

CALENDAR FOR WATER YEAR 2003

2002

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

2003

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

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

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

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Water Resources Data Minnesota Water Year 2003

By G.B. Mitton, K.G. Guttormson, G.W. Stratton, and E.S. Wakeman

Water-Data Report MN-03-1



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

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U.S. Geological Survey**

U.S. Department of the Interior

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Mounds View, Minnesota, 2004

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Water-Data Report MN-03-1

Preface

This volume of the annual hydrologic report of Minnesota is one of a series of annual reports that documents hydrologic data gathered from the U.S. Geological Survey's surface- and ground-water data-collection networks in each state, Puerto Rico, and the Trust Territories. These records of streamflow, ground-water levels, and water quality provide the hydrologic information needed by state, local, and Federal agencies, and the private sector for developing and managing our Nation's land and water resources. Hydrologic data for Minnesota, including four major basins; Great Lakes, Souris-Red Rainy River, Upper Mississippi River, and Missouri River, are contained in this volume.

This report is the culmination of a concerted effort by dedicated personnel of the U.S. Geological Survey who collected, compiled, analyzed, verified, and organized the data, and who typed, edited, and assembled the report. The authors had primary responsibility for assuring that the information contained herein is accurate, complete, and adheres to U.S. Geological Survey policy and established guidelines.

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Note.--Data for partial-record stations and miscellaneous sites for both surface-water quantity and quality are published in separate sections of the data report. See references at the end of this list for page numbers for these sections.

[Letters after station name designates type of data: (d) discharge; (e) gage height, elevation, or contents; (c) chemical, radio-chemical, or pesticides; (b) biological or micro-biological; (p) physical (water temperature, sediment, or specific conductance)]

ST. LAWRENCE RIVER BASIN

	<u>Station Number</u>	<u>Page</u>
<u>STREAMS TRIBUTARY TO LAKE SUPERIOR</u>		
Pigeon River at Middle Falls, near Grand Portage	(d - - - -) 04010500	34
Hollow Rock Creek near Red Rock	(d - - - -) 04010520	36
Reservation River near Grand Portage	(d - - - -) 04010528	38
Knife River near Two Harbors	(d - - - -) 04015330	40
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HUDSON BAY BASIN

STREAMS TRIBUTARY TO LAKE WINNIPEG (head of Nelson River):

RED RIVER OF THE NORTH BASIN

Otter Tail River (head of Red River of the North):		
Otter Tail River near Elizabeth	(d - - - -) 05030500	44
Otter Tail River below Orwell Dam, near Fergus Falls.....	(d - - - -) 05046000	46
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Mud Lake above White Rock Dam near White Rock, SD.....	(- e - - -) 05049995	48
Bois de Sioux River near White Rock, SD	(d - - - -) 05050000	50
Bois de Sioux River near Doran	(d - - - -) 05051300	52
Red River of the North at Wahpeton, ND.....	(d - - - -) 05051500	54
Red River of the North at Hickson, ND.....	(d - - - -) 05051522	56
Red River of the North at Fargo, ND.....	(d - - - -) 05054000	58
Buffalo River near Hawley	(d - - - -) 05061000	60
South Branch Buffalo River at Sabin	(d - - - -) 05061500	62
Buffalo River near Dilworth	(d - - - -) 05062000	64
Wild Rice River at Twin Valley.....	(d - - - -) 05062500	66
Wild Rice River at Hendrum.....	(d - - - -) 05064000	68
Red River of the North at Halstad, ND.....	(d - - - -) 05-64500	70
Marsh River near Shelly	(d - - - -) 05067500	72
Sand Hill River at Climax	(d - - - -) 05069000	74
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Upper Red Lake at Waskish.....	(- e - - -) 05073500	76
Lower Red Lake at Battle River mouth near Saum	(- e - - -) 05073650	78
Lower Red Lake near Red Lake.....	(- e - - -) 05074000	80
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Thief River near Thief River Falls	(d - - - -) 05076000	84
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Lost River at Oklee	(d - - - -) 05078230	88
Clearwater River:		
Lower Badger Creek:		
Judicial Ditch 64 near Mentor	(d - - - -) 05078470	90
Clearwater River at Red Lake Falls.....	(d - - - -) 05078500	92
Red Lake River:		
Cyr Creek near Marcoux Corners	(d - - - -) 05078520	94
Gentilly River:		
County Ditch 140 near Benoit	(d - - - -) 05078730	96
Kripple Creek:		
Judicial Ditch 66 near Marcoux Corners.....	(d - - - -) 05078770	98
Red Lake River at Crookston	(d - - - -) 05079000	100

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County Ditch 65 near Maple Bay.....	(d - - -)	05079250	104
Red Lake River at Fisher.....	(d - - -)	05080000	106
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Snake River:			
Middle River at Argyle.....	(d - - -)	05087500	110
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South Branch Two Rivers at Lake Bronson.....	(d - - -)	05094000	114
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Sprague Creek near Sprague, Manitoba.....	(d - - -)	05106000	118
Roseau River at Ross.....	(d - - -)	05107500	120
Roseau River below State Ditch 51, near Caribou.....	(d - - -)	05112000	122
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Basswood River:			
Kawishiwi River near Ely.....	(d - - -)	05124480	124
South Kawishiwi River near Ely.....	(d - - -)	05125000	126
South Kawishiwi River abv White Iron Lake near Ely.....	(d - - -)	05126210	128
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Vermilion River near Crane Lake.....	(d - - -)	05129115	136
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Rainy River:			
Little Fork River:			
Sturgeon River near Chisholm.....	(d - - -)	05130500	142
Nett Lake River:			
Wood Duck Creek near Nett Lake.....	(d - - -)	05131448	144
Nett Lake at Nett Lake.....	(- e - -)	05131450	146
Nett Lake River near Nett Lake.....	(d - - -)	05131455	148
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Straight River near Park Rapids.....	(d - - -)	05243725	170
Crow Wing River at Nimrod.....	(d - - -)	05244000	172
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Mille Lacs Lake (head of Rum River) at Cove Bay near Onamia ...(- e - - -).....		05284000	188
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Whetstone River near Big Stone City, SD	(d - - -)	05291000	204
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Watonwan River near Garden City	(d - - -)	05319500	236
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Little Cobb River near Beauford	(d - c - p)	05320270	240
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High Island Creek near Henderson	(d - - -)	05327000	254
Minnesota River near Jordan	(d - - -)	05330000	256
<u>UPPER MISSISSIPPI RIVER MAIN STEM</u>			
Mississippi River at St. Paul	(d - - -)	05331000	258
Mississippi River below Lock and Dam 2, at Hastings	(d - c - p)	05331580	260
<u>ST. CROIX RIVER BASIN</u>			
St. Croix River:			
Kettle River below Sandstone	(d - - -)	05336700	266
Snake River near Pine City	(d - - -)	05338500	268
St. Croix River at St. Croix Falls, WI.....	(d - - -)	05340500	270
<u>UPPER MISSISSIPPI RIVER MAIN STEM</u>			
Mississippi River at Prescott, WI.....	(d - - -)	05344500	272
Sturgeon Lake, West Side, at Prairie Island.....	(- e - -)	05344850	274
Vermillion River near Empire.....	(d - - -)	05345000	276
Clear Lake, East Side, at Prairie Island	(- e - -)	05346050	278
Cannon River:			
Straight River near Faribault	(d - - -)	05353800	280
Cannon River at Welch	(d - - -)	05355200	282

x SURFACE-WATER STATIONS, IN DOWNSTREAM ORDER, FOR WHICH RECORDS ARE PUBLISHED--Continued

Zumbro River:
 South Fork Zumbro River at Rochester(d - - -)05372995284
 Mississippi River at Winona.....(d - - -)05378500286
 Root River near Pilot Mound(d - - -)05383950288
 Iowa River:
 Cedar River near Austin(d - - -)05457000290
 Des Moines River at Jackson(d - - -)05476000292

GROUND-WATER WELLS, BY COUNTY, FOR WHICH RECORDS ARE PUBLISHED IN THIS VOLUME

GROUND-WATER LEVELS

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BELTRAMI	
Well 473423095053301 Local number 147N35W02CDCBDD.....	330
ITASCA	
Well 474921093144001 Local number 062N23W26CDC	331
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DISCONTINUED SURFACE-WATER DISCHARGE OR STAGE ONLY STATIONS

The following continuous-record surface-water discharge or stage-only stations (gaging stations) in Minnesota have been discontinued. Daily streamflow or stage records were collected and published for the period of record, expressed in water years, shown for each station. Those stations with an asterisk (*) after the station number are currently operated as crest-stage partial-record stations. Discontinued project stations with less than 3 years of record have not been included. Information regarding these stations may be obtained from the District Office at the address given on the back side of the title page of this report.

[Letters after station name designate type of data collected: (d) discharge, (e) elevation (stage only)].

Station name	Station number	Drainage area (mi ²)	Period of record
Pigeon River above mouth of Arrow River, MN (d)	04010000	256	1924-27
Loon Lake, northeast side, near Grand Portage, MN (e)	475807089483501	-	1998-2002
Cuffs Lake, east side, near Grand Portage, MN (e)	475647089443301	-	1998-2002
Poplar River at Lutsen, MN (d)	04012500	114	1911 (e), 1912-17, 1928-47, 1952-61
Cross River at Schroeder, MN (d)	04013000	91	1931-32
Baptism River near Beaver Bay, MN (d)	04014500	140	1928-93
Beaver Creek (Beaver Bay Run) at Beaver Bay, MN (d)	04015000	126	1911-14, 1928-31
South Branch Partridge River near Babbitt, MN (d)	04015455	18.5	1977-80
Partridge River above Colby Lake, at Hoyt Lakes, MN (d)	04015475	106	1979-88
Second Creek near Aurora, MN (d)	04015500	29	1955-80
Partridge River near Aurora, MN (d)	04016000	161	1942-82
St. Louis River near Aurora, MN (d)	04016500	290	1942-87
Embarrass River at Embarrass, MN (d)	04017000	93.8	1942-64
Embarrass River near McKinley, MN (d)	04018000	171	1953-62
St. Louis River at Forbes, MN (d)	04018750	713	1965-90
East Two Rivers near Iron Junction, MN (d)	04018900	40.0	1966-79
West Two Rivers near Iron Junction, MN (d)	04019000	65.3	1953-62, 1965-79
West Swan River near Silica, MN (d)	04019300	16.3	1963-79
East Swan River near Toivola, MN (d)	04019500	112	1953-62, 1964-71
Swan River near Toivola, MN (d)	04020000	254	1952-61
Whiteface River below (at) Meadowlands, MN (d)	04021000	453	1909-17
Cloquet River at Independence, MN (d)	04023000	750	1909-17
Elim Creek near Holyoke, MN (d)	04024090	1.06	1976-78
Skunk Creek below Elim Creek near Holyoke, MN (d)	04024093	8.83	1976-78
Deer Creek near Holyoke, MN (d)	04024098	7.70	1976-2002
Otter Tail River near Detroit Lakes, MN (d)	05030000	270	1937-71
Pelican River at Detroit Lakes, MN (d)	05033900	-	1968-71
Pelican River at Detroit Lk. out. nr. Detroit Lakes, MN (d)	05034100	-	1968-71, 1974-75
Long Lake outlet near Detroit Lakes, MN (d)	05035100	-	1968-71
West Branch Cty. Ditch No. 14 nr. Detroit Lakes, MN (d)	05035200	-	1968-71
East Branch County Ditch No. 14 nr. Detroit Lakes, MN (d)	05035300	-	1968-71
St. Clair Lake outlet near Detroit Lakes, MN (d)	05035500	-	1968-75
Pelican River at Muskrat Lk outlt nr Detroit Lakes, MN (d)	05035600	-	1968-75
Pelican River at Sallie Lk outlet nr Detroit Lakes, MN (d)	05037100	-	1968-75
Pelican River at Lake Melissa olt nr Detroit Lakes, MN (d)	05039100	-	1968-75
Pelican River near Detroit Lakes, MN (d)	05040000	123	1942-53
Pelican River near Fergus Falls, MN (d)	05040500	482	1909-12
Otter Tail River near Breckenridge, MN (d)	05046500	2,040	1931-32, 1939-46
Mustinka River (head of Bois de Sioux River) nr Norcross, MN (d)	05047000	-	1940-47
Mustinka Ditch above West Branch Mustinka River (Twelve Mile Creek) near Charlesville, MN (d)	05047500	-	1943-55
Mustinka Ditch below West Branch Mustinka River (Twelve Mile Creek) near Charlesville, MN (d)	05048000	-	1943-55
W. Branch Mustinka River (Twelve Mile Creek) below Mustinka Ditch near Charlesville, MN (d)	05048500	-	1943-55
Mustinka River above Wheaton, MN (d)	05049000	834	1915-24, 1930-58
Bois de Sioux River below Fairmont, ND (d)	05050500	1,540	1919-44
Rabbit River at Campbell, MN (d)	05051000	266	1942-52
Red River of the North below Fargo, ND (d)	05054020	-	1969-78
Whiskey Creek at Barnesville, MN (d)	05061200*	25.3	1964-66
Wild Rice River near Ada, MN (d)	05063000	1,100	1948-54
South Branch Wild Rice River near Borup, MN (d)	05063500	254	1944-49
Marsh River below Ada, MN (d)	05067000	-	1948-52
Sand Hill River at Beltrami, MN (d)	05068000	324	1943-58
Sand Hill Ditch at Beltrami, MN (d)	05068500	-	1943-58

DISCONTINUED SURFACE-WATER DISCHARGE OR STAGE-ONLY STATIONS--Continued

Station name	Station number	Drainage area (mi ²)	Period of record
Red Lake River at High Landing, near Goodridge (d)	05075000	2,300	1929-2000
Thief River near Gatske, MN (d)	05075500	-	1953-56
Red Lake River at Thief River Falls, MN (d)	05076500	3,450	1909-18, 1920-30
Clearwater River near Pinewood, MN (d)	05077000	132	1940-45
Clearwater River near Leonard, MN (d)	05077500	153	1934-47
Ruffy Brook near Gonvick, MN (d)	05077700*	45.2	1960-78
Red River of the North at Oslo, MN (d)	05083500	31,200	1936-37, 1941-43, 1945-60, 1973-78
Snake River at Warren, MN (d)	05085500	-	1945, 1953-56
Snake River above Alvarado, MN (d)	05085900	218	1993-96
Snake River at Alvarado, MN (d)	05086000	220	1945, 1953-56
Middle River near Strandquist, MN (d)	05087000	-	1953-56
Tamarac River near Strandquist, MN (d)	05090500	-	1953-56
Tamarac River near Stephen, MN (d)	05091500	320	1945
Two Rivers (Middle Fork Two Rivers) nr Hallock, MN (d)	05092500	131	1931-38
South Branch (South Fork) Two Rivers near Pelan, MN (d)	05093000	281	1928-38, 1953-56
South Branch Two Rivers (Two Rivers) at Hallock, MN (d)	05094500	-	1940-47
Two Rivers (South Branch Two Rivers) at Hallock, MN (d)	05095000	-	1911-14, 1929-30, 1938-39, 1941-43
Two Rivers below Hallock, MN (d)	05095500	644	1945-55
North Branch (North Fk) Two Rivers nr Lancaster, MN (d)	05096000	32	1929-38, 1941-55 1953-55
State Ditch 85 near Lancaster, MN (d)	05096500	95	1929-38, 1942-55
North Branch Two Rivers at Lancaster, MN (d)	05096500	209	1941-42, 1953-56
North Branch Two Rivers near Northcote, MN (d)	05097500	386	1941-42, 1945-51
Two Rivers below North Branch near Hallock, MN (d)	05098000	1,060	1941-43
Roseau River (at) near Malung, MN (d)	05103000	252	1928-46
South Fork (W. Branch) Roseau River nr Malung, MN (d)	05104000	312	1911-14, 1928-46
Roseau River at Roseau, MN (d)	05105000	-	1940-47
Roseau River near Roseau, MN (d)	05105500	-	1930-60
Pine Creek near Pine Creek, MN (d)	05107000	74.6	1928-53
Roseau River at Roseau Lake, MN (e)	05106500	-	1939-91
Roseau River near Badger, MN (d)	05108000	-	1928-69
Roseau River near Duxby, MN (d)	05108500	-	1929-51, 1952-56
Badger Creek near Badger, MN (d)	05109000	2.2	1929-30, 1931-38
Roseau River near Haug, MN (d)	05109500	-	1932-66
Roseau River at otl of State Ditch 69 nr Oak Point, MN (d)	05110000	-	1939-42
Roseau R. at head of State Ditch 51 nr Oak Point, MN (d)	05110500	-	1933-42
Roseau River at Oak Point, MN (d)	05111000	-	1933-39, 1941-60
Roseau River at international boundary, nr Caribou, MN (d)	05112500	1,590	1933-69
Shagawa Lake tributary at Ely, MN (d)	05127219	1.84	1971-78
Burgo Creek near Ely, MN (d)	05127220	3.04	1967-78
Shagawa River near Ely, MN (d)	05127230	99	1967-78
Vermilion Lake near Soudan, MN (e)	05128200	-	1913-15, 1941-42, 1946-87
Pike River near Biwabik, MN (d)	05128340	-	1977-79
Pike River near Embarrass, MN (d)	05128500	115	1953-64, 1976-79
Rainy River at International Falls, MN (d)	05129500	14,900	1905-60
Sturgeon River (Lake) at Side Lake, MN (d)	05130000	-	1938-47
Dark River near Chisholm, MN (d)	05131000	50.6	1942-61, 1965-79
Deer Lake outlet (Deer Lake) near Effie, MN (d)	05131800	-	1937-39, 1940-46 1982-93
Rapid River near Baudette, MN (d)	05134200	543	1956-85
Warroad River near Warroad, MN (d)	05139500	162	1946-80
Bulldog Run near Warroad, MN (d)	05140000	14.2	1946-51, 1966-77
East Branch Warroad River nr Warroad, MN (d)	05140500	102	1946-54, 1966-77
Mississippi River near Bemidji, MN (d)	05200510	610	1987-2002
Williams lake near Akeley, MN (e) (data stored under station number 465724094402601)	05202000	0.88	1988-96.
Mississippi River near Deer River, MN (d)	05210000	3,190	1945-50
Prairie River near Grand Rapids, MN (d)	05213000	485	1909 (e), 1925-49
O'Brien Creek near Pengilly, MN (d)	05216800	-	1963-68
Initial tailings basin outflow near Keewatin, MN (d)	05216820	2.5	1982-85
Swan River near Calumet, MN (d)	05216850	114	1964-90

DISCONTINUED SURFACE-WATER DISCHARGE OR STAGE ONLY STATIONS--Continued

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Station name	Station number	Drainage area (mi ²)	Period of record
Swan River near Warba, MN (d)	05217000	254	1954-69
Mississippi River above Sandy River near Libby, MN (d)	05218000	4,560	1895-1915, 1925-29
Mississippi River below Sandy River near Libby, MN (d)	05220500	5,060	1930-90
Pelican Brook (Long Lake) near Pequot Lakes, MN (d)	05232000	-	1938-42, 1943-47
Rabbit River near Crosby, MN (d)	05241500	8.38	1945-63
Little Sand Lake outlet (Sand Lake outlet) nr Dorset, MN (d)	05242700	74	1930-41
Straight River at County Highway 125 near Osage, MN (d)	05243721	-	1986-91
Straight River at Cty. Hwy. 115 near Park Rapids, MN (d)	05243723	-	1986-89
Crow Wing River at Motley, MN (d)	05244500	2,140	1909 (e), 1913-17 1930-31
Diversion from Long Prairie River near Osakis, MN (d)	05244980	-	1939-47
Long Prairie River near Osakis, MN (d)	05245000	-	1949-54
Long Prairie near Motley	05245500	973	1909-17, 1930-31
Crow Wing River at Pillager, MN (d)	05246000	-	1909-13, 1925-50
Mississippi River near Ft. Ripley, MN (d)	05261000	11,010	1987-2000
Platte (Platt) River at Pillager, MN (d)	05268000*	338	1929-36
Mississippi River near Sauk Rapids, MN (d)	05269000	12,400	1903-06
Mississippi River at Sartell, MN (d)	05270000	12,450	1929, 1943-47(e)
Clearwater River at Clearwater, MN (d)	05273500	-	1937, 1940-42
St. Francis River at Santiago, MN (d)	05274700	-	1965-70, 1980-81
St. Francis River above Zimmerman, MN (d)	05274750	-	1980-84
St. Francis River near Big Lake, MN (d)	05274900	-	1965-70
Mississippi River at Elk River, MN (d)	05275500	14,500	1915-56
North Fork Crow River near Regal, MN (d)	05276000	215	1943-54
North Fork Crow River above Paynesville, MN (d)	05276005	232	1996-98
Middle Fork Crow River at New London, MN (e)	05277000	-	1939-42, 1943-47
Middle Fork Crow River (Calhoun Lk Diversion) nr Spicer, MN (e)	05277500	-	1939, 1940-46
Middle Fork Crow River near Spicer, MN (d)	05278000	179	1949-87
South Fork Crow River at Cosmos, MN (d)	05278500	221	1945-64
Buffalo Creek near Glencoe, MN (d)	05278930*	374	1972-80
South Fork Crow River near Mayer, MN (d)	05279000	1,170	1934-79
South Fork Crow River near Rockford, MN (d)	05279500	1,250	1909-12
Mississippi River at Anoka, MN (d)	05283500	17,100	1897, 1905-13
Rum River at Onamia, MN (d)	05284500	414	1910-12
Rum River at Spencer Brook, MN (d)	05284750	-	1960-64
Rum River at Cambridge, MN (d)	05285000	1,160	1909-14
Rum River near Anoka, MN (d)	05286500	1,430	1905-06, 1909
Minnetonka Lake (head of Minnehaha Creek) near Wayzata (at Excelsior), MN (d)	05289000	-	1938-64
Minnehaha Creek at Minnetonka Mills, MN (d)	05289500	130	1953-64
Little Minnesota River near Peever, SD (d)	05290000	438	1939-81, 90-2002
Big Stone Lake near Big Stone City, SD (formerly Big Stone Lake at Ortonville, MN (e)	05291500	-	1937-93
Minnesota River near Odessa, MN (d)	05292500	1,340	1909-12, 1944-63
Pomme de Terre River near Morris, MN (d)	05293500	-	1937-39, 1940-47
Pomme de Terre River at Appleton, MN (d)	05294000	864	1931-99
Canby Creek at Canby, MN (d)	05299500	-	1938-39, 1940-46
Chippewa River at diversion dam near Hancock, MN (d)	05303000	-	1930-39, 1940-46
Chippewa River at Benson, MN (d)	05303500	1,270	1949-51
Shakopee Creek near Benson, MN (d)	05304000	352	1949-54
Chippewa River near Watson, MN (d)	05305000	2,050	1910-17, 1931-36
South Branch Yellow Medicine River at Minneota, MN (d)	05311400	111	1960-81, 1983-87
Spring Creek near Hazel Run, MN (d)	05312500	101	1945-48
Chetomba Creek near Maynard, MN (d)	05314000	200	1949-51
Hawk Creek near Maynard, MN (d)	05314500*	474	1949-54
Prairie Ravine near Marshall, MN (d)	05315200	5.63	1959-64
Redwood River near Green Valley, MN (d)	05315500	436	1947-57
Minnesota River at New Ulm, MN (d)	05316770	9,536	1968-76
Dry Creek near Jeffers, MN (d)	05316900	3.13	1982-85
Minnesota River at Judson, MN (d)	05317500	11,200	1938-50
East Branch (East Fork) Blue Earth River near Bricelyn, MN (d)	05318000	132	1951-70
South Fork Watonwan River at diversion dam near St. James, MN (d)	05319000	-	1939, 1940-46
Blue Earth River at Mankato, MN (d)	05321000	3,550	1938-39, 1940-42
Sand Creek at diversion dam near Jordan, MN (d)	05330400	-	1938-39, 1940-46
Purgatory Creek at Eden Prairie, MN (d)	05330800	-	1975-80

