAN. 15, 1973...	2.0	0	1550	MAY 29.....	116	17	1050
FEB. 21.....	3.8	0	1700	JULY 02.....	3.5	25.5	1600
MAR. 07.....	94	0	800	AUG. 09.....	.06	22	1375
MAR. 09.....	96	0	650	SEPT. 18.....	.57	13	1470
MAR. 14.....	188	.5	780				
05291000 WHETSTONE RIVER NEAR BIG STONE CITY, S. DAK.							
OCT. 27, 1972...	17	7	1020	MAR. 27.....	195	6.5	950
DEC. 05.....	22	0	1350	APR. 27.....	68	12	1170
JAN. 11, 1973...	10	0	1040	MAY 29.....	274	--	--
FEB. 21.....	36	0	1200	JULY 02.....	14	27	1080
MAR. 07.....	375	0	540	AUG. 09.....	5.3	27	850
MAR. 09.....	427	.5	450	SEPT. 18.....	4.3	16	1130
MAR. 15.....	856	3	780				
05292000 MINNESOTA RIVER AT ORTONVILLE, MINN.							
OCT. 27, 1972...	1.8	9	1610	MAR. 29.....	387	7	920
DEC. 01.....	2.3	5	1490	APR. 27.....	62	11.5	1190
JAN. 11, 1973...	1.7	1.5	1700	MAY 08.....	217	15	1080
JAN. 19.....	45	1	1080	MAY 29.....	582	--	--
FEB. 21.....	67	0	1100	JULY 02.....	15	24.5	1100
MAR. 07.....	265	0	550	JULY 24.....	7.5	22	1125
MAR. 09.....	294	.5	550	SEPT. 18.....	3.9	15.5	1350
MAR. 15.....	402	4	700				

## MISCELLANEOUS ANALYSES OF STREAMS IN MINNESOTA

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCTANCE (MICRO- MHOS)	DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCTANCE (MICRO- MHOS)
05293000 YELLOW BANK RIVER NEAR ODESSA, MINN.							
OCT. 24, 1972...	19	3.5	900	APR. 30.....	62	9.5	940
JAN. 12, 1973...	9.8	0	1000	MAY 31.....	242	18	1000
FEB. 22.....	18	0	1000	JULY 06.....	9.9	24	900
MAR. 09.....	416	0	510	AUG. 10.....	4.3	20.5	920
MAR. 14.....	623	5	650	SEPT. 11.....	1.2	16	850
APR. 06.....	104	8	1060				
05294000 POMME DE TERRE RIVER AT APPLETON, MINN.							
OCT. 24, 1972...	86	4.5	790	APR. 06.....	258	8	840
DEC. 08.....	72	0	--	APR. 30.....	157	9.5	860
JAN. 12, 1973...	50	0	900	MAY 31.....	195	19	950
FEB. 21.....	52	0	910	JULY 06.....	44	26	700
MAR. 08.....	250	.5	580	AUG. 10.....	47	24	780
MAR. 14.....	735	--	--	SEPT. 11.....	30	18	810
05300000 LAC QUI PARLE RIVER NEAR LAC QUI PARLE, MINN.							
OCT. 27, 1972...	32	7.5	1200	APR. 30.....	138	9.5	1300
JAN. 12, 1973...	10	0	1680	JUNE 01.....	358	22	1350
FEB. 20.....	30	0	1300	JULY 06.....	19	29	1300
MAR. 06.....	288	0	480	AUG. 09.....	6.5	26.5	1175
MAR. 15.....	1730	5.5	790	SEPT. 11.....	.71	18	1000
APR. 06.....	324	7.5	1200				
05301000 MINNESOTA RIVER NEAR LAC QUI PARLE, MINN.							
NOV. 06, 1972...	502	--	--	MAY 03.....	867	11.5	920
NOV. 28.....	108	1	--	MAY 04.....	830	11.5	920
JAN. 10, 1973...	235	--	--	MAY 31.....	1210	21	1025
FEB. 21.....	356	3	1180	JUNE 20.....	161	--	--
MAR. 08.....	1120	--	--	JULY 27.....	27	24.5	980
MAR. 15.....	3110	3	760	SEPT. 11.....	30	21	1050
05304500 CHIPPEWA RIVER NEAR MILAN, MINN.							
NOV. 07, 1972...	506	--	--	APR. 11.....	8.7	--	640
NOV. 28.....	178	--	--	MAY 14.....	508	--	760
JAN. 11, 1973...	131	--	850	JUNE 27.....	133	--	770
FEB. 22.....	134	5	900	AUG. 08.....	100	--	660
MAR. 12.....	1460	7	550	AUG. 10.....	142	--	540
MAR. 16.....	2250	--	600	SEPT. 12.....	71	--	710

## WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)	DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)
05311000 MINNESOTA RIVER AT MONTEVIDEO, MINN.							
NOV. 27, 1972...	272	1	--	JUNE 08.....	1550	22	1000
DEC. 11.....	572	0	760	JUNE 22.....	663	19	1000
JAN. 30, 1973...	564	0	1000	JULY 18.....	67	24.5	710
MAR. 01.....	583	1.5	700	AUG. 23.....	67	20	925
MAR. 09.....	1650	2	700	SEPT. 19.....	53	15	900
MAY 08.....	1470	16.5	910	SEPT. 27.....	58	15.5	950
05311400 SOUTH BRANCH YELLOW MEDICINE RIVER NEAR MINNEOTA, MINN.							
OCT. 17, 1972...	2.6	--	--	MAR. 19.....	84	4.5	1100
NOV. 24.....	8.2	--	--	MAR. 20.....	70	5	1130
DEC. 21.....	3.4	--	--	APR. 02.....	49	5.5	1400
JAN. 22, 1973...	11.2	0	800	APR. 25.....	22	11	1100
FEB. 20.....	EST .03	--	--	MAY 22.....	9.8	22	--
MAR. 02.....	94	0	430	JULY 05.....	.11	23	1300
MAR. 06.....	152	0	560	AUG. 02.....	.14	--	--
MAR. 14.....	292	6.5	875	AUG. 29.....	NO FLOW	--	--
				SEPT. 13.....	NO FLOW	--	--
05313500 YELLOW MEDICINE RIVER NEAR GRANITE FALLS, MINN.							
OCT. 16, 1972...	10	8.5	--	APR. 26.....	122	10.5	1550
DEC. 26.....	13	0	1590	MAY 22.....	95	21	1400
JAN. 26, 1973...	66	0	680	JULY 05.....	14	28	1200
MAR. 06.....	411	0	510	AUG. 06.....	5.2	24	1130
MAR. 19.....	805	3.5	1100	SEPT. 05.....	2.6	20	1110
MAR. 27	423	8	1400				
05315000 REDWOOD RIVER AT MARSHALL, MINN.							
OCT. 27, 1972...	7.8	--	--	MAR. 19.....	255	5.5	750
NOV. 24.....	35.4	--	--	APR. 02.....	123	6	1090
DEC. 21.....	5.9	0	1300	APR. 26.....	72	10.5	1170
JAN. 22, 1973...	12	0	950	MAY 22.....	25	18	1050
FEB. 15.....	8.4	0	1310	JULY 05.....	3.7	25	1150
MAR. 02.....	87	0	560	AUG. 02.....	2.2	25	1420
MAR. 06.....	256	0	510	SEPT. 05.....	.05	24	1300
MAR. 14.....	465	6.5	650				

## MISCELLANEOUS ANALYSES OF STREAMS IN MINNESOTA

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)	DATE	DISCHARGE (CFS)	TEMPERA- TURE (°C)	SPECIFIC CONDUCT- TANCE (MICRO- MHOS)
05316500 REDWOOD RIVER NEAR REDWOOD FALLS, MINN.							
OCT. 16, 1972...	23	7.5	--	MAR. 19.....	697	5	950
JAN. 10, 1973...	9.7	0	--	APR. 24.....	182	12	1300
JAN. 26.....	98	.5	680	MAY 25.....	103	14	1350
FEB. 26.....	36	0	--	AUG. 06.....	6.1	29.5	1050
MAR. 06.....	157	.5	480	SEPT. 05.....	2.6	20	1000
05316770 MINNESOTA RIVER AT NEW ULM, MINN.							
NOV. 02, 1972...	944	6	915	APR. 17.....	3110	3	--
DEC. 20.....	704	.5	--	MAY 25.....	2150	--	--
JAN. 10, 1973...	630	--	--	JUNE 29.....	704	20	975
FEB. 21.....	661	0	--	AUG. 02.....	105	23	925
MAR. 13.....	3490	4	590	SEPT. 07.....	135	22	900
MAR. 26.....	7120	3	--				
05317000 COTTONWOOD RIVER NEAR NEW ULM, MINN.							
NOV. 02, 1972...	193	6	1130	APR. 17.....	465	9.5	--
DEC. 06.....	230	.5	--	MAY 24.....	230	19.5	1100
JAN. 10, 1973...	53	0	--	JUNE 29.....	111	21	950
FEB. 23.....	66	0	--	AUG. 02.....	33	26	800
MAR. 12.....	787	--	600	SEPT. 07.....	16	15.5	800
MAR. 27.....	698	6	--				
05320000 BLUE EARTH RIVER NEAR RAPIDAN, MINN.							
OCT. 31, 1972...	496	6.5	935	APR. 18.....	4060	9.5	--
DEC. 11.....	425	.5	--	MAY 22.....	1590	18	750
JAN. 11, 1973...	581	0	--	JULY 10.....	478	21.5	750
FEB. 23.....	325	.5	--	AUG. 01.....	191	23	600
MAR. 07.....	2980	--	--	SEPT. 06.....	70	23	660
MAR. 13.....	7000	--	--				
05320500 LE SUEUR RIVER NEAR RAPIDAN, MINN.							
NOV. 01, 1972...	330	6	890	APR. 18.....	2940	--	--
DEC. 05.....	425	5	--	MAY 23.....	804	--	--
JAN. 12, 1973...	138	0	--	JULY 09.....	243	26.5	700
FEB. 06.....	192	0	0	JULY 31.....	160	23	--
MAR. 07.....	3050	--	--	SEPT. 06.....	73	19	680
MAR. 14.....	6060	--	--				

## WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

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.							
NOV. 01, 1972...	1600	6.5	935	MAR. 27.....	13100	9	--
DEC. 20.....	1200	0	--	APR. 16.....	8810	4	--
JAN. 11, 1973...	1230	--	--	MAY 24.....	5200	18	700
FEB. 22.....	1280	0	--	JULY 09.....	1710	24.5	--
MAR. 14.....	18000	5	495	AUG. 01.....	582	23.5	790
05330000 MINNESOTA RIVER NEAR JORDAN, MINN.							
OCT. 24, 1972...	1460	6	935	APR. 13.....	7750	7	860
NOV. 28.....	2710	--	--	MAY 09.....	14900	13	--
DEC. 19.....	1560	0	--	JUNE 12.....	5880	--	--
JAN. 30, 1973...	3100	--	--	JULY 17.....	1380	--	--
FEB. 27.....	1910	0	--	AUG. 20.....	626	--	--
MAR. 09.....	8870	1	435	SEPT. 10.....	575	20	--
MAR. 15.....	16800	4	450	SEPT. 18.....	432	19	--
MAR. 21.....	20300	--	--				
05330900 NINE MILE CREEK AT BLOOMINGTON, MINN.							
OCT. 17, 1972...	7.1	6	745	MAR. 12.....	71	1	360
NOV. 20.....	9.4	5	--	APR. 13.....	14	4.5	--
DEC. 15.....	6.7	.5	--	MAY 09.....	30	--	--
JAN. 18, 1973...	24	.5	--	JUNE 07.....	10	19	--
MAR. 01.....	11	.5	--	JULY 04.....	14	--	--
05336700 KETTLE RIVER BELOW SANDSTONE, MINN.							
OCT. 16, 1972...	551	7	115	MAY 08.....	1050	12.5	78
NOV. 17.....	692	1	90	JUNE 08.....	949	--	--
DEC. 13.....	206	0	170	JULY 25.....	218	--	--
JAN. 17, 1973...	232	--	--	JULY 26.....	211	--	--
FEB. 21.....	172	0	--	AUG. 15.....	480	--	--
MAR. 16.....	4770	--	--	SEPT. 20.....	281	--	--
05338500 SNAKE RIVER NEAR PINE CITY, MINN.							
OCT. 16, 1972...	458	9.5	195	MAY 08.....	719	16	158
NOV. 20.....	558	2	190	JUNE 22.....	454	15	--
DEC. 14.....	129	0	--	JULY 25.....	185	--	--
JAN. 18, 1973...	172	--	--	AUG. 15.....	454	--	--
FEB. 22.....	168	0	275	SEPT. 20.....	162	--	--
MAR. 16.....	4650	--	--				

## MISCELLANEOUS ANALYSES OF STREAMS IN MINNESOTA

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

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.							
OCT. 17, 1972...	75	5.5	280	MAY 07.....	139	13	262
NOV. 20.....	124	3	260	JUNE 11.....	240	--	--
DEC. 14.....	57	0	325	JULY 17.....	18	--	--
JAN. 18, 1973...	59	--	--	AUG. 16.....	22	--	--
FEB. 22.....	43	0	390	SEPT. 21.....	22	--	--
MAR. 15.....	192	2	260				
05344500 MISSISSIPPI RIVER AT PRESCOTT, WIS.							
MAR. 30, 1973...	53100	--	--	SEPT. 26.....	9890	18	--
JULY 31.....	9690	22	400				
05353800 STRAIGHT RIVER NEAR FARIBAULT, MINN.							
OCT. 30, 1972...	239	6	650	APR. 20.....	1020	--	--
DEC. 04.....	111	.5	700	MAY 02.....	5280	6	360
JAN. 08, 1973...	90	--	--	MAY 21.....	335	17.5	625
JAN. 23.....	266	0	--	JUNE 25.....	125	23	500
FEB. 05.....	102	0	--	JULY 30.....	533	18.5	400
MAR. 05.....	354	0	--	SEPT. 05.....	123	18.5	740
MAR. 12.....	3670	2	288				
05373000 SOUTH FORK ZUMBRO RIVER NEAR ROCHESTER, MINN.							
OCT. 23, 1972...	488	6	510	MAR. 11.....	8280	--	--
DEC. 08.....	134	--	--	APR. 10.....	165	5.5	600
JAN. 09, 1973...	143	3	685	MAY 18.....	349	16	585
JAN. 20.....	498	1	340	JUNE 20.....	192	20.5	640
FEB. 05.....	150	7.5	675	JULY 23.....	121	23	720
MAR. 06.....	660	3	355	AUG. 27.....	353	--	--
MAR. 07.....	1930	1.5	255				
05374000 ZUMBRO RIVER AT ZUMBRO FALLS, MINN.							
OCT. 23, 1972...	293	5.5	570	APR. 20.....	2130	13.5	450
DEC. 06.....	187	--	--	MAY 02.....	20900	8	250
JAN. 15, 1973...	212	.5	575	MAY 14.....	1590	12.5	505
JAN. 20.....	2040	--	--	JUNE 20.....	287	18	570
FEB. 05.....	190	2	540	JULY 20.....	187	18.5	--
MAR. 06.....	3230	2.0	300	SEPT. 04.....	858	22	480
MAR. 12.....	13200	5	--				



## WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

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.							
NOV. 06, 1972...	63	9.5	--	APR. 11.....	40	6	--
DEC. 12.....	32	0	--	APR. 19.....	121	12	485
JAN. 12, 1973...	32	0	--	MAY 17.....	86	14	--
JAN. 19.....	176	--	--	JUNE 28.....	55	14.5	--
FEB. 08.....	34	-1	535	JULY 26.....	48	17.5	--
MAR. 05.....	236	1.5	--	AUG. 28.....	51	18	--
MAR. 11.....	1000	--	--				
05378300 STRAIGHT VALLEY CREEK NEAR ROLLINGSTONE, MINN.							
OCT. 27, 1972...	2.31	9	590	MAR. 07.....	9.82	2	305
DEC. 06.....	1.72	--	--	APR. 18.....	3.61	15.5	590
JAN. 11, 1973...	1.53	2.5	560	MAY 17.....	2.52	12.5	555
JAN. 19.....	2.36	--	--	JUNE 27.....	2.08	15.5	570
FEB. 07.....	1.24	2	565	JULY 25.....	1.98	18	575
MAR. 05.....	2.22	--	540	AUG. 03.....	2.13	15.5	590
05378500 MISSISSIPPI RIVER AT WINONA, MINN.							
MAR. 28, 1973...	92000	--	--	SEPT. 27.....	24700	17	--
MAY 16.....	68100	--	--				
05384000 ROOT RIVER NEAR LANESBORO, MINN.							
OCT. 25, 1972...	1460	4.5	410	APR. 13.....	458	6	485
DEC. 08.....	269	--	--	MAY 15.....	856	12	530
JAN. 11, 1973...	311	--	--	JUNE 21.....	645	18	430
JAN. 19.....	6180	--	--	JULY 24.....	333	21	510
FEB. 06.....	338	0	515	AUG. 29.....	318	24.5	--
MAR. 05.....	2130	1.5	240				
05384500 RUSH CREEK NEAR RUSHFORD, MINN.							
OCT. 26, 1972...	58	6.5	500	MAR. 06.....	70	5	430
DEC. 07.....	45	--	--	APR. 14.....	65	9	475
JAN. 10, 1973...	41	0	500	MAY 16.....	77	10.5	480
FEB. 07.....	40	0	500	AUG. 29.....	74	27	--

## MISCELLANEOUS ANALYSES OF STREAMS IN MINNESOTA

WATER QUALITY DATA AT STREAMFLOW STATIONS, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

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.							
OCT. 26, 1972...	1930	7	450	APR. 13.....	947	9	500
DEC. 07.....	302	--	--	MAY 16.....	1650	14	530
JAN. 12, 1973...	626	0	550	JUNE 26.....	997	21.5	540
JAN. 19.....	5120	--	--	JULY 24.....	733	23	510
FEB. 06.....	775	--	--	AUG. 10.....	1190	20.5	440
MAR. 06.....	2500	3	275	AUG. 30.....	751	24	520
MAR. 12.....	10100	--	--				
05385500 SOUTH FORK ROOT RIVER NEAR HOUSTON, MINN.							
OCT. 26, 1972...	200	6.5	500	APR. 14.....	183	7.5	485
DEC. 07.....	111	--	--	MAY 16.....	276	11.5	520
JAN. 10, 1973...	118	0	560	JUNE 26.....	197	17	535
JAN. 12.....	510	0	220	JULY 24.....	173	22	515
FEB. 07.....	161	0	490	AUG. 30.....	173	22	505
MAR. 06.....	186	5.5	470				
05457000 CEDAR RIVER NEAR AUSTIN, MINN.							
OCT. 30, 1972...	214	7	765	MAR. 12.....	3580	1	--
DEC. 04.....	134	1.5	790	APR. 19.....	745	--	--
JAN. 08, 1973...	121	--	--	MAY 21.....	265	20.5	600
JAN. 19.....	1300	.5	--	JUNE 27.....	254	21.5	550
FEB. 05.....	127	.1	--	JULY 30.....	175	24.5	580
MAR. 06.....	1720	--	--	SEPT. 05.....	128	23	670
05476000 WEST FORK DES MOINES RIVER AT JACKSON, MINN.							
OCT. 26, 1972...	51	--	--	APR. 04.....	910	6	725
NOV. 21.....	258	1	--	APR. 25.....	641	11	1000
JAN. 08, 1973...	28	0	1300	MAY 24.....	257	19.5	950
JAN. 19.....	197	0	420	JULY 03.....	96	24	840
FEB. 15.....	89	0	850	AUG. 01.....	42	23.5	810
MAR. 07.....	504	2	460	SEPT. 05.....	2.8	23	725
MAR. 13.....	1170	0	440				