DISCONTINUED SURFACE-WATER DISCHARGE OR STAGE-ONLY STATIONS--Continued

Station name	Station number	Drainage area (mi ²)	Period of record
Nine Mile Creek at Bloomington, MN (d)	05330900	-	1963-73
Glaisby Brook near Kettle River, MN (d)	05336200*	24.2	1959-70
Kettle River near Sandstone, MN (d)	05336500	825	1908-16
Grindstone River at Hinckley, MN (d)	05337000	-	1940-47
Knife River near Mora, MN (d)	05337400	102	1974-2002
Snake River at Mora, MN (d)	05337500	422	1909-13
St. Croix River near Rush City, MN (d)	05339500	5,120	1923-61
Sunrise River near Stacy, MN (d)	05340000	167	1949-65
Sunrise River near Lindstrom, MN (d)	05340050	231	1965-85
Vermillion River at Hastings, MN (d)	05346000	195	1942-47, 90
South Fork Zumbro River near Rochester, MN (d)	05373000	304	1952-81
Zumbro River (South Branch) near Zumbro Falls, MN (d)	05373500	821	1911-17
Zumbro River at Zumbro Falls, MN (d)	05374000*	-	1909-17, 1929-80
Zumbro River at Theilman, MN (d)	05374500	1,320	1938-56
Zumbro River at Kellogg, MN (d)	05374900	1,400	1975-90
North Fork Whitewater River near Elba, MN (d)	05376000	101	1939-41, 1967-93
Middle Fork Whitewater River near St. Charles, MN (d)	05376100	-	1988-92
South Fork Whitewater River near Altura, MN (d)	05376500	76.8	1939-71
Whitewater River near Beaver, MN (d)	05376800	271	1975-85, 1991-99
Whitewater River at Beaver, MN (d)	05377500	288	1936-38, 1939-56
Stockton Valley Creek at Stockton, MN (d)	05378230	-	1982-85
Garvin Brook near Minnesota City, MN (d)	05378235	-	1982-91
Straight Valley Creek near Rollingstone, MN (d)	05378300	5.16	1970-85
Gilmore Creek at Winona, MN (d)	05379000	8.95	1939-63
Mississippi River at LaCrosse, WI (d)	05383500	-	1929-55
North Branch Root River tributary near Stewartville, MN (d)	05383600	0.73	1959-64
Root River near Lanesboro, MN (d)	05384000*	615	1910, 11-17, 1940-85, 87-90
Rush Creek near Rushford, MN (d)	05384500*	129	1942-79
Root River near Houston, MN (d)	05385000*	1,250	1909-17, 1929-83, 1991-2000
South Fork Root River near Houston, MN (d)	05385500*	275	1953-83
Root River below South Fork near Houston, MN (d)	05386000	1,560	1938-61
Turtle Creek near Austin, MN (d)	05456500	144	1947-51
Heron Lake outlet nr Heron Lake, MN (d)	05475000	-	1930-43
Rock River at Luverne, MN (d)	06483000*	419	1911-14, 1996-97
Little Sioux River near Lakefield, MN (d)	06603000	17.1	1948-63
Jackson County Ditch No. 11 near Lakefield, MN (d)	06603500	7.69	1948-61

DISCONTINUED SURFACE-WATER-QUALITY STATIONS

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Station name	Station number	Drainage area (mi ²)	Type of record	Period of record
Baptism River near Beaver Bay, MN	04014500	140	C., Bio., Sed., Temp., D.O., pH, S.C.	1968-93
Partridge River abv Colby Lake at Hoyt Lakes, MN	04015475	106	Temp., S.C.	1976-85
St. Louis River at Forbes, MN	04018750	713	Sed.	1968-70
St. Louis River at Scanlon, MN	04024000	3430	C., Bio., Sed., Temp., D.O., pH, S.C.	1958-66, 68-94
Elim Creek near Holyoke, MN	04024090	1.06	Sed.	1976-79
Skunk Creek below Elim Creek near Holyoke, MN	04024093	8.83	C., Sed., Temp., D.O., pH, S.C.	1976-79
Deer Creek near Holyoke, MN	04024098	7.77	C., Bio., Temp., D.O., pH, S.C.	1977-79
			Sed.	1977-81
Pelican River near Fergus Falls, MN	05040500	482	Sed.	1968-69
Otter Tail River below Orwell Dam, near Fergus Falls, MN	05046000	1740	C., Sed., Temp., D.O., pH, S.C.	1961-63, 65-66, 85-86, 93-95
Bois de Sioux River near Doran, MN	05051300	1880	C., Sed., Temp., D.O., pH, S.C.	1993-95
Buffalo River near Hawley, MN	05061000	325	Sed.	1977-78
South Branch Buffalo River at Sabin, MN	05061500	454	Sed.	1977-78
Buffalo River near Dilworth, MN	05062000	1040	Sed.	1971-81
Wild Rice River at Twin Valley, MN	05062500	934	C., Sed., Temp., D.O., pH, S.C.	1966, 1973-79, 92-98, 2000-01
Wild Rice River at Hendrum, MN	05064000	1,560	C., Temp., D.O., pH, S.C.	1962-63, 67-68, 80-85, 91, 97-2001
Marsh River near Shelly, MN	05067500	220	C., Temp., D.O., pH, S.C.	1975, 79, 2000-01
Sand Hill River at Climax, MN	05069000	420	C., Temp., D.O., pH, S.C.	1966, 75, 79, 2000-01
Red Lake River near Red Lake, MN	05074500	1,950	C., Temp., D.O., pH, S.C.	1964-66, 2000-01
Thief River near Thief River Falls, MN	05076000	985	C., Temp., D.O., pH, S.C.	1963-66, 75, 79, 2000-01
Clearwater River at Plummer, MN	05078000	555	C., Temp., D.O., pH, S.C.	1963, 79, 2000-01
Lost River at Oklee, MN	05078230	254	C., Temp., D.O., pH, S.C.	1966, 1979, 2000-01
Clearwater River at Red Lake Falls, MN	05078500	1370	C., Sed., Temp., D.O., pH, S.C.	1964-66, 79, 92, 95
Red Lake River at Crookston, MN	05079000	5,270	C., Sed., Temp., D.O., pH, S.C.	1962-68, 72-76, 78-95, 97, 2000-01
Red Lake River at Fisher, MN	05080000	5,680	C., Sed., Temp., D.O., pH, S.C.	2000-01
Snake River above Alvarado, MN (d)	05085900	218	C., Temp., D.O., pH, S.C.	1994-96
Middle River at Argyle, MN	05087500	255	C., Sed., Temp., D.O., pH, S.C.	1968, 75, 79, 93, 2000-01
South Branch Two Rivers at Lake Bronson, MN	05094000	422	C., Sed., Temp., D.O., pH, S.C.	2000-01
Roseau River below Roseau, MN	05105300		C., Bio., Sed., Temp., D.O., pH, S.C.	1973-83
Roseau River below State Ditch 51, near Caribou, MN	05112000	1560	C., Bio., Sed., Temp., D.O., pH, S.C.	1972-95, 2001
Kawishwi River near Ely, MN	05124480	253	C., Bio., Sed., Temp., D.O., pH, S.C.	1966-96
Little Fork River at Littlefork, MN	05131500	1730	C., Bio., Sed., Temp., D.O., pH, S.C.	1967, 69, 71, 73-86
Big Fork River at Big Falls, MN	05132000	1460	C., Bio., Sed., Temp., D.O., pH, S.C.	1968, 71-77
Rainy River at Manitou Rapids, MN	05133500	19,400	C., Bio., Sed., Temp., D.O., pH, S.C.	1968-70, 78-94
Crow Wing River at Nimrod, MN	05244000	1,010	Sed.	1968-70
Mississippi River near Royalton, MN	05267000	11,600	C., Bio., Sed., Temp., D.O., pH, S.C.	1963-66, 1975-98
Sauk River near St. Cloud, MN	05270500	1,030	C., Bio., Temp., D.O., pH, S.C.	2001
Elk River near Big Lake, MN	05275000	615	Sed., Temp.	1976-81
North Fork Crow River above Paynesville, MN	05276005	232	C., Bio., Sed., Temp., D.O., S.C.	1996-98
Crow River at Rockford, MN	05280000	2520	Sed., Temp.	1975-81
			C., Sed., Temp., D.O., pH, S.C.	1997
Mississippi River near Anoka, MN	05288500	19,100	Sed.	1963-67, 75-98
			C., Temp., D.O., pH, S.C.	1996-98
Mississippi River at Fridley, MN	05288550		Temp., D.O., pH, S.C.	1975-86
Mississippi River at Ford Plant at St. Paul, MN	05288950	19,700	Temp., D.O., pH, S.C.	1974-78, 81-82
Whetstone River near Big Stone City, SD	05291000	389	Sed., Temp.	1974-88
Yellow Bank River near Odessa, MN	05293000	398	Sed., Temp.	1974-88
Chippewa River near Milan, MN	05304500	1870	Sed., Temp.	1972-81
Yellow Medicine River near Granite Falls, MN	05313500	653	Sed., Temp.	1971-75, 77-81
Redwood River near Marshall, MN	05315000	259	Sed., Temp.	1968-71
Redwood River near Redwood Falls, MN	05316500	629	Sed., Temp.	1968-70
Cottonwood River near New Ulm, MN	05317000	1,300	Sed.,	1968-76
Watowan River near Garden City, MN	05319500	812	Sed.	1977-80
Blue Earth River near Rapidan, MN	05320000	2,410	C., Bio., Temp., D.O., pH, S.C.	1960-67, 69, 2000-01
Minnesota River near Jordan, MN	05330000	16,200	C., Bio., Temp., D.O., pH, S.C.	1952-63, 69, 72-98
Minnesota River at Burnsville, MN	05330908		Temp., D.O., pH, S.C.	1980-83
Minnesota River at Fort Snelling State Pk., St. Paul, MN	05330920	16,900	Temp., D.O., pH, S.C.	1973-83
Mississippi River at Industrial Molasses, St. Paul, MN	05331005		Temp., D.O., pH, S.C.	1976-85
Mississippi River at Fifth at Newport, MN	05331545		Temp., D.O., pH, S.C.	1979-90
Mississippi River at Grey Cloud Island near Cottage Grove, MN	05331560		Temp., D.O., pH, S.C.	1977-90
Mississippi River at Ninninger	05331570	37,000	C., Bio., Sed., Temp., D.O., pH, S.C.	1977-95
Mississippi River at Lock and Dam 2 at Hastings, MN	05331578		Temp., D.O., pH, S.C.	1975-90
Snake River near Pine City, MN	05338500	958	C., Bio., Temp., D.O., pH, S.C.	1963, 65, 67-68, 75-83, 85, 92-94, 98

DISCONTINUED SURFACE-WATER-QUALITY STATIONS--Continued

Station name	Station number	Drainage area (mi ²)	Type of record	Period of record
St. Croix River at Afton, MN	05341770		Temp., D.O., pH, S.C.	1977-83
Vermillion River near Empire, MN	05345000	110	Temp., D.O., pH, S.C. C., Bio.	1974-91 1990-91, 97, 98
Mississippi River at Lock and Dam 3 near Red Wing, MN	05344980	46,000	Temp., D.O., pH, S.C.	1976-83
Mississippi River at Red Wing, MN	05355250	46,800	C., Bio., Sed., Temp., D.O., pH, S.C.	1996-98
South Fork Zumbro River at Rochester, MN	05372995	303	C., Temp., D.O., pH, S.C. Sed., Temp.	2001 1981-82
Zumbro River at Zumbro Falls, MN	05374000	1,150	Sed.	1971, 73-75
Zumbro River at Kellogg, MN	05374900	1400	Sed., Temp.	1975-81
North Fork Whitewater River near Elba, MN	05376000	101	C., Bio., Sed., Temp, D.O., pH, S.C.	1967-93
Middle Fork Whitewater River near St. Charles, MN	05376100		Sed., Temp., S.C.	1988-92
Whitewater River near Beaver, MN	05376800	271	Sed., Temp.	1975-81
Mississippi River at Winona, MN	05378500	59,200	C., Bio., D.O., pH Sed.	1963-66, 76-88 1976-2000
Root River near Lanesboro, MN	05384000	615	Sed.	1968-71
Root River near Houston, MN	05385000	1270	Sed., Temp.	1975-81
South Fork Root River near Houston, MN	05385500	275	Sed., Temp.	1975-81
Cedar River near Austin, MN	05457000	425	Sed., Temp., S.C.	1971, 73-75, 78-81
Des Moines River at Jackson, MN	05476000	1220	C., Bio., D.O., pH, S.C. Sed., Temp	1968-69, 73-76, 78, 83, 89- 90, 94-95, 98 1968-81

INTRODUCTION

Water Resources Division of the U.S. Geological Survey (USGS), in cooperation with Federal, State, and local agencies, collects a large amount of data pertaining to the water resources of Minnesota each water year. These data, accumulated during many years, constitute a valuable data base for developing an improved understanding of the water resources of the State. To make these data readily available to interested parties outside the USGS, the data are published annually in this report series entitled, "Water-Resources Data—Minnesota."

Water-resources data for the 2003 water year (hereinafter 2003) for Minnesota consist of records of stage, discharge, and water quality of streams; and stage of lakes and reservoirs; and water quality of ground water. This volume contains discharge records for 109 stream-gaging stations; stage for 12 lakes and reservoirs; water quality for 9 stream-gaging stations; peak flow data for 90 high-flow partial-record stations; and ground-water levels for 3 ground-water observation wells. These data represent a part of the National Water Data System collected by the USGS and cooperating State and Federal agencies in Minnesota.

This series of annual reports for Minnesota began with the 1961 water year with a report that contained only data relating to the quantities of surface water. For the 1964 water year, a similar report was introduced that contained only data relating to water quality. Beginning with the 1975 water year, the report was changed to present, in one volume, data on quantities of surface water, quality of surface and ground water, and ground-water levels.

Prior to introduction of this series and for several water years concurrent with it, water-resources data for Minnesota were published in U.S. Geological Survey Water-Supply Papers. Data on stream discharge and stage and on lake or reservoir contents and stage, through September 1960, were published annually under the title "Surface-Water Supply of the United States, Parts 4, 5 and 6A." For the 1961 through 1970 water years, the data were published in two 5-year reports. Data on chemical quality, temperature, and suspended sediment for the 1941 through 1970 water years were published annually under the title "Quality of Surface Waters of the United States," and water levels for the 1935 through 1974 water years were published under the title "Ground-Water Levels in the United States." The above mentioned Water-Supply Papers can be consulted in the libraries of the principal cities of the United States and may be purchased from the U.S. Geological Survey Branch of Information Services, Denver Federal Center, Box 25286, Denver, Colorado 80225.

Publications similar to this report are published annually by the USGS for all States. These official Survey reports have an identification number consisting of the two-letter State abbreviation, the last two digits of the water year, and volume number. For example, this volume is identified as the "U.S. Geological Survey Water-Data Report MN-03-1." For archiving and general distribution, the reports for 1971-74 water years also are identified as water-data reports. These water-data reports are for sale in paper copy or in microfiche by the National Technical Information Service, U.S. Department of Commerce, Springfield, Virginia 22161.

Additional information, including current prices, for ordering specific reports may be obtained from the District Chief at the address given on the back of the title page or by telephone (763) 783-3100.

COOPERATION

The USGS and agencies of the State of Minnesota have had cooperative agreements for the systematic collection of streamflow records since 1909, for ground-water levels since 1948, and for water-quality records since 1952. Organizations that assisted in collecting data through cooperative agreement with the USGS are:

- Minnesota Department of Natural Resources
- Minnesota Department of Transportation
- Minnesota Pollution Control Agency
- Grand Portage Reservation Tribal Council
- Elm Creek Watershed Management Commission
- Red River Watershed Management Board
- City of Rochester
- City of Grand Forks
- Bois Forte Reservation Tribal Council
- Prairie Island Indian Community
- City of Mankato
- Prairie Country Resource Conservation District
- White Earth Reservation Tribal Council
- High Island Creek Clean Water Partnership

Assistance in the form of funds or services was given by the U.S. Army Corps of Engineers, U.S. Department of State, and the Federal Energy Regulatory Commission. Other organizations that supplied data are acknowledged in station descriptions.

SUMMARY OF HYDROLOGIC CONDITIONS

Precipitation

Most of Minnesota received normal to above normal precipitation (normal being the statistical median based on data from 1971-2000) during the 2003 water year (figs. 1 and 2). Southeast Minnesota was greater than 7 inches below normal while east-central Minnesota was 1.4 inches below normal. State aggregate totals for the water year were 4.5 inches below normal. Precipitation totals, unless otherwise stated, are aggregates for the state, or for the nine climatic divisions. These include the northwest, north-central, northeast, west-central, central, east-central, southwest, south-central, and southeast divisions.

Precipitation totals for the first quarter, October 1 to December 31, 2002, ranged from 1.7 inches in the northwest to 4.5 inches in the central parts of the state. Departures from normal ranged from -1.9 inches in the north-central to -0.4 inches in the central part of the state.

Precipitation for the second quarter, January 1 to March 31, 2003, was again below normal for the entire state. The largest deviations were in the north-central and northeast parts of the state, which were approximately 1.7 inches below normal. Statewide, the average was 1.4 inches below normal.

The third quarter, April 1 to June 30, 2003, was the only quarter with precipitation totals above normal either for the state as an aggregate or in any of the nine climate divisions. Statewide, the total was 1.0 inch above normal while in the east-central part of the state, the total was 4.4 inches above normal. The northwest, west-central, central, southwest, and south-central parts of the state were below normal.

The fourth quarter, July 1 to September 30, 2003, precipitation totals were below normal for all nine climate divisions in the state. The state aggregate was about 3 inches below normal with individual divisions ranging from

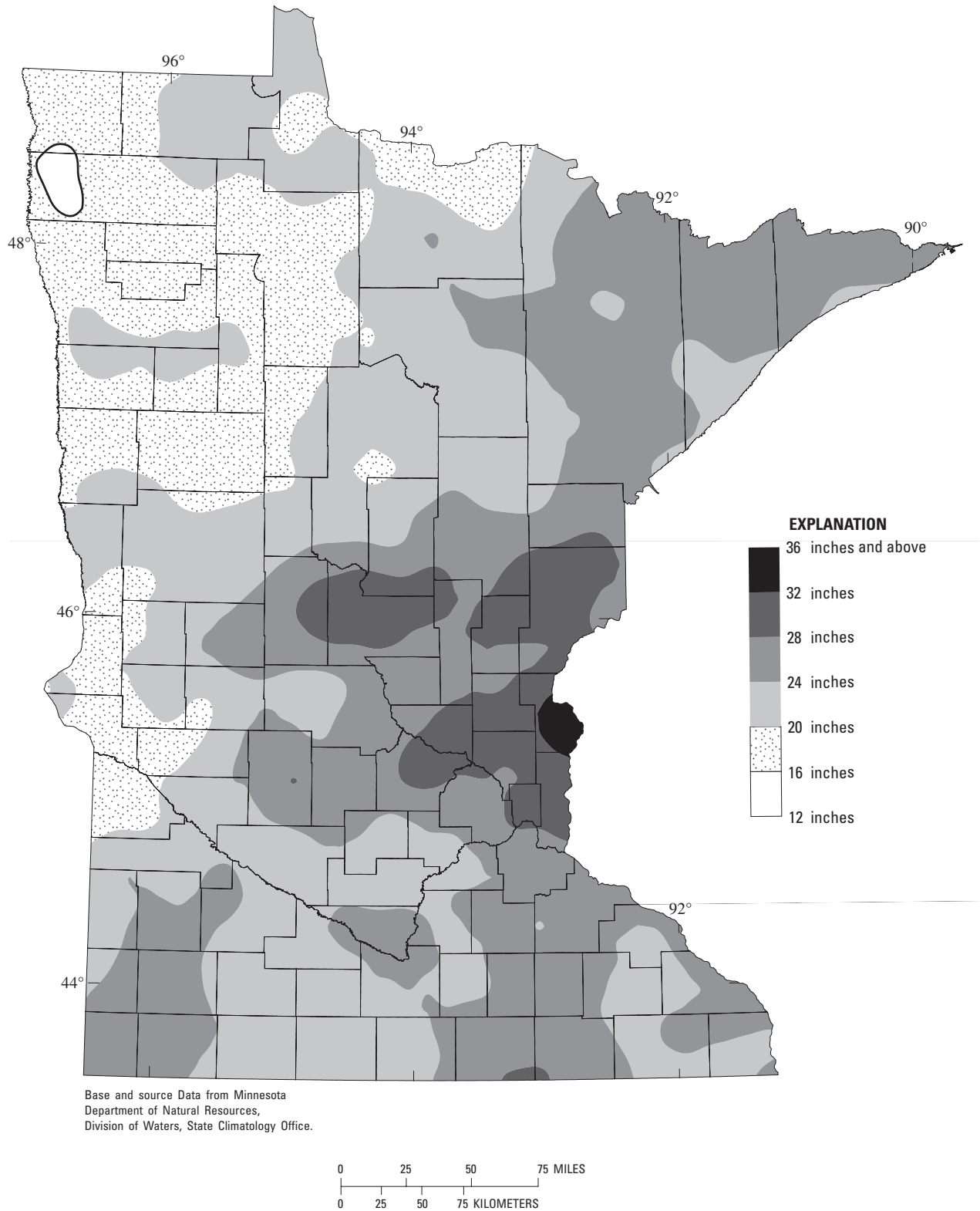
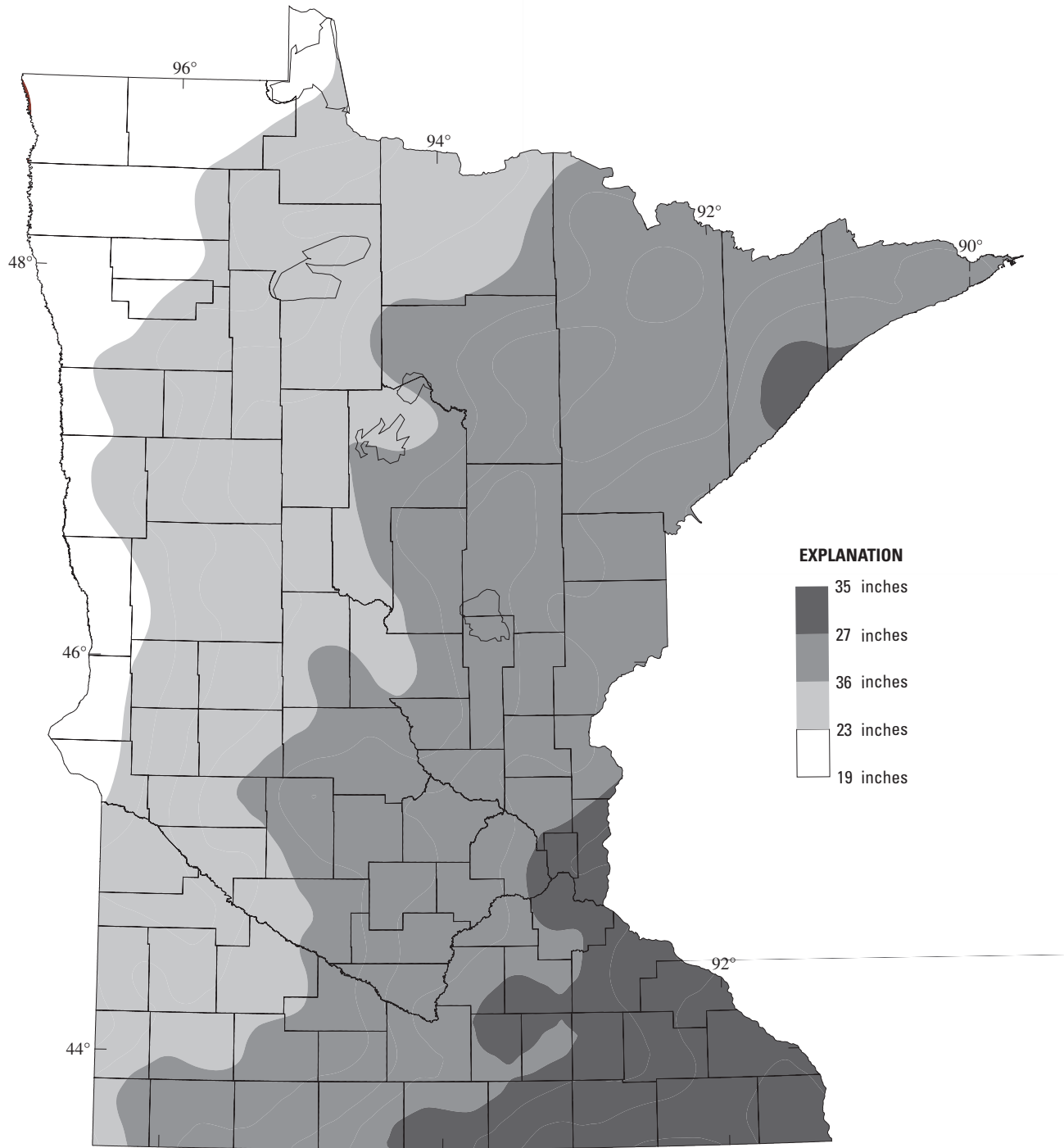


Figure 1. Precipitation, in inches, during 2003 water year, in Minnesota.



Base and source Data from Minnesota
Department of Natural Resources,
Division of Waters, State Climatology Office.

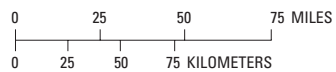


Figure 2. Average annual precipitation, in inches, for 30-year period, 1971-2000, in Minnesota.

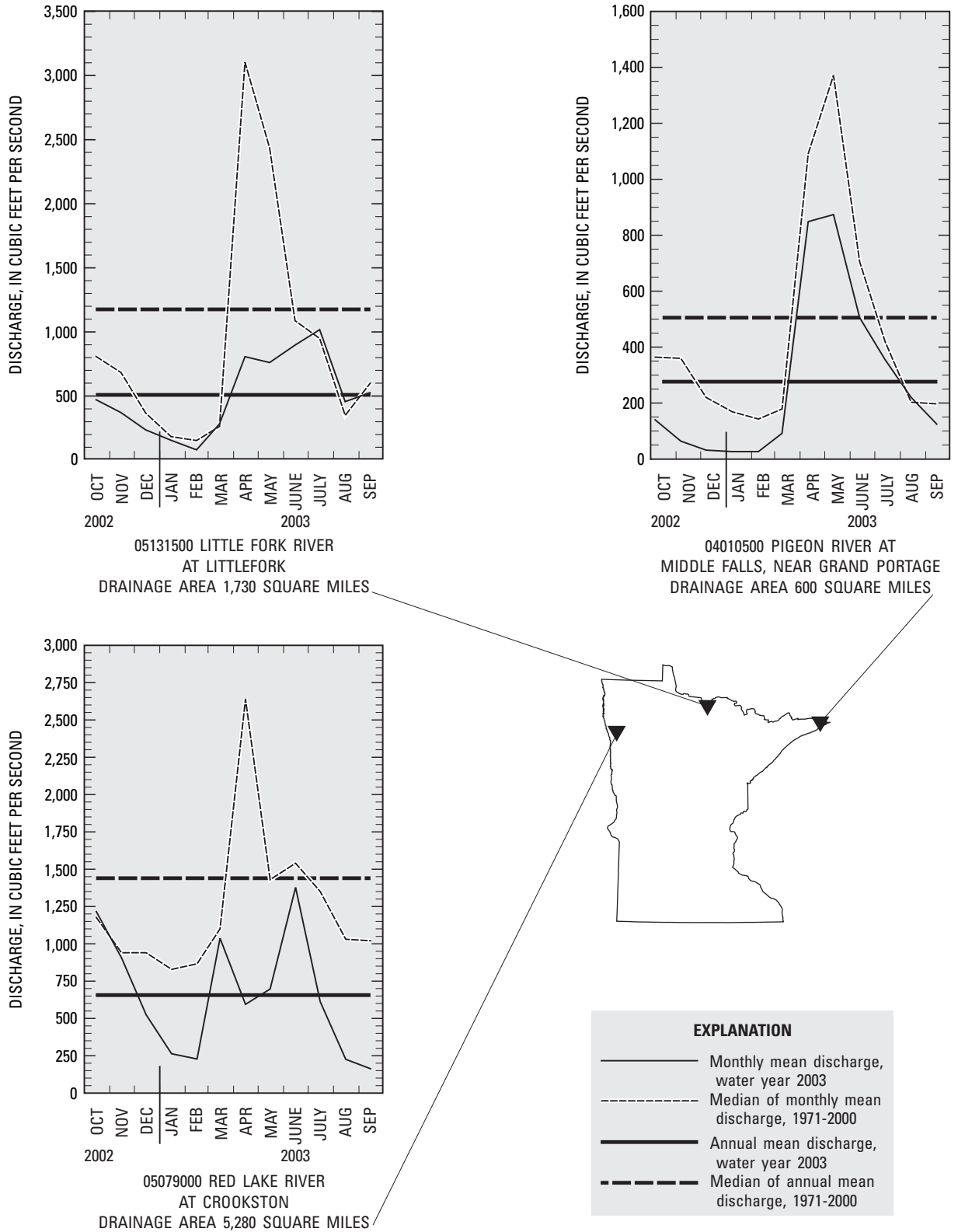
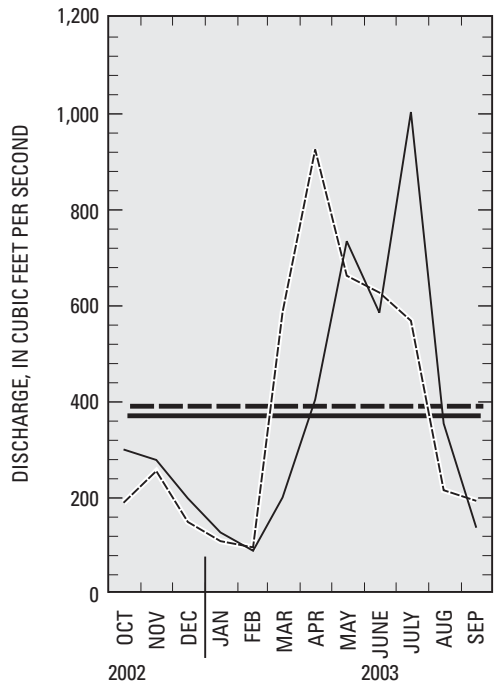
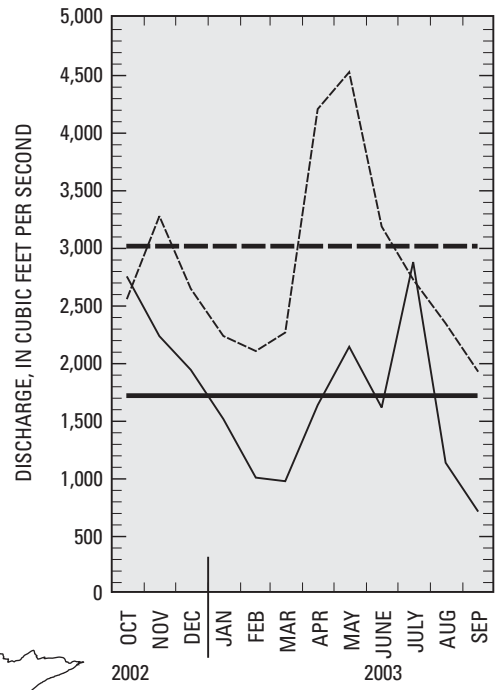


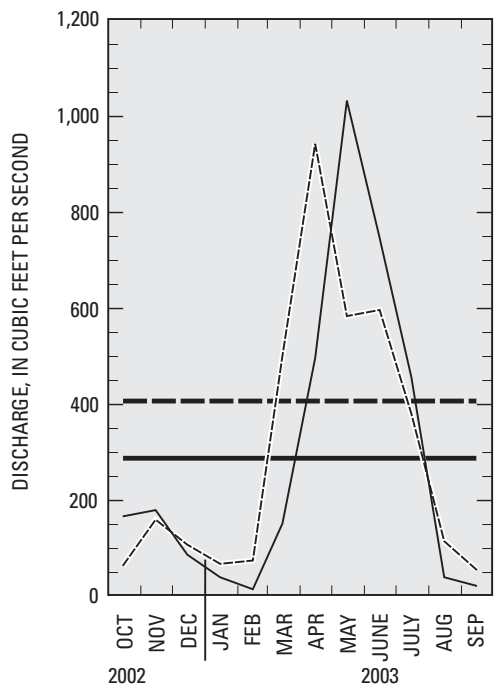
Figure 3. Comparison of mean discharge for the 2003 water year with the median



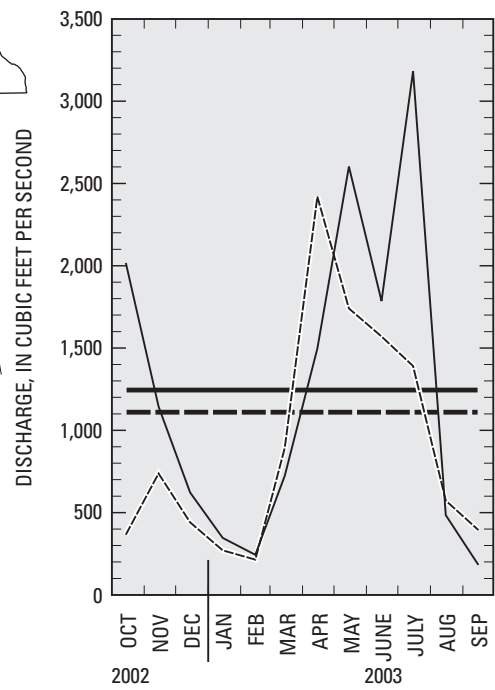
05304500 CHIPPEWA RIVER
NEAR MILAN
DRAINAGE AREA 1,870 SQUARE MILES



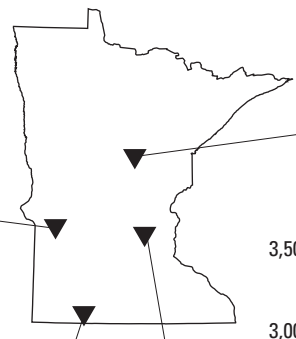
05227500 MISSISSIPPI RIVER
AT AITKIN
DRAINAGE AREA 6,140 SQUARE MILES



05476000 DES MOINES RIVER
AT JACKSON
DRAINAGE AREA 1,220 SQUARE MILES



05280000 CROW RIVER
AT ROCKFORD
DRAINAGE AREA 2,520 SQUARE MILES



of mean discharges for 1971-2000 at seven long-term representative gaging stations.

-0.6 to -6.1 inches below normal. For some climatological reporting stations this quarter ranked among the driest on record.

Precipitation data not derived from figures 1 and 2 were obtained through the World Wide Web from the Minnesota State Climatology Office at: <http://climate.umn.edu/> or from the Midwestern Regional Climate Center at: <http://mec.sws.uiuc.edu/index.html>.

Surface Water

Figure 3 shows monthly-mean and annual-mean discharges for water year 2003 compared to normal (median of monthly-mean discharges for the period 1971-2000) for 7 streamflow gaging stations: Little Fork River at Littlefork, Pigeon River at Middle Falls, Red Lake River at Crookston, Chippewa River near Milan, Mississippi River at Aitkin, Des Moines River at Jackson, and Crow River at Rockford. These stations are located in the following basins—Lake Superior, Red River of the North, Lake of the Woods, and the upper Mississippi River.

Monthly-mean streamflows were at or below normal for the entire water year for four of the seven stations listed. These included Little Fork River at Littlefork, Pigeon River at Middle Falls, Red Lake River at Crookston, and Mississippi River at Aitkin. Flows ranged from near normal to from one-half to one-fifth of normal depending on station and time of year. These stations are in areas of the state that were not only affected by the below normal precipitation of 2003, but were also north of the significant rainfalls that occurred in the state in June 2003.

Flows for the remaining three stations, Chippewa River near Milan, Des Moines River at Jackson, and Crow River at Rockford, typically were near normal for the entire water year. The Des Moines River flows were nearly 200 percent of normal during May and slightly above normal during June. Streamflows for Chippewa River near Milan and Crow River at Rockford were near normal except for the months of May, June, and July, which ranged from just above normal during May to about 200 percent of normal during July. The heavy rains during late June (see Precipitation) contributed to the higher flows during July. However, by August streamflows for these three stations returned to the normal range.

With respect to stream-gaging stations with 10 or more years of record, none recorded peaks of record. The Long Prairie River at Long Prairie recorded the third highest streamflow of record on June 26th. This streamflow (2,570 ft³/s) had a 25-year recurrence interval that was directly attributed to the heavy rains that occurred from June 22 to 25. Some of the greatest precipitation totals recorded in the state from these precipitation events occurred in the Long Prairie watershed.

Ground-Water Levels

This report includes levels from three ground-water wells, all located in surficial-sand and gravel aquifers. All three wells are measured approximately monthly by observers and/or USGS personnel. The wells in Beltrami and Morrison Counties are also equipped with continuous-water-level recorders. The two levels in northern Minnesota, in Beltrami and Itasca Counties generally showed declining water levels throughout the water year. Water levels dropped from just under 1 foot to greater than 2 feet, respectively. The well in Morrison County, located in central Minnesota, had declining water levels until June, when levels rose by nearly 3 feet, which was about the same as the declines in the previous 7 months combined.

The Beltrami and Morrison County Wells are equipped with telemetry so near real-time water levels can now be observed on the World Wide Web

at: <http://waterdata.usgs.gov/mn/nwis/current/?type=gw&group=key=county>.

Downstream Order System and Station Number

Since October 1, 1950, the order of listing hydrologic-station records in USGS reports is in a downstream direction along the main stream. All stations on a tributary entering upstream from a main stream station are listed before that station. A station on a tributary that enters between two main-stream sections is listed between them. A similar order is followed by listing stations on first rank, second rank, and other order ranks of tributaries. The rank of any tributary on which a station is situated with respect to the stream to which it is immediately tributary is indicated by an indentation in a list of stations in front of the report. Each indentation represents one rank. This downstream order and system of indentation show which stations are on tributaries between any two stations and the rank of the tributary on which each station is situated.

As an added means of identification, each hydrologic station and partial-record station has been assigned a station number. These are in the same downstream order in this report. In assigning station numbers, no distinction is made between partial-record stations and other stations; therefore, the station number for a partial-record station indicates downstream-order position in a list made up of both types of stations. 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 eight-digit number for each station such as 05041000, which appears just to the left of the station name, includes the two-digit part number "05" plus the six-digit downstream order number "041000." In areas of high station density, an additional two digits may be added to the station identification number to yield a 10-digit number. The stations are numbered in downstream order as previously described between the stations of consecutive 8-digit numbers.

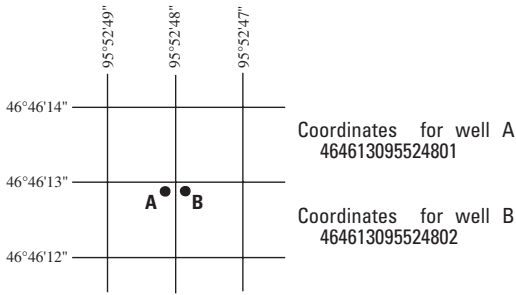
Numbering System for Wells and Miscellaneous Sites

The eight-digit downstream order station numbers are not assigned to wells and miscellaneous sites where only occasional water-quality samples or discharge measurements are taken.

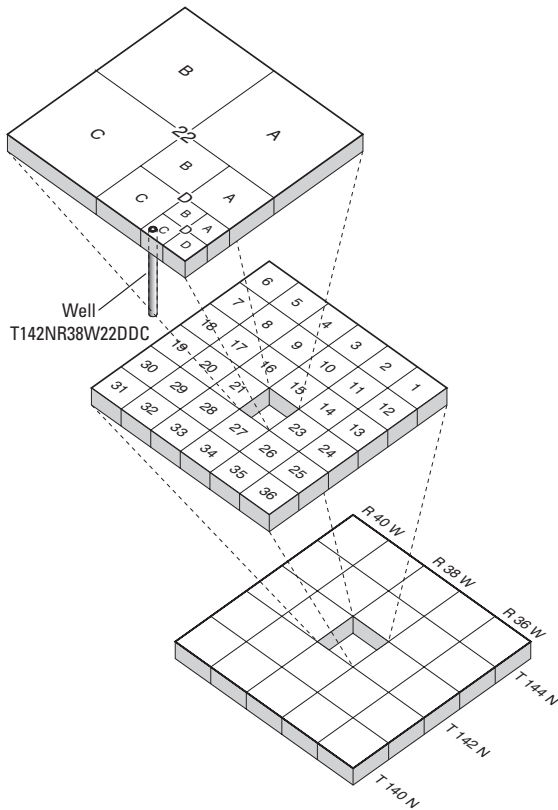
The well and miscellaneous site numbering system of the USGS is based on the grid system of latitude and longitude. The system provides the geographic location of the well or miscellaneous site and a unique number for each site. The number consists of 15 digits. The first six digits denote the degrees, minutes, and seconds of latitude, the next seven digits denote degrees, minutes, and seconds of longitude, and the last two digits (assigned sequentially) identify the wells or other sites within a one-second grid. See figure 4. The numbering system used to define the location of data collection sites is based on the Federal system of land subdivision (township, range, and section). The first number of the site location indicates the township (the N after the township number is an abbreviation for north); the second, the range (the W after the range number is an abbreviation for west); and the third the section. Uppercase letters after the section number indicate location within the section; the first letter denotes the 160-acre tract, the second the 40-acre tract, and the third the 10-acre tract. The number of uppercase letters indicates accuracy of the location number. For example, if a point can be located within a 10-acre tract, three uppercase letters are shown in the location number. The number T142NR38W22DDC indicates the site is located in the SW 1/4 of the SE 1/4 of the SE 1/4, section 22, township 142 north, range 38 west.