LAT- I- TUDE	LONG- I- TUDE	SEQ. NO.	LOCAL IDENT- I- FIER	DATE OF SAMPLE	TEMPER- ATURE (DEG C)	COLOR (PLAT- INUM- COBALT UNITS)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	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-FT)
ANOKA										
45 07 08	093 14 03	01	30,24,1ABD SPRING L. PK.	73-06-19	10,5	20	456	282	275	.38
45 12 22	093 14 08	01	31,23,5 BDD JOHNSVILLE	73-06-19	12,0	5	207	135	133	.18
BECKER										
46 45 55	095 54 56	01	138,41,18CAC82 PT1-PW	72-11-17	7,0	5	712	414	397	.56
46 47 22	095 54 23	00	138,41,7AAB82 PT2-PW	72-12-18	7,0	2	507	314	309	.43
CHIPPEWA										
45 04 42	095 49 01	00	MINN.	73-09-26	8,5	2	1690	1350	1260	1.84
DAKOTA										
44 31 34	093 01 06	01	112,18,8 B8C RANDOLPH	73-06-21	10,0	0	339	210	199	.29
44 36 03	092 55 40	01	113,18,13 B8B H PEINE SR	73-06-20	11,0	0	596	389	352	.53
44 42 20	093 03 50	01	114,19,4 DDA ROSEMOUNT	73-06-20	10,0	20	507	304	297	.41
DOUGLAS										
45 47 30	095 17 53	00	127,37,23DDA BONDGEROTH	72-10-26	7,9	--	2320	--	1730	2.35
45 53 52	095 21 36	10	128,37,17 B8B DAVE MYLI	72-10-26	11,0	20	601	328	329	.45
45 59 20	095 16 31	00	129,37,23-DDA RAY BEILKE	72-10-26	7,5	5	1100	684	686	.93
46 02 57	095 13 13	00	SPRING 130,36,21CDD	73-09-19	12,0	2	580	328	351	.45
HOUSTON										
43 45 24	091 34 08	01	103,6,4 B8C WELL NO. 1	73-06-22	11,0	3	704	480	425	.65
KITTSOON										
48 46 06	096 56 52	01	161 49 138CD HALLOCK, MN	72-10-03	12,0	--	41700	--	25900	35,2
MORRISON										
45 55 45	094 09 50	00	40N31W26DCA	73-07-18	11,0	1	268	206	180	.28
OTTER TAIL										
46 06 00	095 13 17	00	130,36,4C88	73-09-17	12,0	1	389	248	222	.34
46 08 38	095 15 00	00	131,36,20BCC	73-09-13	10,0	2	509	311	294	.42
46 29 57	095 22 18	00	131,37,8CCD	73-09-18	8,5	4	315	198	173	.27
46 11 54	095 12 31	10	132,36,34CBC WOODSIDE TH	72-10-27	10,5	5	467	294	267	.40
46 14 44	095 15 02	00	132,36,18DAA	73-09-18	9,5	3	516	342	311	.47
46 14 46	095 21 03	00	133,36,338888	73-09-18	14,0	2	487	299	291	.41
46 17 49	095 13 47	00	133,36,33 8888	73-09-12	10,0	2	629	367	360	.50
46 19 34	095 16 45	00	133,36,18CCCC	73-09-12	11,0	4	569	341	332	.46
46 26 22	095 10 55	00	134,36,02DCC M JOHNSON	73-07-17	9,0	2	580	322	321	.44
RAMSEY										
44 56 48	093 05 34	02	282206ABD2	73-06-18	11,0	5	637	374	369	.51
44 59 47	093 05 13	02	29,22,18DAD2 ST.P.	73-06-18	11,0	10	510	320	288	.44
SCOTT										
44 46 50	093 33 53	01	115,23,10 DAD BONNEV T C	73-06-21	--	2	616	396	351	.54
STEARNS										
45 24 20	094 30 59	01	122,31,1 BDD SCHKEIFELS	73-06-27	--	--	5770	4400	3550	5.98
SWIFT										
45 12 01	095 59 04	00	120,43,13DAC R BROWN	73-08-02	--	5	532	345	334	--
45 12 39	096 02 58	00	120,43,16ACB	73-09-13	9,0	1	622	397	400	.54
45 13 44	096 00 51	00	120,43,02BBD MINN FARMS	73-07-12	10,0	4	847	497	447	.68
45 14 09	096 02 10	00	120,43,38BD J CAIRNS #1	73-07-31	--	2	843	596	--	--
45 15 01	095 59 16	00	121,42,31BCA J. CAIRNS	73-07-12	8,0	5	800	531	525	.72
45 15 53	095 57 28	00	121,42,29AAC R BOELSON	73-07-13	8,0	4	570	366	352	.50
45 17 50	095 57 47	00	121,42,17ABB WELL A32	73-08-01	8,0	1	664	451	432	.61
45 21 05	095 58 03	00	122,42,29BAC	73-09-13	8,5	2	892	639	612	.87