RECORDS OF STAGE AND WATER DISCHARGE

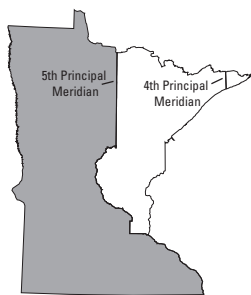
Well and Miscellaneous Site Numbering System



Local Well Numbering System



Principal Meridians and Base Lines



Notes:
The base line for the 5th Principal Meridian is located in central Arkansas.
The base line for the 4th Principal Meridian is the south line of the State of Wisconsin.

Figure 4. Example of system for numbering wells.

Records of stage and water discharge may be complete or partial. Complete records of discharge are those obtained using a continuous stage-recording device through which either instantaneous or mean-daily discharge may be computed for any time, or any period of time, during the period of record. Complete records of lake or reservoir content, similarly, are those for which stage or content may be computed or estimated with reasonable accuracy for any time, or period of time. They may be obtained using a continuous stage-recording device, but need not be. Because daily-mean discharges and end-of-day contents commonly are published for such stations, they are referred to as "daily stations."

By contrast, partial records are obtained through discrete measurements without using a continuous stage-recording device and pertain only to a few flow characteristics, or perhaps only one. The nature of the partial record is indicated by table titles such as "High-flow partial records," or "Low-flow partial records." Records of miscellaneous discharge measurements or of measurements from special studies, such as low-flow seepage studies, may be considered as partial records, but they are presented separately in this report. Location of all continuous-record, surface-water-quality, and high-flow partial-record stations for which data are given in this report are shown in figures 5, 6, and 7.

SPECIAL NETWORKS AND PROGRAMS

Hydrologic Benchmark Network is a network of 61 sites in small drainage basins in 39 states that was established in 1963 to provide consistent streamflow data representative of undeveloped watersheds nationwide, and from which data could be analyzed on a continuing basis for use in comparison and contrast with conditions observed in basins more obviously affected by human activities. At selected sites, water-quality information is being gathered on major ions and nutrients, primarily to assess the effects of acid deposition on stream chemistry. Additional information on the Hydrologic Benchmark Program may be accessed from <http://water.usgs.gov/hbn/>.

National Stream-Quality Accounting Network (NASQAN) is a network of sites used to monitor the water quality of large rivers within the Nation's largest river basins. From 1995 through 1999, a network of approximately 40 stations was operated in the Mississippi, Columbia, Colorado, and Rio Grande River Basins. For the period 2000 through 2004, sampling was reduced to a few index stations on the Colorado and Columbia Rivers so that a network of 5 stations could be implemented on the Yukon River. Samples are collected with sufficient frequency that the flux of a wide range of constituents can be estimated. The objective of NASQAN is to characterize the water quality of these large rivers by measuring concentration and mass transport of a wide range of dissolved and suspended constituents, including nutrients, major ions, dissolved and sediment-bound heavy metals, common pesticides, and inorganic and organic forms of carbon. This information will be used (1) to describe the long-term trends and changes in concentration and transport of these constituents; (2) to test findings of the National Water-Quality Assessment (NAWQA) Program; (3) to characterize processes unique to large-river systems such as storage and re-mobilization of sediments and associated contaminants; and (4) to refine existing estimates of off-continent transport of water, sediment, and chemicals for assessing human effects on the world's oceans and for determining global cycles of carbon, nutrients, and other chemicals. Additional information about the NASQAN Program may be accessed from <http://water.usgs.gov/nasqan/>.

The National Atmospheric Deposition Program/National Trends Network (NADP/NTN) is a network of monitoring sites that provide continuous measurement and assessment of the chemical constituents in precipita-

tion throughout the United States. As the lead Federal agency, the USGS works together with over 100 organizations to provide a long-term, spatial and temporal record of atmospheric deposition generated from this network of 250 precipitation-chemistry monitoring sites. The USGS supports 74 of these 250 sites. This long-term, nationally consistent monitoring program, coupled with ecosystem research, provides critical information toward a national scorecard to evaluate the effectiveness of ongoing and future regulations intended to reduce atmospheric emissions and subsequent impacts to the Nation's land and water resources. Reports and other information on the NADP/NTN Program, as well as data from the individual sites, may be accessed from <http://bqs.usgs.gov/acidrain/>.

The National Water-Quality Assessment (NAWQA) Program of the USGS is a long-term program with goals to describe the status and trends of water-quality conditions for a large, representative part of the Nation's ground- and surface-water resources; to provide an improved understanding of the primary natural and human factors affecting these observed conditions and trends; and to provide information that supports development and evaluation of management, regulatory, and monitoring decisions by other agencies.

Assessment activities are being conducted in 42 study units (major watersheds and aquifer systems) that represent a wide range of environmental settings nationwide and that account for a large percentage of the Nation's water use. A wide array of chemical constituents will be measured in ground water, surface water, streambed sediments, and fish tissues. The coordinated application of comparative hydrologic studies at a wide range of spatial and temporal scales will provide information for decision making by water-resources managers and a foundation for aggregation and comparison of findings to address water-quality issues of regional and national interest.

Communication and coordination between USGS personnel and other local, State, and Federal interests are critical components of the NAWQA Program. Each study unit has a local liaison committee consisting of representatives from key Federal, State, and local water resources agencies, Indian nations, and universities in the study unit. Liaison committees typically meet semiannually to discuss their information needs, monitoring plans and progress, desired information products, and opportunities to collaborate efforts among the agencies. Additional information about the NAWQA Program can be found at <http://water.usgs.gov/nawqa>.

The USGS National Streamflow Information Program (NSIP) is a long-term program with goals to provide framework streamflow data across the Nation. Included in the program are creation of a permanent Federally funded streamflow network, research on the nature of streamflow, regional assessments of streamflow data and data bases, and upgrades in the streamflow information delivery systems. Additional information about NSIP may be accessed from <http://water.usgs.gov/nsip/>.

EXPLANATION OF STAGE- AND WATER-DISCHARGE RECORDS

Data Collection and Computation

The data obtained at a complete-record gaging station on a stream or canal consist of a continuous record of stage, individual measurements of discharge throughout a range of stages, and notations regarding factors that may affect the relation between stage and discharge. These data, together with supplemental information, such as weather records, are used to compute daily discharges. The data obtained at a complete-record gaging station on a lake or reservoir consist of a record of stage and of notations regarding factors that may affect the relation between stage and lake content. These

data are used with stage-area and stage-capacity curves or tables to compute water-surface areas and lake storage.

Records of stage are obtained with recorders that encode stage values at selected time intervals and stored on a variety of media. Measurements of discharge are made with current and acoustic meters using methods adapted by the USGS as a result of experience accumulated since 1880. These methods are described in standard textbooks, in U.S. Geological Survey Water-Supply Paper 2175, and in U.S. Geological Survey Techniques of Water-Resources Investigations (TWRI), book 3, chapter A6.

In computing discharge records, results of individual measurements are plotted against the corresponding stages, and stage-discharge relation curves are then constructed. From these curves, rating tables indicating the approximate discharge for any stage within the range of the measurements are prepared. If it is necessary to define extremes of discharge outside the range of current-meter measurements, the curves are extended using: (1) logarithmic-plotting; (2) velocity-area studies; (3) results of indirect measurements of peak discharge, such as slope-area or contracted-opening measurements, and computations of flow-over-dams or weirs; or (4) step-backwater techniques.

Daily-mean discharges are computed by applying the daily-mean stages (gage heights) to the stage-discharge curves or tables. 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 determined by the shifting-control method, in which correction factors based on the individual discharge measurements and notes of the personnel making the measurements are applied to the gage heights before the discharges are determined from the curves or tables. This shifting-control method also is used if the stage-discharge relation is changed temporarily because of aquatic growth or debris on the control. For some stations, formation of ice in the winter may so obscure the stage-discharge relations so that daily-mean discharges must be estimated from other information such as temperature and precipitation records, notes of observations, and records for other stations in the same or nearby basins for comparable periods.

At some stream-gaging stations the stage-discharge relation is affected by the 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.

In computing records of lake or reservoir contents, it is necessary to have available from surveys, curves or tables defining the relation of stage and content. The application of stage to the stage-content curves or tables gives the contents from which daily, monthly, or yearly changes then are determined. If the stage-content relation changes because of deposition of sediment in a lake or reservoir, periodic resurveys may be necessary to redefine the relation. Even when this is done, the contents computed may become increasingly in error as time since the last survey increases. Discharge over lake or reservoir spillways are computed from stage-discharge relations much as other stream discharges are computed.

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. For such periods, the daily discharges are estimated from the recorded range in stage, previous or following record, discharge measurements, weather records, and comparison with other station

records from the same or nearby basins. Likewise, daily contents may be estimated from operator's logs, previous or following record, inflow-outflow studies, and other information. Information explaining how estimated daily-discharge values are identified in station records is included in the sections, "Data Presentation" (REMARKS paragraph) and "Identifying Estimated Daily Discharge."

Data Presentation

Streamflow data in this report are presented in a new format that is considerably different from the format in data reports prior to the 1991 water year. The major changes are that statistical characteristics of discharge now appear in tabular summaries following the water-year data table and less information is provided in the text or station manuscript above the table.

The records published for each continuous-record surface-water discharge station (gaging station) now consist of five parts: (1) the manuscript or station description; (2) the data table of daily-mean values of discharge for the current water year with summary data; (3) a tabular statistical summary of monthly-mean-flow data for a designated period, by water year; (4) a summary statistics table that includes statistical data of annual, daily and instantaneous flows as well as data pertaining to annual runoff, 7-day low-flow minimums, and flow duration; and (5) a hydrograph of discharge.

Station Manuscript

The manuscript provides, under various headings, descriptive information, such as station location, period of record, historical extremes outside the period of record, record accuracy, and other remarks pertinent to station operation and regulation. The following information, as appropriate, is provided with each continuous record of discharge or lake content. Comments to follow clarify information presented under the various headings of the station description.

LOCATION--Information on locations is obtained from the most accurate maps available. The location of the gage with respect to the cultural and physical features in the vicinity and with respect to the reference place mentioned in the station name is given. River mileages, given for only a few stations, were determined by methods given in "River Mileage Measurement," Bulletin 14, Revision of October 1968, prepared by the Water Resources Council or were provided by the U.S. Army Corps of Engineers.

DRAINAGE AREA--Drainage areas are measured using the most accurate maps available. Because the type of maps available varies from one drainage basin to another, the accuracy of drainage areas likewise varies. Drainage areas are updated as better maps become available.

PERIOD OF RECORD--This indicates the period for which there are published records for the station or for an equivalent station. An equivalent station is one that was in operation at a time when the present station was not, and whose location was such that records from it can reasonably be considered equivalent with records from the present station.

REVISED RECORDS--Published records, because of new information, occasionally are found to be incorrect, and revisions are printed in later reports. Listed under this heading are all reports in which revisions have been published for the station and water years to which the revisions apply. If a revision did not include daily, monthly, or annual figures of discharge, that fact is noted after the year dates as follows: "(M)" means that only the instantaneous maximum discharge was revised; "(m)" means that only the instantaneous minimum was revised; and "(P)" means that only peak discharges were revised. If the drainage area has been revised, the report in which the most recently revised figure was first published is given.

GAGE--The type of gage in current use, the datum of the current gage referred to National Geodetic Vertical Datum of 1929 (see glossary), and a condensed history of the types, locations, and datum of previous gages are given under this heading.

REMARKS--All periods of estimated daily-discharge record will either be identified by date in this paragraph of the station description for water-discharge stations or flagged in the daily-discharge table. If a remarks statement is used to identify estimated record, the paragraph will begin with this information presented as the first entry. The paragraph is also used to present information relative to the accuracy of the records, to special methods of computation, to conditions that affect natural flow at the station and, possibly, to other pertinent items. For reservoir stations, information is given on the dam forming the reservoir, the capacity, outlet works and spillway, and purpose and use of the reservoir.

COOPERATION--Records provided by a cooperating organization or obtained for the USGS by a cooperating organization are identified here.

EXTREMES OUTSIDE PERIOD OF RECORD--Included here is the information concerning major floods or unusually low flows that occurred outside the stated period of record. The information may or may not have been obtained by the USGS.

REVISIONS--If errors in published water-quality records are discovered after publication, appropriate updates are made in the U.S. Geological Survey's distributed data system NWIS, and subsequently to its web-based National data system, NWISWeb [<http://water.usgs.gov/nwis/nwis>]. Because the usual volume of updates makes it impractical to document individual changes in the State data-report series or elsewhere, potential users of U.S. Geological Survey water-quality data are encouraged to obtain all required data from NWIS or NWISWeb to ensure the most recent updates. Updates to NWISWeb are currently made on an annual basis.

Manuscript information for lake or reservoir stations differs from that for stream stations in the nature of the "Remarks" and to the inclusion of a skeleton stage-capacity table when daily contents are given.

Headings for AVERAGE DISCHARGE, EXTREMES FOR PERIOD OF RECORD, AND EXTREMES FOR CURRENT YEAR have been deleted and the information contained in these paragraphs, except for the listing of secondary instantaneous peak discharges in the EXTREMES FOR CURRENT YEAR paragraph, is now presented in the tabular summaries following the discharge table or in the REMARKS paragraph, as appropriate. No changes have been made to the data presentations of lake contents.

Peak Discharges Greater Than Base Discharge

Tables of peak discharges above base discharge are included for some stations where secondary instantaneous peak discharges are used in flood-frequency studies of highway and bridge design, flood-control structures, and other flood-related projects. The base discharge value is selected so an average of three peaks a year will be reported. This base discharge value has a recurrence interval of approximately 1.1 years, or a 91-percent chance of exceedance in any 1 year.

Data Table of Daily-Mean Values

The daily table of discharge records for stream-gaging stations gives mean discharge for each day of the water year. In the monthly summary for the table, the line headed TOTAL gives the sum of the daily figures for each month; the line headed MEAN gives the average flow in cubic feet per sec-

ond for the month; and the lines headed MAX and MIN give the maximum and minimum daily-mean discharges, respectively, for each month. Discharge for the month also is usually 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 or in acre-feet may be omitted if there is extensive regulation or diversion or if the drainage area includes large noncontributing areas. At some stations, monthly and (or) yearly observed discharges are adjusted for reservoir storage or diversion, or diversion data or reservoir contents are given. These figures are identified by a symbol and corresponding footnote.

Statistics of Monthly-Mean Data

A tabular summary of the mean (line headed MEAN), maximum (line headed MAX), and minimum (line headed MIN) of monthly-mean flows for each month for a designated period is provided below the mean values table. The water years of the first occurrence of the maximum and minimum monthly flows are provided immediately below those figures. The designated period will be expressed as FOR WATER YEARS 20__-20__, BY WATER YEAR (WY), and will list the first and last water years of the range of years selected from the PERIOD OF RECORD paragraph in the station manuscript. It will consist of all of the station record within the specified water years, inclusive, including complete months of record for partial water years, if any, and may coincide with the period of record for the station. The water years for which the statistics are computed will be consecutive, unless a break in the station record is indicated in the manuscript.

Summary Statistics

A table titled SUMMARY STATISTICS follows the statistics of monthly mean data tabulation. This table consists of four columns, with the first column containing the line headings of the statistics being reported. The table provides a statistical summary of yearly, daily, and instantaneous flows, not only for the current water year, but also for the previous calendar year and for a designated period, as appropriate. The designated period selected, WATER YEARS 20__-20__, will consist of all of the station record within the specified water years, inclusive, including complete months of record for partial water years, if any, and may coincide with the period of record for the station. The water years for which the statistics are computed will be consecutive, unless a break in the station record is indicated in the manuscript. All of the calculations for the statistical characteristics designated ANNUAL (see line headings below), except for the ANNUAL 7-DAY MINIMUM statistic, are calculated for the designated period using complete water years. The other statistical characteristics may be calculated using partial water years.

The date or water year, as appropriate, of the first occurrence of each statistic reporting extreme values of discharge is provided adjacent to the statistic. Repeated occurrences may be noted in the REMARKS paragraph of the manuscript or in footnotes. Because the designated period may not be the same as the station period of record published in the manuscript, occasionally the dates of occurrence listed for the daily and instantaneous extremes in the designated-period column may not be within the selected water years listed in the heading. When this occurs, it will be noted in the REMARKS paragraph or in footnotes. Selected streamflow duration curve statistics and runoff data are also given. Runoff data may be omitted if there is extensive regulation or diversion of flow in the drainage basin.

The following summary statistics data, as appropriate, are provided with each continuous record of discharge. Comments to follow clarify infor-

mation presented under the various line headings of the Summary Statistics Table.

ANNUAL TOTAL--The sum of the daily-mean values of discharge for the year. At some stations the yearly-mean discharge is adjusted for reservoir storage or diversion. The adjusted figures are identified by symbol and corresponding footnotes.

ANNUAL MEAN--The arithmetic mean of the individual daily-mean discharges for the year noted or for the designated period. At some stations the yearly-mean discharge is adjusted for reservoir storage or diversion. The adjusted figures are identified by a symbol and corresponding footnotes.

HIGHEST ANNUAL MEAN--The maximum annual-mean discharge occurring for the designated period.

LOWEST ANNUAL MEAN--The minimum annual-mean discharge occurring for the designated period.

HIGHEST DAILY MEAN--The maximum daily-mean discharge for the year or for the designated period.

LOWEST DAILY MEAN--The minimum daily-mean discharge for the year or for the designated period.

ANNUAL 7-DAY MINIMUM--The lowest mean discharge for 7 consecutive days for a calendar year or a water year. Note that most low-flow frequency analyses of annual 7-day minimum flows use a climatic year (April 1-March 31). The date shown in the summary statistics table is the initial date of the 7-day period. (This value should not be confused with the 7-day 10-year low-flow statistic.)

MAXIMUM PEAK FLOW--The maximum instantaneous peak discharge occurring for the water year or designated period. Occasionally the maximum flow for a year may occur at midnight at the beginning or end of the year. In this case, the maximum peak flow is given in the table and the maximum flow may be reported in a footnote or REMARKS paragraph in the manuscript.

MAXIMUM PEAK STAGE--The maximum instantaneous peak stage occurring for the water year or designated period. Occasionally the maximum flow for a year may occur at midnight at the beginning or end of the year, on a recession from or rise toward a higher peak in the adjoining year. In this case, the maximum peak stage is given in the table and the maximum stage may be reported in the REMARKS paragraph in the manuscript or in a footnote. If the dates of occurrence of the maximum peak stage and maximum peak flow are different, the REMARKS paragraph in the manuscript or a footnote may be used to provide further information.

INSTANTANEOUS LOW FLOW--The minimum instantaneous discharge occurring for the water year or for the designated period.

ANNUAL RUNOFF--Indicates the total quantity of water in runoff for a drainage area for the year. Data reports may use any of the following units of measurement in presenting annual runoff data.

Acre-foot (AC-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 about 326,000 gallons or 1,233 cubic meters.

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 the runoff is distributed uniformly in time and area.

Inches (INCHES) indicates the depth to which the drainage area would be covered if all of the runoff for a given time period were uniformly distributed on it.

10 PERCENT EXCEEDS--The discharge that is exceeded by 10 percent of the flow for the designated period.

50 PERCENT EXCEEDS--The discharge that is exceeded by 50 percent of the flow for the designated period.

90 PERCENT EXCEEDS--The discharge that is exceeded by 90 percent of the flow for the designated period.

Data collected at partial-record stations follow the information for continuous-record sites. Data for partial-record discharge 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. The tables of partial-record stations are followed by a listing of discharge measurements made at sites other than continuous-record or partial-record stations. These measurements generally are 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.

Identifying Estimated Daily Discharge

Estimated daily-discharge values published in the water-discharge tables of annual State data reports are identified either by flagging individual daily values with the letter symbol "e" and printing a table footnote, "e Estimated," or by listing the dates of the estimated record in the REMARKS paragraph of the station description.

Accuracy of the Field Data and Completed Results

The accuracy of streamflow records 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 measurements of stage, measurements of discharge, and interpretation of records.

The accuracy attributed to the records is indicated under REMARKS. "Excellent" means that about 95 percent of the daily discharges are within 5 percent of the true; "good," within 10 percent; and "fair," within 15 percent.

Rating classifications for continuous water-quality records

[≤, less than or equal to; ±, plus or minus value shown; °C, degree Celsius; >, greater than; %, percent; mg/L, milligram per liter; pH unit, standard pH unit]

Records that do not meet the criteria mentioned are rated "poor." Different accuracies may be attributed to different parts of a given record.