DATE OF SAMPLE	PM (UNITS)	ALKA- LITY AS CaCO <sub>3</sub> (MG/L)	CAR- BONATE (CO <sub>3</sub> ) (MG/L)	BICAR- BONATE (HCO <sub>3</sub> ) (MG/L)	CARBON DIOXIDE (CO <sub>2</sub> ) (MG/L)	DIS- SOLVED CHLO- RIDE (CL) (MG/L)	DIS- SOLVED SULFATE (SO <sub>4</sub> ) (MG/L)	DIS- SOLVED FLUO- RIDE (F) (MG/L)	DIS- SOLVED CAL- CIUM (CA) (MG/L)	DIS- SOLVED MAG- NE- SIUM (MG)	DIS- SOLVED SODIUM (NA) (MG/L)	DIS- SOLVED PO- TAS- SIUM (K) (MG/L)
ANOKA												
73-06-19	7.5	262	0	319	16	1.2	2.7	.1	69	17	4.7	1.4
73-06-19	7.9	112	0	137	268	.9	6.6	.3	29	5.5	7.0	1.0
BECKER												
72-11-17	7.0	356	0	434	69	2.4	19	.2	38	37	2.7	2.8
72-12-18	7.2	254	0	310	31	1.9	16	.2	70	26	2.0	2.3
CHIPPEWA												
73-09-26	7.1	355	0	433	55	6.3	640	.4	260	84	22	6.4
DAKOTA												
73-06-21	7.8	157	0	192	4.9	1.6	29	.2	40	19	2.5	.9
73-06-20	7.5	238	0	290	15	20	37	.3	72	30	5.4	.6
73-06-20	7.6	267	0	326	13	1.5	21	.3	69	25	3.8	1.6
DOUGLAS												
72-10-26	7.4	347	0	423	27	98	540	.3	240	64	230	15
72-10-26	7.4	322	0	362	25	4.0	9.1	.4	75	33	3.6	2.0
72-10-26	7.3	344	0	419	34	52	31	.3	130	48	20	3.7
73-09-19	7.6	340	0	414	10	1.0	2.5	.0	84	.2	6.8	1.9
HOUSTON												
73-06-22	7.2	215	0	262	26	85	47	.3	68	27	49	4.0
KITTSOON												
72-10-03	8.1	54	--	66	68	15000	1500	.8	2700	940	5400	200
MORRISON												
73-07-18	6.5	53	0	65	33	13	13	.2	29	8.2	6.6	2.3
OTTER TAIL												
73-09-17	7.8	167	0	204	5.2	3.1	25	.1	49	19	2.3	2.0
73-09-13	7.7	212	0	258	8.2	11	11	.1	70	22	1.7	1.2
73-09-18	9.1	139	18	133	12	3.1	30	.0	8.7	29	7.0	4.6
72-10-27	7.9	234	0	285	.4	1.9	9.4	.1	66	20	1.4	2.2
73-09-18	8.2	258	0	315	3.2	4.1	34	.1	74	19	5.4	3.3
73-09-18	8.1	210	0	256	3.3	4.1	16	.1	65	21	2.8	2.1
73-09-12	7.5	266	0	324	16	12	12	.1	89	26	3.3	1.3
73-09-12	7.4	310	0	378	24	2.6	3.6	.2	84	23	3.5	1.6
73-07-17	7.5	299	0	255	13	15	19	.2	76	22	2.9	1.3
RAMSEY												
73-06-18	7.0	264	0	322	52	20	54	.4	77	29	10	2.6
73-06-18	7.5	279	0	340	17	2.3	3.8	.3	66	25	3.8	1.8
SCOTT												
73-06-21	7.2	313	0	381	38	1.6	23	.4	76	31	7.6	8.3
STEARNS												
73-06-27	7.1	65	0	80	10	1600	670	.5	430	180	580	26
SWIFT												
73-08-02	7.7	233	0	284	9.1	3.4	55	.2	75	23	3.6	1.9
73-09-13	7.4	255	0	311	20	9.5	78	.1	91	27	4.3	1.7
73-07-12	7.4	102	0	124	7.9	7.8	130	.3	85	33	11	3.0
73-07-31	--	--	--	--	--	4.7	180	.2	110	40	17	5.0
73-07-12	7.4	283	0	345	22	4.3	160	.2	110	37	10	3.6
73-07-13	7.6	222	0	271	11	5.7	70	.2	77	26	2.3	2.2
73-08-01	7.5	237	0	289	15	2.7	130	.2	82	32	11	2.7
73-09-13	7.4	230	0	281	18	3.4	250	.1	110	43	28	3.9