Daily-mean discharges in this report are given to the nearest hundredth of a cubic foot per second for values less than 1 ft³/s; to the nearest tenth between 1.0 and 10 ft³/s; to whole numbers between 10 and 1,000 ft³/s; and to 3 significant figures for more than 1,000 ft³/s. The number of significant figures used is based solely on the magnitude of the discharge value. The same rounding rules apply to discharges 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.

Other Records Available

Information of a more detailed nature than that published for most of the gaging stations, such as observations of water temperatures, discharge measurements, gage-height records, and rating tables, is on file in the Minnesota District office. Also, most gaging-station records are available in computer-usable form and many statistical analyses have been made.

Information on the availability of unpublished data or statistical analyses may be obtained from the district office.

The National Water-Data Exchange, Water Resources Division, U.S. Geological Survey, National Center, Reston, VA 22092, maintains an index of all discharge-measurement sites in the State as well as an index of records of discharge collected by other agencies but not published by the USGS. Information on records available at specific sites can be obtained upon request.

Measured physical property	Rating			
	Excellent	Good	Fair	Poor
Water temperature	≤ ±0.2 °C	> ±0.2 to 0.5 °C	> ±0.5 to 0.8 °C	> ±0.8 °C
Specific conductance	≤ ±3%	> ±3 to 10%	> ±10 to 15%	> ±15%
Dissolved oxygen	≤ ±0.3 mg/L	> ±0.3 to 0.5 mg/L	> ±0.5 to 0.8 mg/L	> ±0.8 mg/L
pH	≤ ±0.2 unit	> ±0.2 to 0.5 unit	> ±0.5 to 0.8 unit	> ±0.8 unit
Turbidity	≤ ±5%	> ±5 to 10%	> ±10 to 15%	> ±15%

EXPLANATION OF PRECIPITATION RECORDS

Data Collection and Computation

Rainfall data generally are collected using electronic data loggers that measure the rainfall in 0.01-inch increments every 15 minutes using either a tipping-bucket rain gage or a collection well gage. Twenty-four hour rainfall totals are tabulated and presented. A 24-hour period extends from just past midnight of the previous day to midnight of the current day. Snowfall-affected data can result during cold weather when snow fills the rain-gage funnel and then melts as temperatures rise. Snowfall-affected data are subject to errors. Missing values are indicated by this symbol “---” in the table.

Data Presentation

Precipitation records collected at surface-water gaging stations are identified with the same station number and name as the stream-gaging station. Where a surface-water daily-record station is not available, the precipitation record is published with its own name and latitude-longitude identification number.

Information pertinent to the history of a precipitation station is provided in descriptive headings preceding the tabular data. These descriptive headings give details regarding location, period of record, and general remarks.

The following information is provided with each precipitation station. Comments that follow clarify information presented under the various headings of the station description.

LOCATION.—See Data Presentation in the EXPLANATION OF STAGE- AND WATER-DISCHARGE RECORDS section of this report (same comments apply).

PERIOD OF RECORD.—See Data Presentation in the EXPLANATION OF STAGE- AND WATER-DISCHARGE RECORDS section of this report (same comments apply).

INSTRUMENTATION.—Information on the type of rainfall collection system is given.

REMARKS.—Remarks provide added information pertinent to the collection, analysis, or computation of records.

EXPLANATION OF WATER-QUALITY RECORDS

Collection and Examination of Data

Surface-water samples for analysis usually are collected at or near stream-gaging stations. The quality-of-water records are given immediately following the discharge records at these stations.

The descriptive heading for water-quality records gives the period of record for all water-quality data; the period of daily record for parameters that are measured on a daily basis (specific conductance, water temperature, sediment discharge, and so forth); extremes for the current year; and general remarks.

For ground-water records, no descriptive statements are given; however, the well number, depth of well, sampling date, or other pertinent data are given in the table containing the chemical analyses of the ground water.

Water Analysis

Most of the methods used for collecting and analyzing water samples are described in the TWRIs. A list of TWRIs is provided in this report.

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 to obtain a representative sample needed for an accurate mean concentration and for use in calculating load.

Chemical-quality data published in this report are considered to be the most representative values available for the stations listed. The values reported represent water-quality conditions at the time of sampling as much as possible, consistent with available sampling techniques and methods of analysis. In the rare case where an apparent inconsistency exists between a reported pH value and the relative abundance of carbon dioxide species (carbonate and bicarbonate), the inconsistency is the result of a slight uptake of carbon dioxide from the air by the sample between measurement of pH in the field and determination of carbonate and bicarbonate in the laboratory.

For chemical-quality stations equipped with digital monitors, the records consist of daily maximum and minimum values (and sometimes mean or median values) for each constituent measured, and are based on 15-minute or 1-hour intervals of recorded data beginning at 0000 hours and ending at 2400 hours for the day of record.

RECORDS OF SURFACE-WATER QUALITY

Records of surface-water quality ordinarily are obtained at or near stream-gaging stations because interpretation of records of surface-water quality nearly always requires corresponding discharge data. Records of surface-water quality in this report may involve a variety of types of data and measurement frequencies.

Classification of Records

Water-quality data for surface-water sites are grouped into one of three classifications. A **continuing record station** is a site where data are collected on a regularly scheduled basis. Frequency may be one or more times daily, weekly, monthly, or quarterly. A **partial-record station** is a site where limited water-quality data are collected systematically over a period of years. Frequency of sampling is usually less than quarterly. A **miscellaneous** sampling site is a location other than a continuing or partial-record station, where random samples are collected to give better areal coverage to define water-quality conditions in the river basin.

A distinction needs to be made between "continuing records," as used in this report, and "continuous recordings," which refers to a continuous graph or a series of discrete values punched at short intervals on a paper tape. Some records of water quality, such as temperature and specific conductance, may be obtained through continuous recordings; however, **PERIOD OF RECORD.**—See Data Presentation in the EXPLANATION OF STAGE- AND WATER-DISCHARGE RECORDS section of this report (same comments apply).

INSTRUMENTATION.—Information on the type of rainfall collection system is given.

REMARKS.—Remarks provide added information pertinent to the collection, analysis, or computation of records.

Arrangement of Records

EXPLANATION OF WATER-QUALITY RECORDS

Collection and Examination of Data

Surface-water samples for analysis usually are collected at or near stream-gaging stations. The quality-of-water records are given immediately following the discharge records at these stations.

The descriptive heading for water-quality records gives the period of record for all water-quality data; the period of daily record for parameters that are measured on a daily basis (specific conductance, water temperature, sediment discharge, and so forth); extremes for the current year; and general remarks.

For ground-water records, no descriptive statements are given; however, the well number, depth of well, sampling date, or other pertinent data are given in the table containing the chemical analyses of the ground water.

Water Analysis

Most of the methods used for collecting and analyzing water samples are described in the TWRIs. A list of TWRIs is provided in this report.

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 to obtain a representative sample needed for an accurate mean concentration and for use in calculating load.

Chemical-quality data published in this report are considered to be the most representative values available for the stations listed. The values reported represent water-quality conditions at the time of sampling as much as possible, consistent with available sampling techniques and methods of analysis. In the rare case where an apparent inconsistency exists between a reported pH value and the relative abundance of carbon dioxide species (carbonate and bicarbonate), the inconsistency is the result of a slight uptake of carbon dioxide from the air by the sample between measurement of pH in the field and determination of carbonate and bicarbonate in the laboratory.

For chemical-quality stations equipped with digital monitors, the records consist of daily maximum and minimum values (and sometimes mean or median values) for each constituent measured, and are based on 15-minute or 1-hour intervals of recorded data beginning at 0000 hours and ending at 2400 hours for the day of record.

Accuracy of the Records

One of four accuracy classifications is applied for measured physical properties at continuous-record stations on a scale ranging from poor to excellent. The accuracy rating is based on data values recorded before any shifts or corrections are made. Additional consideration also is given to the amount of publishable record and to the amount of data that have been corrected or shifted.

Water-quality records collected at a surface-water daily record station are published immediately following that record, regardless of the frequency of sample collection. Station number and name are the same for both records. Where a surface-water daily-record station is not available or where the water quality differs significantly from that at the nearby surface-water station, the continuing water-quality record is published with its own station number and name in the regular downstream-order sequence. Water-quality data for partial-record stations and for miscellaneous sampling sites appear in separate tables following the table of discharge measurements at miscellaneous sites.

On-Site Measurements and Sample Collection

Water-quality data must be representative of the in situ quality of water. To assure this, certain measurements, such as water temperature, pH, and dissolved oxygen, need to be made onsite when the samples are taken. To assure that measurements made in the laboratory also represent the in situ water, carefully prescribed procedures need to be followed in collecting the samples, in treating the samples to prevent changes in quality pending analysis, and in shipping the samples to the laboratory. Procedures for on-site measurements and for collecting, treating, and shipping samples are given in publications on "Techniques of Water-Resource Investigations," book 1, chap. D2; book 3, chap. C2; book 5 chaps. A1, A3, and A4; book 9, chap. A1-A9. All of these references are listed on pages 22-24 of this report. Also, detailed information on collecting, treating, and shipping samples may be obtained from the USGS Minnesota District office.

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 through several vertical sections to obtain a representative sample needed for an accurate mean concentration and for use in calculating load. All samples obtained for the National Stream Quality Accounting Network (see definitions) are obtained from at least several verticals. Whether samples are obtained from the centroid of flow or from several verticals depends on flow conditions and other factors which must be evaluated by the collector.

Chemical-quality data published in this report are considered to be the most representative values available for the stations listed. The values reported represent water-quality conditions at the time of sampling as much as possible, consistent with available sampling techniques and methods of analysis. In the rare case where an apparent inconsistency exists between a reported pH value and the relative abundance of carbon dioxide species (carbonate and bicarbonate), the inconsistency is the result of a slight uptake of carbon dioxide from the air by the sample between measurement of pH in the field and determination of carbonate and bicarbonate in the laboratory.

For chemical-quality stations equipped with digital monitors, the records consist of daily maximum, minimum, and mean values for each constituent measured and are based upon hourly punches beginning at 0100 hours and ending at 2400 hours for the day of record. More detailed records (hourly values) may be obtained from the USGS Minnesota District office.

Water Temperature

Water temperatures are measured at most of the water-quality stations. In addition, water temperatures are taken at time of discharge measurements for water-discharge stations. For stations where water temperatures are taken manually once or twice daily, the water temperatures are taken at about the same time each day. Large streams have a small diurnal temperature change; 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 recording instruments are used, either mean temperatures or maximum and minimum temperatures for each day are published. Water temperatures measured at the time of water-discharge measurements are on file in the Minnesota District office.

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 subdivided-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 subdivided-day method. For periods when no samples were collected, daily loads of suspended sediment were 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 were collected periodically at many verticals in the stream cross section. Although data collected periodically may represent conditions only at the time of observations, such data are useful in establishing seasonal relations between quality and stream-flow and in predicting long-term sediment-discharge characteristics of the stream.

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

Laboratory Measurements

Samples for indicator bacteria and specific conductance are analyzed locally. All other samples are analyzed in the U.S. Geological Survey laboratories in Arvada, Colorado; Doraville, Georgia; or Iowa City, Iowa. Methods used in analyzing sediment samples and computing sediment records are given in U.S. Geological Survey Techniques of Water Resources Investigations, book 5, chap. C1. Methods used by the USGS laboratories are given in U.S. Geological Survey Techniques of Water Resources Investigation, book 1, chap. D2; book 3, chap. C2; book 5, chaps. A1, A3, and A4.

Data Presentation

For continuous-record stations, information pertinent to the history of station operation is provided in descriptive headings preceding the tabular data. These descriptive headings give details regarding location, drainage area, period of record, type of data available, instrumentation, general remarks, cooperation, and extremes for parameters currently measured daily. Tables of chemical, physical, biological, radiochemical data, and so forth, obtained at a frequency less than daily are presented first. Tables of daily values of specific conductance, pH, water temperature, dissolved, and suspended sediment then follow in sequence.

In the descriptive headings, if the location is identical to that of the discharge gaging station, neither the LOCATION nor the DRAINAGE AREA statements are repeated. The following information, when appropriate, is provided with each continuous-record station. Comments that follow clarify information presented under the various headings of the station description.

LOCATION--See "Data Presentation" under "Records of Stage and Water Discharge;" same comments apply.

DRAINAGE AREA--See "Data Presentation" under "Records of Stage and Water Discharge;" same comments apply.

PERIOD OF RECORD--This indicates the periods for which there are published water-quality records for the station. The periods are shown separately for records of parameters measured daily or continuously and those measured less than daily. For those measured daily or continuously, periods of record are given for the parameters individually.

INSTRUMENTATION--Information on instrumentation is given only if a water-quality monitor, temperature recorder, sediment pumping sampler, or other sampling device is in operation at a station.

REMARKS--Remarks provide added information pertinent to the collection, analysis, or computation of the records.

COOPERATION--Records provided by a cooperating organization or obtained for the USGS by a cooperating organization are identified here.

EXTREMES--Maximums and minimums are given only for parameters measured daily or more frequently. None are given for parameters measured weekly or less frequently, because the true maximums or minimums may not have been sampled. Extremes, when given, are provided for both the period of record and for the current water year.

REVISIONS--If errors in published water-quality records are discovered after publication, appropriate updates are made to the Water-Quality File in the U.S. Geological Survey's computerized data system, WATSTORE, and subsequently by monthly transfer of update transactions to the U.S. Environmental Protection Agency's STORET system. Because the usual volume of updates makes it impractical to document individual changes in the State data-report series or elsewhere, potential users of USGS water-quality data are encouraged to obtain all required data from the appropriate computer file to ensure the most recent updates.

The surface-water-quality records for partial-record stations and miscellaneous sampling sites are published in separate tables following the table of discharge measurements at miscellaneous sites. No descriptive statements are given for these records. Each station is published with its own station number and name in the regular downstream-order sequence.

Remark Codes

The following remark codes may appear with the water-quality data in this report:

**PRINTED
OUTPUT**

REMARK	REMARK
e, E	Estimated value
>	Actual value is known to be greater than the value shown
<	Actual value is known to be less than the value shown
K	Results based on colony count outside the acceptance range (non-ideal colony count)
L	Biological organisms count less than 0.5 percent (organisms may be observed rather than counted)
D	Biological organism count equal to or greater than 15 percent (dominant)
M	Presence of material verified, but not quantified.
V	Analyte was detected in both the environmental sample and the associated blanks
&	Biological organism estimated as dominant.

Water Quality-Control Data

The USGS National Water-Quality Laboratory collects quality-control data on a continuing basis to evaluate selected analytical methods to determine long-term method detection levels (LT-MDLs) and laboratory reporting levels (LRLs). These values are re-evaluated each year on the basis of the most recent quality-control data and, consequently, may change from year to year.

This reporting procedure limits the occurrence of false positive error. Falsely reporting a concentration greater than the LT-MDL for a sample in which the analyte is not present is 1 percent or less. Application of the LRL limits the occurrence of false negative error. The chance of falsely reporting a non-detection for a sample in which the analyte is present at a concentration equal to or greater than the LRL is 1 percent or less.

Accordingly, concentrations are reported as less than LRL for samples in which the analyte was either not detected or did not pass identification. Analytes detected at concentrations between the LT-MDL and the LRL and that pass identification criteria are estimated. Estimated concentrations will be noted with a remark code of "E." These data should be used with the understanding that their uncertainty is greater than that of data reported without the E remark code.

Data generated from quality-control (QC) samples are a requisite for evaluating the quality of the sampling and processing techniques as well as data from the actual samples themselves. Without QC data, environmental sample data cannot be adequately interpreted because the errors associated with the sample data are unknown. The various types of QC samples collected by this district are described in the following section. Procedures have been established for the storage of water-quality-control data within the USGS. These procedures allow for storage of all derived QC data and are identified so that they can be related to corresponding environmental samples.

Blank Samples

Blank samples are collected and analyzed to ensure that environmental samples have not been contaminated by the overall data-collection process.

The blank solution used to develop specific types of blank samples is a solution that is free of the analytes of interest. Any measured value signal in a blank sample for an analyte (a specific component measured in a chemical analysis) that was absent in the blank solution is believed to be due to contamination. There are many types of blank samples possible, each designed to segregate a different part of the overall data-collection process. The types of blank samples collected in this district are:

FIELD BLANK--a blank solution that is subjected to all aspects of sample collection, field processing preservation, transportation, and laboratory handling as an environmental sample.

TRIP BLANK--a blank solution that is put in the same type of bottle used for an environmental sample and kept with the set of sample bottles before and after sample collection.

EQUIPMENT BLANK--a blank solution that is processed through all equipment used for collecting and processing an environmental sample (similar to a field blank, but normally done in the more controlled conditions of the office).

SAMPLER BLANK--a blank solution that is poured or pumped through the same field sampler used for collecting an environmental sample.

FILTER BLANK--a blank solution that is filtered in the same manner and through the same filter apparatus used for an environmental sample.

SPLITTER BLANK--a blank solution that is mixed and separated using a field splitter in the same manner and through the same apparatus used for an environmental sample.

PRESERVATION BLANK--a blank solution that is treated with the sampler preservatives used for an environmental sample.

Reference Samples

Reference material is a solution or material prepared by a laboratory whose composition is certified for one or more properties so that it can be used to assess a measurement method. Samples of reference material are submitted for analysis to ensure that an analytical method is accurate for the known properties of the reference material. Generally, the selected reference material properties are similar to the environmental sample properties.

Replicate Samples

Replicate samples are a set of environmental samples collected in a manner such that the samples are thought to be essentially identical in composition. Replicate is the general case for which a duplicate is the special case consisting of two samples. Replicate samples are collected and analyzed to establish the amount of variability in the data contributed by some part of the collection and analytical process. There are many types of replicate samples possible, each of which may yield slightly different results in a dynamic hydrologic setting, such as a flowing stream. The types of replicate samples collected in this district are:

CONCURRENT SAMPLES—A type of replicate sample in which the samples are collected simultaneously with two or more samplers or by using one sampler and alternating the collection of samples into two or more compositing containers.

SEQUENTIAL SAMPLE--a type of replicate sample in which the samples are collected one after the other, typically over a short time.

SPLIT SAMPLE--a type of replicate sample in which a sample is split into subsamples contemporaneous in time and space.

Spike Samples

Spike samples are samples to which known quantities of a solution with one or more well-established analyte concentrations have been added. These samples are analyzed to determine the extent of matrix interference or degradation on the analyte concentration during sample processing and analysis.

EXPLANATION OF GROUND-WATER-LEVEL RECORDS

Generally, only ground-water-level data from selected wells with continuous recorders from a basic network of observation wells are published in this report. This basic network contains observation wells located so that the most significant data are obtained from the fewest wells in the most important aquifers.

Site Identification Numbers

Each well is identified by means of (1) a 15-digit number that is based on latitude and longitude and (2) a local number that is produced for local needs.

Data Collection and Computation

Measurements are made in many types of wells, under varying conditions of access and at different temperatures; hence, neither the method of measurement nor the equipment can be standardized. At each observation well, however, the equipment and techniques used are those that will ensure that measurements at each well are consistent.

Most methods for collecting and analyzing water samples are described in the TWRI's referred to in the On-site Measurements and Sample Collection and the Laboratory Measurements sections in this report. In addition, TWRI book 1, chapter D2, describes guidelines for the collection and field analysis of ground-water samples for selected unstable constituents. Procedures for on-site measurements and for collecting, treating, and shipping samples are given in TWRI's book 1, chapter D2; book 3, chapters A1, A3, and A4; and book 9, chapters A1 through A9. The values in this report represent water-quality conditions at the time of sampling, as much as possible, and that are consistent with available sampling techniques and methods of analysis. These methods are consistent with ASTM standards and generally follow ISO standards. Trained personnel collected all samples. The wells sampled were pumped long enough to ensure that the water collected came directly from the aquifer and had not stood for a long time in the well casing where it would have been exposed to the atmosphere and to the material, possibly metal, comprising the casings.

Water-level measurements in this report are given in feet with reference to land-surface datum (lsd). Land-surface datum is a datum plane that is approximately at land surface at each well. If known, the elevation of the land-surface datum above sea level is given in the well description. The height of the measuring point (MP) above or below land-surface datum is given in each well description. Water levels in wells equipped with recording gages are reported for every fifth day and the end of each month (EOM).

Water levels are reported to as many significant figures as can be justified by the local conditions. For example, in a measurement of a depth of water of several hundred feet, the error in determining the absolute value of the total depth to water may be a few tenths of a foot, whereas the error in determining the net change of water level between successive measurements may be only a hundredth or a few hundredths of a foot. For lesser depths to

water the accuracy is greater. Accordingly, most measurements are reported to a hundredth of a foot, but some are given only to a tenth of a foot or a larger unit.

Data Presentation

Water-level data are presented in alphabetical order by county. The primary identification number for a given well is the 15-digit site identification number that appears in the upper left corner of the table. The secondary identification number is the local or county well number. Well locations are shown in figure 8; each well is identified on the map by its local well or county well number.

Each well record consists of three parts: the well description, the data table of water levels observed during the water year, and, for most wells, a hydrograph following the data table. Well descriptions are presented in the headings preceding the tabular data.

The following comments clarify information presented in these various headings.

LOCATION.—This paragraph follows the well-identification number and reports the hydrologic-unit number and a geographic point of reference. Latitudes and longitudes used in this report are reported as North American Datum of 1927 unless otherwise specified.

AQUIFER.—This entry designates by name and geologic age the aquifer that the well taps.

WELL CHARACTERISTICS.—This entry describes the well in terms of depth, casing diameter and depth or screened interval, method of construction, use, and changes since construction.