## MISCELLANEOUS ANALYSES OF GROUND WATER IN MINNESOTA

DATE OF SAMPLE	HARD- NESS (CA, MG) (MG/L)	NON- CAR- BONATE HARD- NESS (MG/L)	SODIUM AD- SORP- TION RATIO	PERCENT SODIUM	DIS- SOLVED IRON (FE) (UG/L)	DIS- SOLVED MAN- GANESE (MN) (UG/L)	DIS- SOLVED BORON (B) (UG/L)	DIS- SOLVED SILICA (SIO2) (MG/L)	TOTAL PHOS- PHORUS (P) (MG/L)	DIS- SOLVED NITRITE PLUS NITRATE (N) (MG/L)
ANOKA										
73-06-19	240	0	.1	4	410	810	20	20	.01	.00
73-06-19	95	0	.3	14	30	150	20	15	.08	.01
BECKER										
72-11-17	370	16	.1	2	80	60	30	26	.03	1.2
72-12-18	280	28	.1	2	20	10	30	24	.03	3.1
CHIPPEWA										
73-09-26	1000	640	.3	5	3700	350	170	28	.10	.02
DAKOTA										
73-06-21	180	21	.1	3	40	0	10	11	.01	.00
73-06-20	300	65	.1	4	9	10	0	22	.06	4.8
73-06-20	280	8	.1	3	940	80	10	13	.03	.00
DOUGLAS										
72-10-26	860	520	3.4	36	30	--	800	29	--	.22
72-10-26	320	2	.1	2	4000	200	240	5.1	.12	.01
72-10-26	520	180	.4	8	20	20	140	25	.03	27
73-09-19	210	0	.2	6	0	120	20	21	.39	.47
HOUSTON										
73-06-22	280	66	1.3	27	30	0	140	11	.04	1.0
KITTSOON										
72-10-03	11000	11000	23	52	1200	340	0	.1	.42	.16
MORRISON										
73-07-18	110	53	.3	12	30	0	0	22	.01	12
OTTER TAIL										
73-09-17	200	33	.1	2	90	60	30	9.7	.31	2.6
73-09-13	270	54	.0	1	180	30	50	20	.27	6.6
73-09-18	140	2	.3	9	30	80	10	6.4	.04	.13
72-10-27	250	13	.0	1	80	140	30	11	.02	3.4
73-09-18	270	10	.1	4	100	1100	60	12	.04	.16
73-09-18	250	39	.1	2	30	160	20	14	.07	9.0
73-09-12	330	64	.1	2	60	40	50	18	.19	8.6
73-09-12	300	0	.1	2	3800	430	50	22	.23	.25
73-07-17	280	71	.1	2	50	60	10	15	.04	9.8
RAMSEY										
73-06-18	310	48	.2	6	220	200	0	17	.01	.01
73-06-18	270	0	.1	3	560	500	0	16	.07	.01
SCOTT										
73-06-21	320	5	.2	5	20	20	340	9.2	.02	.14
STEARNS										
73-06-27	1800	1800	5.9	41	4700	430	1500	6.7	--	.00
SWIFT										
73-08-02	280	49	.1	3	400	240	20	28	.02	.81
73-09-13	340	83	.1	3	10	67	30	23	.02	2.7
73-07-12	350	250	.3	6	440	210	240	26	.02	20
73-07-31	440	--	.4	8	1200	580	110	27	.05	.81
73-07-12	430	140	.2	5	580	210	100	25	.02	.95
73-07-13	300	77	.1	2	270	250	30	26	.01	1.9
73-08-01	340	99	.3	7	800	260	80	26	.05	.45
73-09-13	450	220	.6	12	840	470	160	28	.02	1.2

LAT- I- TUDE	LONG- I- TUDE	SEQ. NO.	LOCAL IDENT- I- FIER	DATE OF SAMPLE	TEMPER- ATURE (DEG C)	COLOR (PLAT- INUM- COBALT UNIT8)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	DIS- SOLVED SOLIDS (RESID- UE AT 180 C) (MG/L)	DIS- SOLVED SOLIDS (SUM OF CONSTI- TUENTS) (MG/L)	DIS- SOLVED SOLIDS (TONS PER AC-FT)
TODD										
46 21 40	095 03 38	00	133,35,02CAB PETERSON	73-07-17	9.5	2	484	303	274	.41
WABASHA										
44 27 08	092 15 54	01	CITY OF LAKE CITY, MINN.	73-06-01	--	2	4720	2810	2570	3.82
WADENA										
46 22 22	094 59 58	00	134,34,32DCB	73-07-17	10.0	3	634	378	366	.51
46 25 33	095 05 00	00	134,35,10CDC ANDREI	73-07-18	11.0	3	597	365	345	.50
46 28 10	094 53 20	00	135,33,30DCD BLAHA	73-07-18	9.0	2	551	341	324	.46
46 30 05	094 58 30	00	135,34,16DBC MORSEGER	73-07-18	8.5	3	480	275	262	.37