INSTRUMENTATION.—This paragraph provides information on both the frequency of measurement and the collection method used, allowing the user to better evaluate the reported water-level extremes by knowing whether they are based on continuous, monthly, or some other frequency of measurement.

DATUM.—This entry describes both the measuring point and the land-surface elevation at the well. The altitude of the land-surface datum is described in feet above the altitude datum; it is reported with a precision depending on the method of determination. The measuring point is described physically (such as top of casing, top of instrument shelf, and so forth), and in relation to land surface (such as 1.3 ft above land-surface datum). The elevation of the land-surface datum is described in feet above National Geodetic Vertical Datum of 1929 (NGVD 29); it is reported with a precision depending on the method of determination.

REMARKS.—This entry describes factors that may influence the water level in a well or the measurement of the water level, when various methods of measurement were begun, and the network (climatic, terrane, local, or areal effects) or the special project to which the well belongs.

PERIOD OF RECORD.—This entry indicates the time period for which records are published for the well, the month and year at the start of publication of water-level records by the USGS, and the words "to current year" if the records are to be continued into the following year. Time periods for which water-level records are available, but are not published by the USGS, may be noted.

EXTREMES FOR PERIOD OF RECORD.—This entry contains the highest and lowest instantaneously recorded or measured water lev-

els of the period of published record, with respect to land-surface datum or sea level, and the dates of occurrence.

Water-Level Tables

A table of water levels follows the well description for each well. Water-level measurements in this report are given in feet with reference to either sea level or land-surface datum (l.s.d). Missing records are indicated by dashes in place of the water-level value.

For wells not equipped with recorders, water-level measurements were obtained periodically by steel or electric tape. Tables of periodic water-level measurements in these wells show the date of measurement and the measured water-level value.

Hydrographs

Hydrographs are a graphic display of water-level fluctuations over a period of time. In this report, current water year and, when appropriate, period-of-record hydrographs are shown. Hydrographs that display periodic water-level measurements show points that may be connected with a dashed line from one measurement to the next. Hydrographs that display recorder data show a solid line representing the mean water level recorded for each day. Missing data are indicated by a blank space or break in a hydrograph. Missing data may occur as a result of recorder malfunctions, battery failures, or mechanical problems related to the response of the recorder's float mechanism to water-level fluctuations in a well.

GROUND-WATER-QUALITY DATA

Data Collection and Computation

The ground-water-quality data in this report were obtained as a part of special studies in specific areas. Consequently, a number of chemical analyses are presented for some wells within a county, but not for others. As a result, the records for this year, by themselves, do not provide a balanced view of ground-water quality Statewide.

Most methods for collecting and analyzing water samples are described in the TWRI. Procedures for on-site measurements and for collecting, treating, and shipping samples are given in TWRI, book 1, chapter D2; book 3, chapter C2; and book 5, chapters A1, A3, and A4. Also, detailed information on collecting, treating, and shipping samples may be obtained from the USGS District office (see address shown on back of title page in this report).

Laboratory Measurements

Analysis for sulfide and measurement of alkalinity, pH, water temperature, specific conductance, and dissolved oxygen are performed on site. All other sample analyses are performed at the USGS laboratory in Lakewood, Colorado, unless otherwise noted. Methods used by the USGS laboratory are given in TWRI, book 1, chapter D2; book 3, chapter C2; and book 5, chapters A1, A3, and A4.

ACCESS TO USGS WATER DATA

The USGS provides near real-time stage and discharge data for many of the gaging stations equipped with the necessary telemetry and historic daily-mean and peak-flow discharge data for most current or discontinued gaging stations through the World Wide Web (WWW). These data may be accessed from <http://water.usgs.gov>.

Water-quality data and ground-water data also are available through the World Wide Web. In addition, data can be provided in various machine-

readable formats on various media. Information about the availability of specific types of data or products, and user charges, can be obtained locally from each Water Discipline District Office (See address that is shown on the back of the title page of this report.)

RECORDS OF GROUND-WATER QUALITY

Records of ground-water quality in this report differ from other types of records in that for most sampling sites they consist of only one set of measurements for the water year. The quality of ground water ordinarily changes only slowly; therefore, for most general purposes one annual sampling, or only a few samples taken at infrequent intervals during the year, is sufficient. Frequent measurement of the same constituents is not necessary unless one is concerned with a particular problem, such as monitoring for trends in nitrate concentration. In the special cases where the quality of ground water may change more rapidly, more frequent measurements are made to identify the nature of the changes.

Data Collection and Computation

The records of ground-water quality in this report were obtained mostly as a part of special studies in specific areas. Consequently, a number of chemical analyses are presented for some counties, but none are presented for others. As a result, the records for this year, by themselves, do not provide a balanced view of ground-water quality statewide. Such a view can be attained only by considering records for this year in context with similar records obtained for these and other counties in earlier years.

Most methods for collecting and analyzing water samples are described in the U.S. Geological Survey Techniques of Water-Resources Investigation manuals. The values reported in this report represent water-quality conditions at the time of sampling as much as possible, consistent with available sampling techniques and methods of analysis. All samples were obtained by trained personnel. The wells sampled were pumped long enough to assure that the water collected came directly from the aquifer and had not stood for a long time in the well casing where it would have been exposed to the atmosphere and to the material, possibly metal, comprising the casings.

Data Presentation

The records of ground-water quality are published in the section entitled QUALITY OF GROUND WATER. Data for quality of ground water are listed alphabetically, by county, and are identified by well number. The prime identification number for wells sampled is the 15-digit number derived from the latitude-longitude locations. No descriptive statements are given for ground-water-quality records; 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. The REMARK codes listed for surface-water-quality records also are applicable to ground-water-quality records.

DEFINITION OF TERMS

Specialized technical terms related to streamflow, water-quality, and other hydrologic data, as used in this report, are defined below. Terms such as algae, water level, and precipitation are used in their common everyday meanings, definitions of which are given in standard dictionaries. Not all terms defined in this alphabetical list apply to every State. See also table for converting English units to International System (SI) Units on the inside of the back cover. Other glossaries that also define water-related terms are accessible from <http://water.usgs.gov/glossaries.html>.

Acid neutralizing capacity (ANC) is the equivalent sum of all bases or base-producing materials, solutes plus particulates, in an aqueous system that can be titrated with acid to an equivalence point. This term designates titration of an "unfiltered" sample (formerly reported as alkalinity).

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, 325,851 gallons, or 1,233 cubic meters. (See also "Annual runoff")

Adjusted discharge is discharge data that have been mathematically adjusted (for example, to remove the effects of a daily tide cycle or reservoir storage).

Algae are mostly aquatic single-celled, colonial, or multicelled plants containing chlorophyll and lacking roots, stems, and leaves.

Alkalinity is the capacity of solutes in an aqueous system to neutralize acid. This term designates titration of a "filtered" sample.

Annual runoff is the total quantity of water in runoff for a drainage area for the year. Data reports may use any of the following units of measurement in presenting annual runoff data:

Acre-foot (AC-FT, acre-ft) is the quantity of water required to cover 1 acre to a depth of 1 foot and is equal to 43,560 cubic feet, 325,851 gallons, or 1,233 cubic meters.

Cubic foot per second per square mile [CFSM, (ft³/s)/mi²] is the average number of cubic feet of water flowing per second from each square mile of area drained, assuming the runoff is distributed uniformly in time and area.

Inch (IN., in.) as used in this report, refers to the depth to which the drainage area would be covered with water if all of the runoff for a given time period were uniformly distributed on it.

Annual 7-day minimum is the lowest mean value for any 7-consecutive-day period in a year. Annual 7-day minimum values are reported herein for the calendar year and the water year (October 1 through September 30). Most low-flow frequency analyses use a climatic year (April 1-March 31), which tends to prevent the low-flow period from being artificially split between adjacent years. The date shown in the summary statistics table is the initial date of the 7-day period. (This value should not be confused with the 7-day, 10-year low-flow statistic.)

Ash mass is the mass or amount of residue present after the residue from a dry-mass determination has been ashed in a muffle furnace at a temperature of 500 °C for 1 hour. Ash mass of zooplankton and phytoplankton is expressed in grams per cubic meter (g/m³), and periphyton and benthic organisms in grams per square meter (g/m²). (See also "Biomass" and "Dry mass")

Aspect is the direction toward which a slope faces with respect to the compass.

Bacteria are microscopic unicellular organisms, typically spherical, rod like, or spiral and threadlike in shape, often clumped into colonies. Some bacteria cause disease, while others perform an essential role in nature in the recycling of materials; for example, by decomposing organic matter into a form available for reuse by plants.

Total coliform bacteria are a particular group of bacteria that are used as indicators of possible sewage pollution. This group includes coliforms that inhabit the intestine of warm-blooded animals and those that inhabit soils. They are characterized as aerobic or facultative anaerobic, gram-negative, nonspore-forming, rod-shaped bacte-

ria that ferment lactose with gas formation within 48 hours at 35 °C. In the laboratory, these bacteria are defined as all the organisms that produce colonies with a golden-green metallic sheen within 24 hours when incubated at 35 °C plus or minus 1.0 °C on M-Endo medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample.

Fecal coliform bacteria are bacteria that are present in the intestine or feces of warm-blooded animals. They are often used as indicators of the sanitary quality of the water. In the laboratory, they are defined as all organisms that produce blue colonies within 24 hours when incubated at 44.5 °C plus or minus 0.2 °C on M-FC medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample.

Fecal streptococcal bacteria are bacteria found in the intestine of warm-blooded animals. Their presence in water is considered to verify fecal pollution. They are characterized as gram-positive, cocci bacteria that are capable of growth in brain-heart infusion broth. In the laboratory, they are defined as all the organisms that produce red or pink colonies within 48 hours at 35 °C plus or minus 1.0 °C on KF-streptococcus medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample.

Escherichia coli (E. coli) are bacteria present in the intestine and feces of warm-blooded animals. *E. coli* are a member species of the fecal coliform group of indicator bacteria. In the laboratory, they are defined as those bacteria that produce yellow or yellow-brown colonies on a filter pad saturated with urea substrate broth after primary culturing for 22 to 24 hours at 44.5 °C on mTEC medium. Their concentrations are expressed as number of colonies per 100 mL of sample.

Bankfull stage, as used in this report, is the stage at which a stream first overflows its natural banks formed by floods with 1- to 3-year recurrence intervals.

Base discharge (for peak discharge) is a discharge value, determined for selected stations, above which peak discharge data are published. The base discharge at each station is selected so that an average of about three peak flows per year will be published. (See also "Peak flow")

Base flow is flow in a channel sustained by ground-water discharge in the absence of direct runoff.

Bed material is the sediment mixture of which a streambed, lake, pond, reservoir, or estuary bottom is composed. (See also "Bedload" and "Sediment")

Bottom material: See "Bed material."

Canadian Geodetic Vertical Datum 1928 is a geodetic datum derived from a general adjustment of Canada's first order level network in 1928.

Cells/volume refers to the number of cells of any organism that is counted by using a microscope and grid or counting cell. Many planktonic organisms are multicelled and are counted according to the number of contained cells per sample volume, and generally are reported as cells or units per milliliter (mL) or liter (L).

Cells volume (biovolume) determination is one of several common methods used to estimate biomass of algae in aquatic systems. Cell members of algae are frequently used in aquatic surveys as an indicator of algal production. However, cell numbers alone cannot represent true biomass because of considerable cell-size variation among the algal species. Cell volume (μm³) is determined by obtaining critical cell measurements on cell dimensions (for example, length, width, height, or radius) for 20 to 50 cells of each

important species to obtain an average biovolume per cell. Cells are categorized according to the correspondence of their cellular shape to the nearest geometric solid or combinations of simple solids (for example, spheres, cones, or cylinders). Representative formula used to compute biovolume are as follows:

$$\text{sphere } \frac{4}{3} \pi^3 \quad \text{cone } \frac{1}{3} \pi^3 h \quad \text{cylinder } \pi^3 h.$$

From cell volume, total algal biomass expressed as biovolume ($\mu\text{m}^3/\text{mL}$) is thus determined by multiplying the number of cells of a given species by its average cell volume and then summing these volumes over all species.

Cfs-day (See "Cubic foot per second-day")

Chemical oxygen demand (COD) is a measure of the chemically oxidizable material in the water and furnishes an approximation of the amount of organic and reducing material present. The determined value may correlate with BOD or with carbonaceous organic pollution from sewage or industrial wastes. (See also "Biochemical oxygen demand" (BOD))

Chlorophyll refers to the green pigments of plants. Chlorophyll *a* and *b* are the two most common green pigments in plants.

Colloid is any substance with particles in such a fine state of subdivision dispersed in a medium (for example, water) that they do not settle out; but not in so fine a state of subdivision that they can be said to be truly dissolved.

Confined aquifer is a term used to describe an aquifer containing water between two relatively impermeable boundaries. The water level in a well tapping a confined aquifer stands above the top of the confined aquifer and can be higher or lower than the water table that may be present in the material above it. In some cases the water level can rise above the ground surface, yielding a flowing well.

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.

Continuous-record station is a site that meets either of the following conditions:

Stage or streamflow are recorded at some interval on a continuous basis. The recording interval is usually 15 minutes, but may be less or more frequent.

Water-quality, sediment, or other hydrologic measurements are recorded at least daily.

Control designates a feature in the channel downstream from a gaging station that physically influences the water-surface elevation and thereby determines the stage-discharge relation at the station. This feature may be a constriction of the channel, a bedrock outcrop, a gravel bar, an artificial structure, or a uniform cross section over a long reach of the channel.

Control structure as used in this report is a structure on a stream or canal that is used to regulate the flow or stage of the stream or to prevent the intrusion of saltwater.

Cubic foot per second (CFS, ft^3/s) is the rate of discharge representing a volume of 1 cubic foot passing a given point in 1 second. It is equivalent to approximately 7.48 gallons per second, 449 gallons per minute, or 0.02832 cubic meters per second. The daily mean discharges report in the daily value

tables numerically are equal to the daily volumes in cfs-days, and the totals also represent volumes in cfs-days.

Cubic foot per second-day (CFS-DAY, Cfs-day, $[(\text{ft}^3/\text{s})/\text{d}]$) 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, 1.9837 acre-feet, 646,317 gallons, or 2,447 cubic meters. The daily mean discharges reported in the daily value data tables numerically equal to the daily volumes in cfs-days, and the totals represent volumes in cfs-days.

Cubic foot per second per square mile [CFSM, $(\text{ft}^3/\text{s})/\text{mi}^2$] is the average number of cubic feet of water flowing per second from each square mile of area drained, assuming the runoff is distributed uniformly in time and area. (See also "Annual runoff")

Daily mean suspended-sediment concentration is the time-weighted mean concentration of suspended sediment passing a stream cross section during a 24-hour day. (See also "Sediment" and "Suspended-sediment concentration")

Daily record is a summary of streamflow, sediment, or water-quality values computed from data collected with sufficient frequency to obtain reliable estimates of daily mean values.

Daily record station is a site for which daily records of streamflow, sediment, or water-quality values are computed.

Data collection platform (DCP) is an electronic instrument that collects, processes, and stores data from various sensors, and transmits the data by satellite data relay, line-of-sight radio, and/or landline telemetry.

Data logger is a microprocessor-based data acquisition system designed specifically to acquire, process, and store data. Data usually are downloaded from onsite data loggers for entry into office data systems.

Datum is a surface or point relative to which measurements of height and/or horizontal position are reported. A vertical datum is a horizontal surface used as the zero point for measurements of gage height, stage, or elevation; a horizontal datum is a reference for positions given in terms of latitude-longitude, State Plane coordinates, or Universal Transverse Mercator (UTM) coordinates. (See also "Gage datum," "Land-surface datum," "National Geodetic Vertical Datum of 1929," and "North American Vertical Datum of 1988")

Discharge, or flow, is the volume of water (or more broadly, volume of fluid including solid- and dissolved-phase material), that passes a given point in a given period of time.

Annual 7-day minimum is the lowest mean discharge for 7 consecutive days in a year. Note that most low-flow frequency analyses of annual 7-day minimum flows use a climatic year (April 1-March 31). The date shown in the summary statistics table is the initial date of the 7-day period. (This value should not be confused with the 7-day 10-year low-flow statistic.)

Instantaneous discharge is the discharge at a particular instant of time.

Mean discharge (MEAN) is the arithmetic mean of individual daily mean discharges during a specific period.

Dissolved refers to that material in a representative water sample that passes through a 0.45-micrometer membrane filter. This is a convenient operational definition used by Federal agencies that collect water data. Determinations of "dissolved" constituents are made on subsamples of the filtrate.

Dissolved oxygen (DO) content of water in equilibrium with air is a function of atmospheric pressure, temperature, and dissolved-solids concentration of the water. The ability of water to retain oxygen decreases with increasing temperature or dissolved solids, with small temperature changes having the more significant offset. Photosynthesis and respiration may cause diurnal variations in dissolved-oxygen concentration in water from some streams.

Dissolved-solids concentration of water is determined either analytically by the "residue-on-evaporation" method, or mathematically by totaling the concentrations of individual constituents reported in a comprehensive chemical analysis. During that analytical determination of dissolved solids, the bicarbonate (generally a major dissolved component of water) is converted to carbonate. Therefore, in the mathematical calculation of dissolved-solids concentration, the bicarbonate value, in milligrams per liter, is multiplied by 0.4926 to reflect the change. Alternatively, alkalinity concentration (as mg/L CaCO_3) can be converted to carbonate concentration by multiplying by 0.60.

Drainage area of a site on a stream is that area, measured in a horizontal plane, that has a common outlet at the site for its surface runoff. Figures of drainage area given herein include all closed basins, or noncontributing areas, within the area unless otherwise specified.

Drainage basin is a part of the Earth's surface that is occupied by a drainage system with a common outlet for its surface runoff (see "Drainage area").

Dry mass refers to the mass of residue present after drying in an oven at 105 °C, until the mass remains unchanged. This mass represents the total organic matter, ash and sediment, in the sample. Dry-mass values are expressed in the same units as ash mass. (See also "Ash mass," "Biomass," and "Wet mass")

Dry weight refers to the weight of animal tissue after it has been dried in an oven at 65 °C until a constant weight is achieved. Dry weight represents total organic and inorganic matter in the tissue. (See also "Wet weight")

Estimated (E) value of a concentration is reported when an analyte is detected and all criteria for a positive result are met. If the concentration is less than the method detection limit (MDL), an E code will be reported with the value. If the analyte is identified qualitatively as present, but the quantitative determination is substantially more uncertain, the National Water-Quality Laboratory will identify the result with an E code even though the measured value is greater than the MDL. A value reported with an E code should be used with caution. When no analyte is detected in a sample, the default reporting value is the MDL preceded by a less than sign (<). For bacteriological data, concentrations are reported as estimated when results are based on non-ideal colony counts.

Flow-duration percentiles are values on a scale of 100 that indicate the percentage of time for which a flow is not exceeded. For example, the 90th percentile of river flow is greater than or equal to 90 percent of all recorded flow rates.

Gage datum is the elevation of the zero point of the reference gage from which gage height is determined as compared to sea level (see "Datum"). This elevation is established by a system of levels from known benchmarks, by approximation from topographic maps, or by geographical positioning system.

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

Gaging station is a site on a stream, canal, lake, or reservoir where systematic observations of stage, discharge, or other hydrologic data are obtained.

Gage values are values that are recorded, transmitted, and/or computed from a gaging station. Gage values typically are collected at 5-, 15-, or 30-minute intervals.

Gas chromatography/flame ionization detector (GC/FID) is a laboratory analytical method used as a screening technique for semi-volatile organic compounds that are extractable from water in methylene chloride.

Ground-water level is the elevation of the water table or another potentiometric surface at a particular location.

Hardness of water is a physical-chemical characteristic that is commonly recognized by the increased quantity of soap required to produce lather. It is attributable to the presence of alkaline earths (principally calcium and magnesium) and is expressed as the equivalent concentration of calcium carbonate (CaCO_3).

Horizontal datum (See "Datum")

Hydrologic index stations referred to in this report are continuous-record gaging stations that have been selected as representative of stream-flow patterns for their respective regions. Station locations are shown on index maps.

Hydrologic benchmark 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 benchmark station may be used to separate effects of natural from human-induced changes in other basins that have been developed and in which the physiography, climate, and geology are similar to those in the undeveloped benchmark basin.

Hydrologic unit is a geographic area representing part or all of a surface drainage basin or distinct hydrologic feature as defined by the former Office of Water Data Coordination and delineated on the State Hydrologic Unit Maps by the U.S. Geological Survey. Each hydrologic unit is identified by an 8-digit number.

Inch (IN., in.), in reference to streamflow, as used in this report, refers to the depth to which the drainage area would be covered with water if all of the runoff for a given time period were distributed uniformly on it. (See also "Annual runoff")

Instantaneous discharge is the discharge at a particular instant of time. (See also "Discharge")

International Boundary Commission Survey Datum refers to a geodetic datum established at numerous monuments along the United States-Canada boundary by the International Boundary Commission.

Laboratory reporting level (LRL) generally is equal to twice the yearly determined long-term method detection level (LT-MDL). The LRL controls false negative error. The probability of falsely reporting a nondetection for a sample that contained an analyte at a concentration equal to or greater than the LRL is predicted to be less than or equal to 1 percent. The

value of the LRL will be reported with a “less than” (<) remark code for samples in which the analyte was not detected. The National Water Quality Laboratory (NWQL) collects quality-control data from selected analytical methods on a continuing basis to determine LT-MDLs and to establish LRLs. These values are reevaluated annually on the basis of the most current quality-control data and, therefore, may change. The LRL replaces the term ‘non-detection value’ (NDV).

Land-surface datum (Lsd) is a datum plane that is approximately at land surface at each ground-water observation well.

Long-term method detection level (LT-MDL) is a detection level derived by determining the standard deviation of a minimum of 24 method detection limit (MDL) spike-sample measurements over an extended period of time. LT-MDL data are collected on a continuous basis to assess year-to-year variations in the LT-MDL. The LT-MDL controls false positive error. The chance of falsely reporting a concentration at or greater than the LT-MDL for a sample that did not contain the analyte is predicted to be less than or equal to 1 percent.

Low tide is the minimum height reached by each falling tide. The high-low and low-low tides are the higher and lower of the two low tides, respectively, of each tidal day. See NOAA web site: <http://www.co-ops.nos.noaa.gov/tideglos.html>

Macrophytes are the macroscopic plants in the aquatic environment. The most common macrophytes are the rooted vascular plants that are usually arranged in zones in aquatic ecosystems and restricted in the area by the extent of illumination through the water and sediment deposition along the shoreline.

Mean concentration of suspended sediment (Daily mean suspended-sediment concentration) is the time-weighted concentration of suspended sediment passing a stream cross section during a given time period. (See also “Daily mean suspended-sediment concentration” and “Suspended-sediment concentration”)

Mean discharge (MEAN) is the arithmetic mean of individual daily mean discharges during a specific period. (See also “Discharge”)

Mean high or low tide is the average of all high or low tides, respectively, over a specific period.

Mean sea level is a local tidal datum. It is the arithmetic mean of hourly heights observed over the National Tidal Datum Epoch. Shorter series are specified in the name; for example, monthly mean sea level and yearly mean sea level. In order that they may be recovered when needed, such datums are referenced to fixed points known as benchmarks. (See also “Datum”)

Measuring point (MP) is an arbitrary permanent reference point from which the distance to water surface in a well is measured to obtain water level.

Megahertz is a unit of frequency. One megahertz equals one million cycles per second.

Membrane filter is a thin microporous material of specific pore size used to filter bacteria, algae, and other very small particles from water.

Method detection limit (MDL) is the minimum concentration of a substance that can be measured and reported with 99-percent confidence that the analyte concentration is greater than zero. It is determined from the analysis of a sample in a given matrix containing the analyte. At the MDL con-

centration, the risk of a false positive is predicted to be less than or equal to 1 percent.

Micrograms per gram (UG/G, $\mu\text{g/g}$) is a unit expressing the concentration of a chemical constituent as the mass (micrograms) of the element per unit mass (gram) of material analyzed.

Micrograms per kilogram (UG/KG, $\mu\text{g/kg}$) is a unit expressing the concentration of a chemical constituent as the mass (micrograms) of the constituent per unit mass (kilogram) of the material analyzed. One microgram per kilogram is equivalent to 1 part per billion.

Micrograms per liter (UG/L, $\mu\text{g/L}$) is a unit expressing the concentration of chemical constituents in water as mass (micrograms) of constituent per unit volume (liter) of water. One thousand micrograms per liter is equivalent to 1 milligram per liter.

Microsiemens per centimeter (US/CM, $\mu\text{S/cm}$) is a unit expressing the amount of electrical conductivity of a solution as measured between opposite faces of a centimeter cube of solution at a specified temperature. Siemens is the International System of Units nomenclature. It is synonymous with mhos and is the reciprocal of resistance in ohms.

Milligrams per liter (MG/L, mg/L) is a unit for expressing the concentration of chemical constituents in water as the mass (milligrams) of constituent per unit volume (liter) of water. Concentration of suspended sediment also is expressed in mg/L and is based on the mass of dry sediment per liter of water-sediment mixture.

Minimum reporting level (MRL) is the smallest measured concentration of a constituent that may be reliably reported by using a given analytical method.

Miscellaneous site, or miscellaneous station, is a site where stream-flow, sediment, and/or water-quality data are collected once, or more often on a random or discontinuous basis to provide better areal coverage for defining hydrologic and water-quality conditions over a broad area.

Most probable number (MPN) is an index of the number of coliform bacteria that, more probably than any other number, would give the results shown by the laboratory examination; it is not an actual enumeration. MPN is determined from the distribution of gas-positive cultures among multiple inoculated tubes.

Nanograms per liter (NG/L, ng/L) is a unit expressing the concentration of chemical constituents in solution as mass (nanograms) of solute per unit volume (liter) of water. One million nanograms per liter is equivalent to 1 milligram per liter.

National Geodetic Vertical Datum of 1929 (NGVD 29) is a fixed reference adopted as a standard geodetic datum for elevations determined by leveling. It formerly was called “Sea Level Datum of 1929” or “mean sea level.” Although the datum was derived from the mean sea level at 26 tide stations, it does not necessarily represent local mean sea level at any particular place. See NOAA Web site: <http://www.ngs.noaa.gov/faq.shtml#WhatVD29VD88> (See “North American Vertical Datum of 1988”)

Nephelometric turbidity unit (NTU) is the measurement for reporting turbidity that is based on use of a standard suspension of Formazin. Turbidity measured in NTU uses nephelometric methods that depend on passing specific light of a specific wavelength through the sample.

North American Datum of 1927 (NAD 27) is the horizontal control datum for the United States that was defined by a location and azimuth on the Clarke spheroid of 1866.

North American Datum of 1983 (NAD 83) is the horizontal control datum for the United States, Canada, Mexico, and Central America that is based on the adjustment of 250,000 points including 600 satellite Doppler stations that constrain the system to a geocentric origin. NAD 83 has been officially adopted as the legal horizontal datum for the United States by the Federal government.

North American Vertical Datum of 1988 (NAVD of 1988) is the vertical control datum established in 1991 by the minimum-constraint adjustment of the Canadian-Mexican-U.S. leveling observations. It held fixed the height of the primary tidal bench mark, referenced to the new International Great Lakes Datum of 1985 local mean sea level height value, at Father Point/Rimouski, Quebec, Canada. See NOAA web site: <http://www.ngs.noaa.gov/faq.shtml#WhatVD29VD88>

Open or screened interval is the length of unscreened opening or of well screen through which water enters a well, in feet below land surface.

Organic carbon (OC) is a measure of organic matter present in aqueous solution, suspension, or bottom sediments. May be reported as dissolved organic carbon (DOC), suspended organic carbon (SOC), or total organic carbon (TOC).

Organic mass or **volatile mass** of a living substance is the difference between the dry mass and ash mass and represents the actual mass of the living matter. Organic mass is expressed in the same units as for ash mass and dry mass. (See also "Ash mass," "Biomass," and "Dry mass")

Organism is any living entity.

Organism count/area refers to the number of organisms collected and enumerated in a sample and adjusted to the number per area habitat, usually square meter (m²), acre, or hectare. Periphyton, benthic organisms, and macrophytes are expressed in these terms.

Organism count/volume refers to the number of organisms collected and enumerated in a sample and adjusted to the number per sample volume, usually milliliter (mL) or liter (L). Numbers of planktonic organisms can be expressed in these terms.

Total organism count is the total number of organisms collected and enumerated in any particular sample.

Organochlorine compounds are any chemicals that contain carbon and chlorine. Organochlorine compounds that are important in investigations of water, sediment, and biological quality include certain pesticides and industrial compounds.

Parameter Code is a 5-digit number used in the U.S. Geological Survey computerized data system, National Water Information System (NWIS), to uniquely identify a specific constituent or property.

Partial-record station is a site where discrete measurements of one or more hydrologic parameters are obtained over a period of time without continuous data being recorded or computed. A common example is a crest-stage gage partial-record station at which only peak stages and flows are recorded.

Particle size is the diameter, in millimeters (mm), of a particle determined by sieve or sedimentation methods. The sedimentation method utilizes

the principle of Stokes Law to calculate sediment particle sizes. Sedimentation methods (pipet, bottom-withdrawal tube, visual-accumulation tube, Sedigraph) 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).

Particle-size classification used in this report agrees with the recommendation 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	0.004 - 0.062	Sedimentation
Sand	0.062 - 2.0	Sedimentation/sieve
Gravel	2.0 - 64.0	Sieve

The particle-size distributions given in this report are not necessarily representative of all particles in transport in the stream. Most of the organic matter 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.

Peak flow (peak stage) is an instantaneous local maximum value in the continuous time series of streamflows or stages, preceded by a period of increasing values and followed by a period of decreasing values. Several peak values ordinarily occur in a year. The maximum peak value in a year is called the annual peak; peaks lower than the annual peak are called secondary peaks. Occasionally, the annual peak may not be the maximum value for the year; in such cases, the maximum value occurs at midnight at the beginning or end of the year, on the recession from or rise toward a higher peak in the adjoining year. If values are recorded at a discrete series of times, the peak recorded value may be taken as an approximation of the true peak, which may occur between the recording instants. If the values are recorded with finite precision, a sequence of equal recorded values may occur at the peak; in this case, the first value is taken as the peak.

Percent composition or **percent of total** is a unit for expressing the ratio of a particular part of a sample or population to the total sample or population, in terms of types, numbers, weight, or volume.

Periodic-record station is a site where stage, discharge, sediment, chemical, physical, or other hydrologic measurements are made one or more times during a year but at a frequency insufficient to develop a daily record.

Periphyton is the assemblage of microorganisms attached to and living upon submerged solid surfaces. While primarily consisting of algae, they also include bacteria, fungi, protozoa, rotifers, and other small organisms. Periphyton are useful indicators of water quality.

Pesticides are chemical compounds used to control undesirable organisms. Major categories of pesticides include insecticides, miticides, fungicides, herbicides, and rodenticides.

pH of water is the negative logarithm of the hydrogen-ion activity. Solutions with pH less than 7.0 are termed "acidic," and solutions with a pH greater than 7.0 are termed "basic." Solutions with a pH of 7.0 are neutral. The presence and concentration of many dissolved chemical constituents found in water are, in part, influenced by the hydrogen-ion activity of water. Biological processes including growth, distribution of organisms, and toxicity of the water to organisms are also influenced, in part, by the hydrogen-ion activity of water.

Polychlorinated biphenyls (PCB's) are industrial chemicals that are mixtures of chlorinated biphenyl compounds having various percentages of chlorine. They are similar in structure to organochlorine insecticides.

Pool, as used in this report, is a small part of a stream reach with little velocity, commonly with water deeper than surrounding areas.

Radioisotopes are isotopic 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 of 35 and 37, and the natural mixture has an atomic weight of 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. There are 275 isotopes of the 81 stable elements, in addition to more than 800 radioactive isotopes.

Recoverable from bottom material is the amount of a given constituent that is in solution after a representative sample of bottom material has been digested by a method (usually using an acid or mixture of acids) that results in dissolution of readily soluble substances. Complete dissolution of all bottom material is not achieved by the digestion treatment and thus the determination represents less than the total amount (that is, less than 95 percent) of the constituent in the sample. To achieve comparability of analytical data, equivalent digestion procedures would be required of all laboratories performing such analyses because different digestion procedures are likely to produce different analytical results (See also "Bed material").

Recurrence interval, also referred to as return period, is the average time, usually expressed in years, between occurrences of hydrologic events of a specified type (such as exceedances of a specified high flow or non-exceedance of a specified low flow). The terms "return period" and "recurrence interval" do not imply regular cyclic occurrence. The actual times between occurrences vary randomly, with most of the times being less than the average and a few being substantially greater than the average. For example, the 100-year flood is the flow rate that is exceeded by the annual maximum peak flow at intervals whose average length is 100 years (that is, once in 100 years, on average); almost two-thirds of all exceedances of the 100-year flood occur less than 100 years after the previous exceedance, half occur less than 70 years after the previous exceedance, and about one-eighth occur more than 200 years after the previous exceedance. Similarly, the 7-day 10-year low flow ($7Q_{10}$) is the flow rate below which the annual minimum 7-day-mean flow dips at intervals whose average length is 10 years (that is, once in 10 years, on average); almost two-thirds of the non-exceedances of the $7Q_{10}$ occur less than 10 years after the previous non-exceedance, half occur less than 7 years after, and about one-eighth occur more than 20 years after the previous non-exceedance. The recurrence interval for annual events is the reciprocal of the annual probability of occurrence. Thus, the 100-year flood has a 1-percent chance of being exceeded by the maximum peak flow in any year, and there is a 10-percent chance in any year that the annual minimum 7-day-mean flow will be less than the $7Q_{10}$.

Replicate samples are a group of samples collected in a manner such that the samples are thought to be essentially identical in composition.

Riffle, as used in this report, is a shallow part of the stream where water flows swiftly over completely or partially submerged obstructions to produce surface agitation.

River mile is the distance of a point on a river measured in miles from the river's mouth along the low-water channel.

River mileage is the linear distance along the meandering path of a stream channel determined in accordance with Bulletin No. 14 (October 1968) of the Water Resources Council.

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

Sea level, as used in this report, refers to one of the two commonly used national vertical datums (NGVD 1929 or NAVD 1988). See separate entries for definitions of these datums.

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

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

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). The entire sample is used for the analysis.

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

Suspended-sediment discharge (tons/day) is the quantity of sediment moving in suspension, reported as dry weight, that passes a cross section in a given time. It is calculated in units of tons per day as follows: concentration (mg/L) x discharge (ft^3/s) x 0.0027.

Suspended-sediment load is a term that refers to material in suspension. The term needs to be qualified, such as "annual suspended-sediment load" or "sand-size suspended-sediment load," and so on. It is not synonymous with either suspended-sediment discharge or concentration.

Seven-day 10-year low flow ($7Q_{10}$) is the minimum flow averaged over 7 consecutive days that is expected to occur on average, once in any 10-year period. The $7Q_{10}$ has a 10-percent chance of occurring in any given year (See also "Annual 7-day minimum" and "Recurrence interval").

Sodium adsorption ratio (SAR) is the expression of relative activity of sodium ions in exchange reactions within soil and is an index of sodium or alkali hazard to the soil. Waters range in respect to sodium hazard from those which can be used for irrigation on almost all soils to those which are generally unsatisfactory for irrigation.

Soil-water content is the water lost from the soil upon drying to constant mass at 105 °C; expressed either as mass of water per unit mass of dry soil or as the volume of water per unit bulk volume of soil.

Solute is any substance that is dissolved in water.

Specific electrical conductance (conductivity) is a measure of the capacity of water (or other media) to conduct an electrical current. It is expressed in microsiemens per centimeter at 25 °C. Specific electrical conductance is a function of the types and quantity of dissolved substances in water and can be used for approximating the dissolved-solids content of the

water. Commonly, the concentration of dissolved solids (in milligrams per liter) is from 55 to 75 percent of the specific conductance (in microsiemens). This relation is not constant from stream to stream, and it may vary in the same source with changes in the composition of the water.

Stable isotope ratio (per MILL/MIL) is a unit expressing the ratio of the abundance of two radioactive isotopes. Isotope ratios are used in hydrologic studies to determine the age or source of specific waters, to evaluate mixing of different waters, as an aid in determining reaction rates, and other chemical or hydrologic processes.

Stage: See "Gage height."

Stage-discharge relation is the relation between the water-surface elevation, termed stage (gage height), and the volume of water flowing in a channel per unit time.

Streamflow is the discharge that occurs in a natural channel. Although the term "discharge" can be applied to the flow of a canal, the word "streamflow" uniquely describes the discharge in a surface stream course. The term "streamflow" is more general than "runoff" as streamflow may be applied to discharge whether or not it is affected by diversion or regulation.

Surface area of a lake or impoundment is that area encompassed by the boundary of the lake or impoundment as shown on USGS topographic maps, or on other available maps or photographs. The computed surface areas reflect the water levels of the lakes or impoundments at the times when the information for the maps or photographs was obtained.

Surficial bed material is the top 0.1 to 0.2 ft of the bed material that is sampled using U.S. Series Bed-Material Samplers.

Surrogate is an analyte that behaves similarly to a target analyte, but that is highly unlikely to occur in a sample. A surrogate is added to a sample in known amounts before extraction and is measured with the same laboratory procedures used to measure the target analyte. Its purpose is to monitor method performance for an individual sample.

Suspended (as used in tables of chemical analyses) refers to the amount (concentration) of undissolved material in a water-sediment mixture. It is associated with the material retained on a 0.45-micrometer filter.

Suspended, recoverable is the amount of a given constituent that is in solution after the part of a representative suspended-sediment sample that is retained on a 0.45-micrometer membrane filter has been digested by a method (usually using a dilute acid solution) that results in dissolution of only readily soluble substances. Complete dissolution of all the particulate matter is not achieved by the digestion treatment and thus the determination represents something less than the "total" amount (that is, less than 95 percent) of the constituent present in the sample. To achieve comparability of analytical data, equivalent digestion procedures are required of all laboratories performing such analyses because different digestion procedures are likely to produce different analytical results.

Determinations of "suspended, recoverable" constituents are made either by analyzing portions of the material collected on the filter or, more commonly, by difference, based on determinations of (1) dissolved and (2) total recoverable concentrations of the constituent.

Suspended, total is the total amount of a given constituent in the part of a representative suspended-sediment sample that is retained on a 0.45-micrometer membrane filter. This term is used only when the analytical procedure assures measurement of at least 95 percent of the constituent determined. Knowledge of the expected form of the con-

stituent in the sample, as well as the analytical methodology used, is required to determine when the results should be reported as "suspended, total."

Determinations of "suspended, total" constituents are made either by analyzing portions of the material collected on the filter or, more commonly, by difference, based on determinations of (1) dissolved and (2) total concentrations of the constituent.

Suspended sediment is the sediment maintained in suspension by the upward components of turbulent currents or that exists in suspension as a colloid. (See also "Sediment")

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 foot above the bed) expressed as milligrams of dry sediment per liter of water-sediment mixture (mg/L). The analytical technique uses the mass of all of the sediment and the net weight of the water-sediment mixture in a sample to compute the suspended-sediment concentration. (See also "Sediment" and "Suspended sediment")

Suspended-sediment discharge (tons/d) is the rate of sediment transport, as measured by dry mass or volume, that passes a cross section in a given time. It is calculated in units of tons per day as follows: concentration (mg/L) x discharge (ft³/s) x 0.0027. (See also "Sediment," "Suspended sediment," and "Suspended-sediment concentration")

Suspended-sediment load is a general term that refers to a given characteristic of the material in suspension that passes a point during a specified period of time. The term needs to be qualified, such as "annual suspended-sediment load" or "sand-size suspended-sediment load," and so on. It is not synonymous with either suspended-sediment discharge or concentration. (See also "Sediment")

Suspended solids, total residue at 105 °C concentration is the concentration of inorganic and organic material retained on a filter, expressed as milligrams of dry material per liter of water (mg/L). An aliquot of the sample is used for this analysis.

Suspended, total is the total amount of a given constituent in the part of a water-sediment sample that is retained on a 0.45-micrometer membrane filter. This term is used only when the analytical procedure assures measurement of at least 95 percent of the constituent determined. Knowledge of the expected form of the constituent in the sample, as well as the analytical methodology used, is required to determine when the results should be reported as "suspended, total." Determinations of "suspended, total" constituents are made either by directly analyzing portions of the suspended material collected on the filter or, more commonly, by difference, on the basis of determinations of (1) dissolved and (2) total concentrations of the constituent. (See also "Suspended")

Taxa (Species) richness is the number of species (taxa) present in a defined area or sampling unit.

Thalweg is the line formed by connecting points of minimum streambed elevation (deepest part of the channel).

Thermograph is an instrument that continuously records variations of temperature on a chart. The more general term "temperature recorder" is used in the table descriptions and refers to any instrument that records temperature whether on a chart, a tape, or any other medium.

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 year.

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

Tons per day (T/DAY, tons/d) is the rate representing a mass of 1 ton of a constituent in streamflow passing a cross section in 1 day. It is equivalent to 2,000 pounds per day, or 0.9072 metric tons per day.

Total is the total amount of a given constituent in a representative suspended-sediment sample, regardless of the constituent's physical or chemical form. This term is used only when the analytical procedure assures measurement of at least 95 percent of the constituent present in both the dissolved and suspended phases of the sample. A knowledge of the expected form of the constituent in the sample, as well as the analytical methodology used, is required to judge when the results should be reported as "total." (Note that the word "total" does double duty here, indicating both that the sample consists of a suspended-sediment mixture and that the analytical method determined all of the constituent in the sample.)

Total discharge is the quantity of a given constituent, measured as dry mass or volume, that passes a stream cross section per unit of time. When referring to constituents other than water, this term needs to be qualified, such as "total sediment discharge," "total chloride discharge," and so on.

Total in bottom material is the total amount of a given constituent in a representative sample of bottom material. This term is used only when the analytical procedure assures measurement of at least 95 percent of the constituent determined. A knowledge of the expected form of the constituent in the sample, as well as the analytical methodology used, is required to judge when the results should be reported as "total in bottom material."

Total recoverable is the amount of a given constituent that is in solution after a representative suspended-sediment sample has been digested by a method (usually using a dilute acid solution) that results in dissolution of only readily soluble substances. Complete dissolution of all particulate matter is not achieved by the digestion treatment, and thus the determination represents something less than the "total" amount (that is, less than 95 percent) of the constituent present in the dissolved and suspended phases of the sample. To achieve comparability of analytical data, equivalent digestion procedures are required of all laboratories performing such analyses because different digestion procedures are likely to produce different analytical results.

Turbidity is the reduction in the transparency of a solution because of the presence of suspended and some dissolved substances. The measurement technique records the collective optical properties of the solution that cause light to be scattered and attenuated rather than transmitted in straight lines; the higher the intensity of scattered or attenuated light, the higher the value of the turbidity. Turbidity is expressed in nephelometric turbidity units (NTU). Depending on the method used, the turbidity units as NTU can be defined as the intensity of light of a specified wavelength scattered or attenuated by suspended particles or absorbed at a method specified angle, usually 90 degrees, from the path of the incident light. Currently approved methods for the measurement of turbidity in the USGS include those that conform to USEPA Method 180.1, ASTM D1889-00, and ISO 7027. Measurements of turbidity by these different methods and different instruments are unlikely to yield equivalent values.