LAT- I- TUDE	LONG- I- TUDE	SEQ. NO.	LOCAL IDENT- I- FIER	DATE OF SAMPLE	DIS- SOLVED ARSENIC (AS) (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)
BECKER										
46 45 55	095 54 56	01	138,41,18CACB2 PT1-PW	72-11-17	0	2	0	1	10	2
46 47 22	095 54 23	00	138,41,7AAB2 PT2-PW	72-12-18	3	0	0	0	4	0
HOUSTON										
43 45 24	091 34 08	01	103,6,4 BBC WELL NO. 1	73-06-22	1	0	0	0	10	4
KITTSO										
48 46 06	096 56 52	01	161 49 13BCD HALLOCK, MN	72-10-03	60	2	0	2	150	180
STEARNS										
45 24 20	094 30 59	01	122,31,1 BDD SCHKEIFELS	73-06-27	0	1	0	0	20	50
SWIFT										
45 12 39	096 02 58	00	120,43,16ACB	73-09-13	30	--	--	--	--	--
WABASHA										
44 27 08	092 15 54	01	CITY OF LAKE CITY, MINN	73-06-01	2	1	0	0	24	3

## MISCELLANEOUS ANALYSES OF GROUND WATER IN MINNESOTA

DATE OF SAMPLE	PH  (UNITS)	ALKA- LITY AS CACO <sub>3</sub> (MG/L)	CAR- BONATE (CO <sub>3</sub> ) (MG/L)	BICAR- SONATE (HCO <sub>3</sub> ) (MG/L)	CARBON DIOXIDE (CO <sub>2</sub> ) (MG/L)	DIS- SOLVED CHLO- RIDE (CL) (MG/L)	DIS- SOLVED SULFATE (SO <sub>4</sub> ) (MG/L)	DIS- SOLVED FLUO- RIDE (F) (MG/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)
TODD												
73-07-17	7.4	237	0	289	18	7.6	9.7	.1	73	19	1.9	1.4
WABASHA												
73-06-01	7.6	268	0	327	13	1300	120	.4	170	75	710	22
WADENA												
73-07-17	7.2	239	0	291	29	27	27	.2	86	25	4.2	2.0
73-07-18	7.3	281	0	343	28	12	30	.1	94	21	5.4	.8
73-07-18	7.5	189	0	230	12	16	12	.1	76	20	2.7	1.0
73-07-18	7.4	252	0	307	20	2.6	11	.2	71	20	5.3	1.4

DATE OF SAMPLE	DIS- SOLVED LITHIUM (LI) (UG/L) BECKER	DIS- SOLVED MOLYB- DENUM (MO) (UG/L)	DIS- SOLVED NICKEL (NI) (UG/L)	DIS- SOLVED SELE- NIUM (SE) (UG/L)	DIS- SOLVED STRON- TIUM (SR) (UG/L)	DIS- SOLVED VANA- DIUM (V) (UG/L)	DIS- SOLVED ZINC (ZN) (UG/L)	TOTAL IRON (FE) (UG/L)	DENSITY (GM/ML AT 20 C)
72-11-17	10	2	7	1	180	.4	30	--	--
72-12-18	0	0	1	1	80	.3	10	--	--
HOUSTON									
73-06-22	10	0	11	1	280	.4	20	--	--
KITTSOON									
72-10-03	1400	6	8	0	60000	200	18000	12000	1.014
STEARNS									
73-06-27	10	21	37	4	12000	39	840	--	--
SWIFT									
73-09-13	--	--	--	--	--	--	--	--	--
WABASHA									
73-06-01	180	0	2	2	4600	16	30	--	--



DATE OF SAMPLE	HARD- NESS (CA, MG) (MG/L)	NON- CAR- SONATE HARD- NESS (MG/L)	SODIUM AD- SORP- TION RATIO	PERCENT SODIUM	DIS- SOLVED IRON (FE) (UG/L)	DIS- SOLVED MAN- GANESE (MN) (UG/L)	DIS- SOLVED BORON (B) (UG/L)	DIS- SOLVED SILICA (SIO2) (MG/L)	TOTAL PHOS- PHORUS (P) (MG/L)	DIS- SOLVED NITRITE PLUS NITRATE (N) (MG/L)
TODD										
73-07-17	240	23	.1	2	40	0	40	12	.02	1.6
WABASHA										
73-06-01	740	470	11	67	620	70	140	8.7	.00	.00
WADENA										
73-07-17	320	79	.1	3	660	490	40	13	.01	8.3
73-07-18	320	40	.1	4	140	470	0	12	.07	.05
73-07-18	270	83	.1	2	20	0	40	16	.01	15
73-07-18	260	8	.1	4	920	160	20	17	.06	.18



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