Ultraviolet (UV) absorbance (absorption) at 254 or 280 nanometers is a measure of the aggregate concentration of the mixture of UV absorbing organic materials dissolved in the analyzed water, such as lignin, tannin, humic substances, and various aromatic compounds. UV absorbance (absorption) at 254 or 280 nanometers is measured in UV absorption units per centimeter of path length of UV light through a sample.

Unconfined aquifer is an aquifer whose upper surface is a water table free to fluctuate under atmospheric pressure. (See "Water-table aquifer")

Vertical datum (See "Datum")

Water level is the water-surface elevation or stage of the free surface of a body of water above or below any datum (see "Gage height"), or the surface of water standing in a well, usually indicative of the position of the water table or other potentiometric surface.

Water table is the surface of a ground-water body at which the water is at atmospheric pressure.

Water-table aquifer is an unconfined aquifer within which is found the water table.

Water year in U.S. Geological Survey reports dealing with surface-water supply is the 12-month period October 1 through September 30. The water year is designated by the calendar year in which it ends and which includes 9 of the 12 months. Thus, the year ending September 30, 2003, is called the "2003 water year."

WDR is used as an abbreviation for "Water-Data Report" in the REVISED RECORDS paragraph to refer to State annual hydrologic-data reports. (WRD was used as an abbreviation for "Water-Resources Data" in reports published prior to 1976.)

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.

Well is an excavation (pit, hole, tunnel), generally cylindrical in form and often walled in, drilled, dug, driven, bored, or jetted into the ground to such a depth as to penetrate water-yielding geologic material and allow the water to flow or to be pumped to the surface.

Wet mass is the mass of living matter plus contained water. (See also "Biomass" and "Dry mass")

Wet weight refers to the weight of animal tissue or other substance including its contained water (See also "Dry weight").

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

Zooplankton is the animal part of the plankton. Zooplankton are capable of extensive movements within the water column and often are large enough to be seen with the unaided eye. Zooplankton are secondary consumers feeding upon bacteria, phytoplankton, and detritus. Because they are the grazers in the aquatic environment, the zooplankton are a vital part of the aquatic food web. The zooplankton community is dominated by small crustaceans and rotifers. (See also "Plankton")

The USGS publishes a series of manuals titled the "Techniques of Water-Resources Investigations" that describe procedures for planning and conducting specialized work in water-resources investigations. The material in these manuals is grouped under major subject headings called books and is further divided into sections and chapters. For example, section A of book 3 (Applications of Hydraulics) pertains to surface water. Each chapter then is limited to a narrow field of the section subject matter. This publication format permits flexibility when revision or printing is required.

Reports in the Techniques of Water-Resources Investigations series, which are listed below, are available online at <http://water.usgs.gov/pubs/twri>. Printed copies are available for sale from the USGS, Information Services, Box 25286, Federal Center, Denver, Colorado 80225 (an authorized agent of the Superintendent of Documents, Government Printing Office). Please telephone 1-888-ASK-USGS for current prices, and refer to the title, book number, section number, chapter number, and mention the "U.S. Geological Survey Techniques of Water-Resources Investigations." Other products can be viewed online at <http://www.usgs.gov/sales.html>, or ordered by telephone or by FAX to (303)236-4693. Order forms for FAX requests are available online at <http://mac.usgs.gov/isb/pubs/forms/>. Prepayment by major credit card or by a check or money order payable to the "U.S. Geological Survey" is required.

Book 1. Collection of Water Data by Direct Measurement

Section D. Water Quality

- 1–D1. *Water temperature—Influential factors, field measurement, and data presentation*, by H.H. Stevens, Jr., J.F. Ficke, and G.F. Smoot: USGS–TWRI book 1, chap. D1. 1975. 65 p.
- 1–D2. *Guidelines for collection and field analysis of ground-water samples for selected unstable constituents*, by W.W. Wood: USGS–TWRI book 1, chap. D2. 1976. 24 p.

Book 2. Collection of Environmental Data

Section D. Surface Geophysical Methods

- 2–D1. *Application of surface geophysics to ground-water investigations*, by A.A.R. Zohdy, G.P. Eaton, and D.R. Mabey: USGS–TWRI book 2, chap. D1. 1974. 116 p.
- 2–D2. *Application of seismic-refraction techniques to hydrologic studies*, by F.P. Haeni: USGS–TWRI book 2, chap. D2. 1988. 86 p.

Section E. Subsurface Geophysical Methods

- 2–E1. *Application of borehole geophysics to water-resources investigations*, by W.S. Keys and L.M. MacCary: USGS–TWRI book 2, chap. E1. 1971. 126 p.
- 2–E2. *Borehole geophysics applied to ground-water investigations*, by W.S. Keys: USGS–TWRI book 2, chap. E2. 1990. 150 p.

Section F. Drilling and Sampling Methods

- 2–F1. *Application of drilling, coring, and sampling techniques to test holes and wells*, by Eugene Shuter and W.E. Teasdale: USGS–TWRI book 2, chap. F1. 1989. 97 p.

Book 3. Applications of Hydraulics

Section A. Surface-Water Techniques

- 3–A1. *General field and office procedures for indirect discharge measurements*, by M.A. Benson and Tate Dalrymple: USGS–TWRI book 3, chap. A1. 1967. 30 p.
- 3–A2. *Measurement of peak discharge by the slope-area method*, by Tate Dalrymple and M.A. Benson: USGS–TWRI book 3, chap. A2. 1967. 12 p.
- 3–A3. *Measurement of peak discharge at culverts by indirect methods*, by G.L. Bodhaine: USGS–TWRI book 3, chap. A3. 1968. 60 p.
- 3–A4. *Measurement of peak discharge at width contractions by indirect methods*, by H.F. Matthai: USGS–TWRI book 3, chap. A4. 1967. 44 p.
- 3–A5. *Measurement of peak discharge at dams by indirect methods*, by Harry Hulsing: USGS–TWRI book 3, chap. A5. 1967. 29 p.
- 3–A6. *General procedure for gaging streams*, by R.W. Carter and Jacob Davidian: USGS–TWRI book 3, chap. A6. 1968. 13 p.

- 3-A7. *Stage measurement at gaging stations*, by T.J. Buchanan and W.P. Somers: USGS-TWRI book 3, chap. A7. 1968. 28 p.
- 3-A8. *Discharge measurements at gaging stations*, by T.J. Buchanan and W.P. Somers: USGS-TWRI book 3, chap. A8. 1969. 65 p.
- 3-A9. *Measurement of time of travel in streams by dye tracing*, by F.A. Kilpatrick and J.F. Wilson, Jr.: USGS-TWRI book 3, chap. A9. 1989. 27 p.
- 3-A10. *Discharge ratings at gaging stations*, by E.J. Kennedy: USGS-TWRI book 3, chap. A10. 1984. 59 p.
- 3-A11. *Measurement of discharge by the moving-boat method*, by G.F. Smoot and C.E. Novak: USGS-TWRI book 3, chap. A11. 1969. 22 p.
- 3-A12. *Fluorometric procedures for dye tracing*, Revised, by J.F. Wilson, Jr., E.D. Cobb, and F.A. Kilpatrick: USGS-TWRI book 3, chap. A12. 1986. 34 p.
- 3-A13. *Computation of continuous records of streamflow*, by E.J. Kennedy: USGS-TWRI book 3, chap. A13. 1983. 53 p.
- 3-A14. *Use of flumes in measuring discharge*, by F.A. Kilpatrick and V.R. Schneider: USGS-TWRI book 3, chap. A14. 1983. 46 p.
- 3-A15. *Computation of water-surface profiles in open channels*, by Jacob Davidian: USGS-TWRI book 3, chap. A15. 1984. 48 p.
- 3-A16. *Measurement of discharge using tracers*, by F.A. Kilpatrick and E.D. Cobb: USGS-TWRI book 3, chap. A16. 1985. 52 p.
- 3-A17. *Acoustic velocity meter systems*, by Antonius Laenen: USGS-TWRI book 3, chap. A17. 1985. 38 p.
- 3-A18. *Determination of stream reaeration coefficients by use of tracers*, by F.A. Kilpatrick, R.E. Rathbun, Nobuhiro Yotsukura, G.W. Parker, and L.L. DeLong: USGS-TWRI book 3, chap. A18. 1989. 52 p.
- 3-A19. *Levels at streamflow gaging stations*, by E.J. Kennedy: USGS-TWRI book 3, chap. A19. 1990. 31 p.
- 3-A20. *Simulation of soluble waste transport and buildup in surface waters using tracers*, by F.A. Kilpatrick: USGS-TWRI book 3, chap. A20. 1993. 38 p.
- 3-A21. *Stream-gaging cableways*, by C. Russell Wagner: USGS-TWRI book 3, chap. A21. 1995. 56 p.

Section B. Ground-Water Techniques

- 3-B1. *Aquifer-test design, observation, and data analysis*, by R.W. Stallman: USGS-TWRI book 3, chap. B1. 1971. 26 p.
- 3-B2. *Introduction to ground-water hydraulics, a programmed text for self-instruction*, by G.D. Bennett: USGS-TWRI book 3, chap. B2. 1976. 172 p.
- 3-B3. *Type curves for selected problems of flow to wells in confined aquifers*, by J.E. Reed: USGS-TWRI book 3, chap. B3. 1980. 106 p.
- 3-B4. *Regression modeling of ground-water flow*, by R.L. Cooley and R.L. Naff: USGS-TWRI book 3, chap. B4. 1990. 232 p.
- 3-B4. *Supplement 1. Regression modeling of ground-water flow—Modifications to the computer code for nonlinear regression solution of steady-state ground-water flow problems*, by R.L. Cooley: USGS-TWRI book 3, chap. B4. 1993. 8 p.
- 3-B5. *Definition of boundary and initial conditions in the analysis of saturated ground-water flow systems—An introduction*, by O.L. Franke, T.E. Reilly, and G.D. Bennett: USGS-TWRI book 3, chap. B5. 1987. 15 p.
- 3-B6. *The principle of superposition and its application in ground-water hydraulics*, by T.E. Reilly, O.L. Franke, and G.D. Bennett: USGS-TWRI book 3, chap. B6. 1987. 28 p.
- 3-B7. *Analytical solutions for one-, two-, and three-dimensional solute transport in ground-water systems with uniform flow*, by E.J. Wexler: USGS-TWRI book 3, chap. B7. 1992. 190 p.

- 3-B8. *System and boundary conceptualization in ground-water flow simulation*, by T.E. Reilly: USGS-TWRI book 3, chap. B8. 2001. 29 p.

Section C. Sedimentation and Erosion Techniques

- 3-C1. *Fluvial sediment concepts*, by H.P. Guy: USGS-TWRI book 3, chap. C1. 1970. 55 p.
- 3-C2. *Field methods for measurement of fluvial sediment*, by T.K. Edwards and G.D. Glysson: USGS-TWRI book 3, chap. C2. 1999. 89 p.
- 3-C3. *Computation of fluvial-sediment discharge*, by George Porterfield: USGS-TWRI book 3, chap. C3. 1972. 66 p.

Book 4. Hydrologic Analysis and Interpretation

Section A. Statistical Analysis

- 4-A1. *Some statistical tools in hydrology*, by H.C. Riggs: USGS-TWRI book 4, chap. A1. 1968. 39 p.
- 4-A2. *Frequency curves*, by H.C. Riggs: USGS-TWRI book 4, chap. A2. 1968. 15 p.
- 4-A3. *Statistical methods in water resources*, by D.R. Helsel and R.M. Hirsch: USGS-TWRI book 4, chap. A3. 1991. Available only online at <http://water.usgs.gov/pubs/twri/twri4a3/>. (Accessed August 30, 2002.)

Section B. Surface Water

- 4-B1. *Low-flow investigations*, by H.C. Riggs: USGS-TWRI book 4, chap. B1. 1972. 18 p.
- 4-B2. *Storage analyses for water supply*, by H.C. Riggs and C.H. Hardison: USGS-TWRI book 4, chap. B2. 1973. 20 p.
- 4-B3. *Regional analyses of streamflow characteristics*, by H.C. Riggs: USGS-TWRI book 4, chap. B3. 1973. 15 p.

Section D. Interrelated Phases of the Hydrologic Cycle

- 4-D1. *Computation of rate and volume of stream depletion by wells*, by C.T. Jenkins: USGS-TWRI book 4, chap. D1. 1970. 17 p.

Book 5. Laboratory Analysis

Section A. Water Analysis

- 5-A1. *Methods for determination of inorganic substances in water and fluvial sediments*, by M.J. Fishman and L.C. Friedman, editors: USGS-TWRI book 5, chap. A1. 1989. 545 p.
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- 5-A3. *Methods for the determination of organic substances in water and fluvial sediments*, edited by R.L. Wershaw, M.J. Fishman, R.R. Grabbe, and L.E. Lowe: USGS-TWRI book 5, chap. A3. 1987. 80 p.
- 5-A4. *Methods for collection and analysis of aquatic biological and microbiological samples*, by L.J. Britton and P.E. Greeson, editors: USGS-TWRI book 5, chap. A4. 1989. 363 p.
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- 5-A6. *Quality assurance practices for the chemical and biological analyses of water and fluvial sediments*, by L.C. Friedman and D.E. Erdmann: USGS-TWRI book 5, chap. A6. 1982. 181 p.

Section C. Sediment Analysis

- 5-C1. *Laboratory theory and methods for sediment analysis*, by H.P. Guy: USGS-TWRI book 5, chap. C1. 1969. 58 p.

Book 6. Modeling Techniques**Section A. Ground Water**

- 6-A1. *A modular three-dimensional finite-difference ground-water flow model*, by M.G. McDonald and A.W. Harbaugh: USGS-TWRI book 6, chap. A1. 1988. 586 p.
- 6-A2. *Documentation of a computer program to simulate aquifer-system compaction using the modular finite-difference ground-water flow model*, by S.A. Leake and D.E. Prudic: USGS-TWRI book 6, chap. A2. 1991. 68 p.
- 6-A3. *A modular finite-element model (MODFE) for areal and axisymmetric ground-water-flow problems, Part 1: Model Description and User's Manual*, by L.J. Torak: USGS-TWRI book 6, chap. A3. 1993. 136 p.
- 6-A4. *A modular finite-element model (MODFE) for areal and axisymmetric ground-water-flow problems, Part 2: Derivation of finite-element equations and comparisons with analytical solutions*, by R.L. Cooley: USGS-TWRI book 6, chap. A4. 1992. 108 p.
- 6-A5. *A modular finite-element model (MODFE) for areal and axisymmetric ground-water-flow problems, Part 3: Design philosophy and programming details*, by L.J. Torak: USGS-TWRI book 6, chap. A5. 1993. 243 p.
- 6-A6. *A coupled surface-water and ground-water flow model (MODBRANCH) for simulation of stream-aquifer interaction*, by Eric D. Swain and Eliezer J. Wexler: USGS-TWRI book 6, chap. A6. 1996. 125 p.
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- 7-C1. *Finite difference model for aquifer simulation in two dimensions with results of numerical experiments*, by P.C. Trescott, G.F. Pinder, and S.P. Larson: USGS-TWRI book 7, chap. C1. 1976. 116 p.
- 7-C2. *Computer model of two-dimensional solute transport and dispersion in ground water*, by L.F. Konikow and J.D. Bredehoeft: USGS-TWRI book 7, chap. C2. 1978. 90 p.
- 7-C3. *A model for simulation of flow in singular and interconnected channels*, by R.W. Schaffranek, R.A. Baltzer, and D.E. Goldberg: USGS-TWRI book 7, chap. C3. 1981. 110 p.

Book 8. Instrumentation**Section A. Instruments for Measurement of Water Level**

- 8-A1. *Methods of measuring water levels in deep wells*, by M.S. Garber and F.C. Koopman: USGS-TWRI book 8, chap. A1. 1968. 23 p.
- 8-A2. *Installation and service manual for U.S. Geological Survey manometers*, by J.D. Craig: USGS-TWRI book 8, chap. A2. 1983. 57 p.

Section B. Instruments for Measurement of Discharge

- 8-B2. *Calibration and maintenance of vertical-axis type current meters*, by G.F. Smoot and C.E. Novak: USGS-TWRI book 8, chap. B2. 1968. 15 p.

Book 9. Handbooks for Water-Resources Investigations**Section A. National Field Manual for the Collection of Water-Quality Data**

- 9-A1. *National field manual for the collection of water-quality data: Preparations for water sampling*, by F.D. Wilde, D.B. Radtke, Jacob Gibs, and R.T. Iwatsubo: USGS-TWRI book 9, chap. A1. 1998. 47 p.
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- 9-A3. *National field manual for the collection of water-quality data: Cleaning of equipment for water sampling*, edited by F.D. Wilde, D.B. Radtke, Jacob Gibs, and R.T. Iwatsubo: USGS-TWRI book 9, chap. A3. 1998. 75 p.
- 9-A4. *National field manual for the collection of water-quality data: Collection of water samples*, edited by F.D. Wilde, D.B. Radtke, Jacob Gibs, and R.T. Iwatsubo: USGS-TWRI book 9, chap. A4. 1999. 156 p.
- 9-A5. *National field manual for the collection of water-quality data: Processing of water samples*, edited by F.D. Wilde, D.B. Radtke, Jacob Gibs, and R.T. Iwatsubo: USGS-TWRI book 9, chap. A5. 1999. 149 p.
- 9-A6. *National field manual for the collection of water-quality data: Field measurements*, edited by F.D. Wilde and D.B. Radtke: USGS-TWRI book 9, chap. A6. 1998. Variously paginated.
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Surface-Water Stations



Measurement of streamflow through ice.

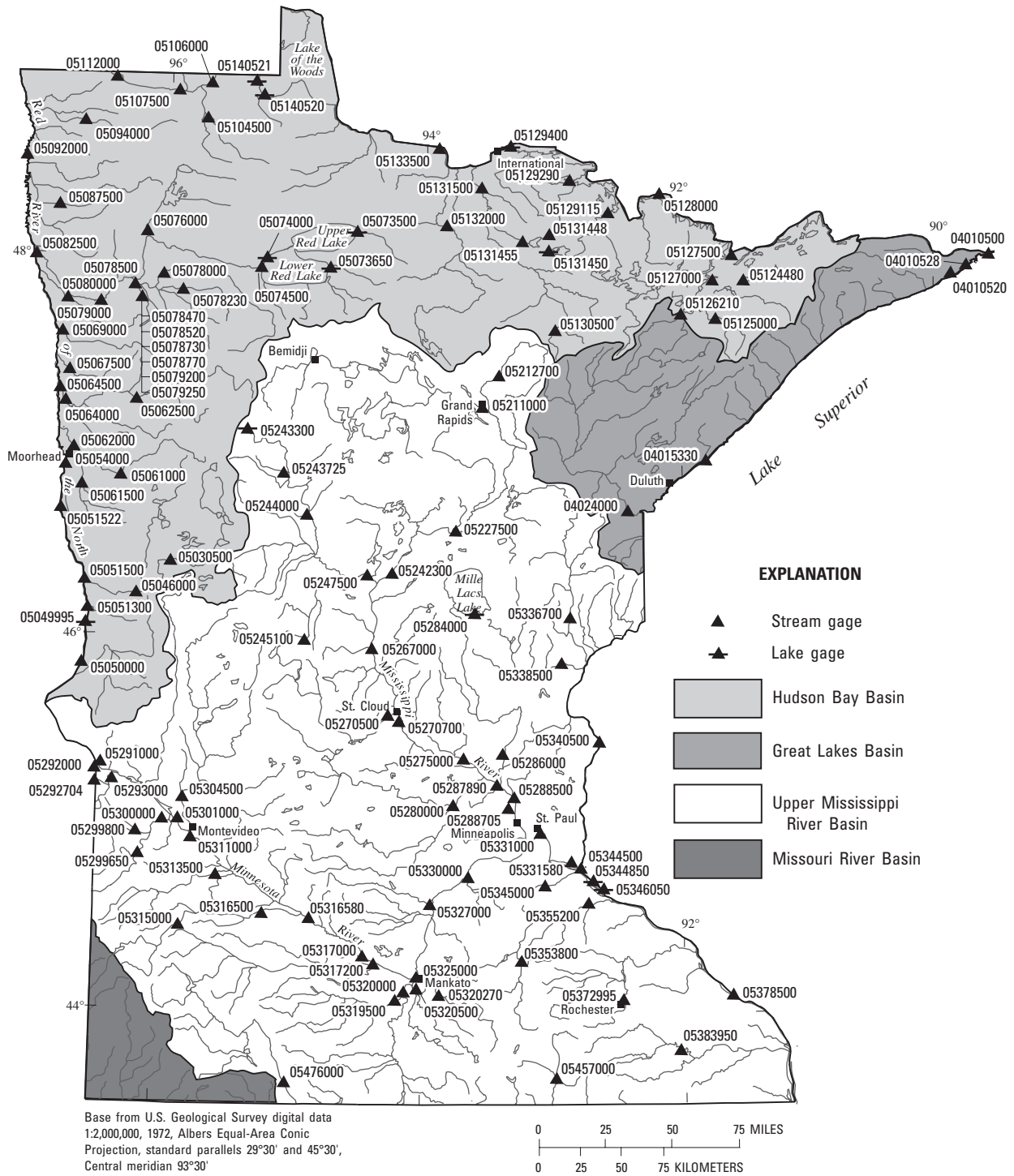


Figure 5. Location of lake and stream-gaging stations.

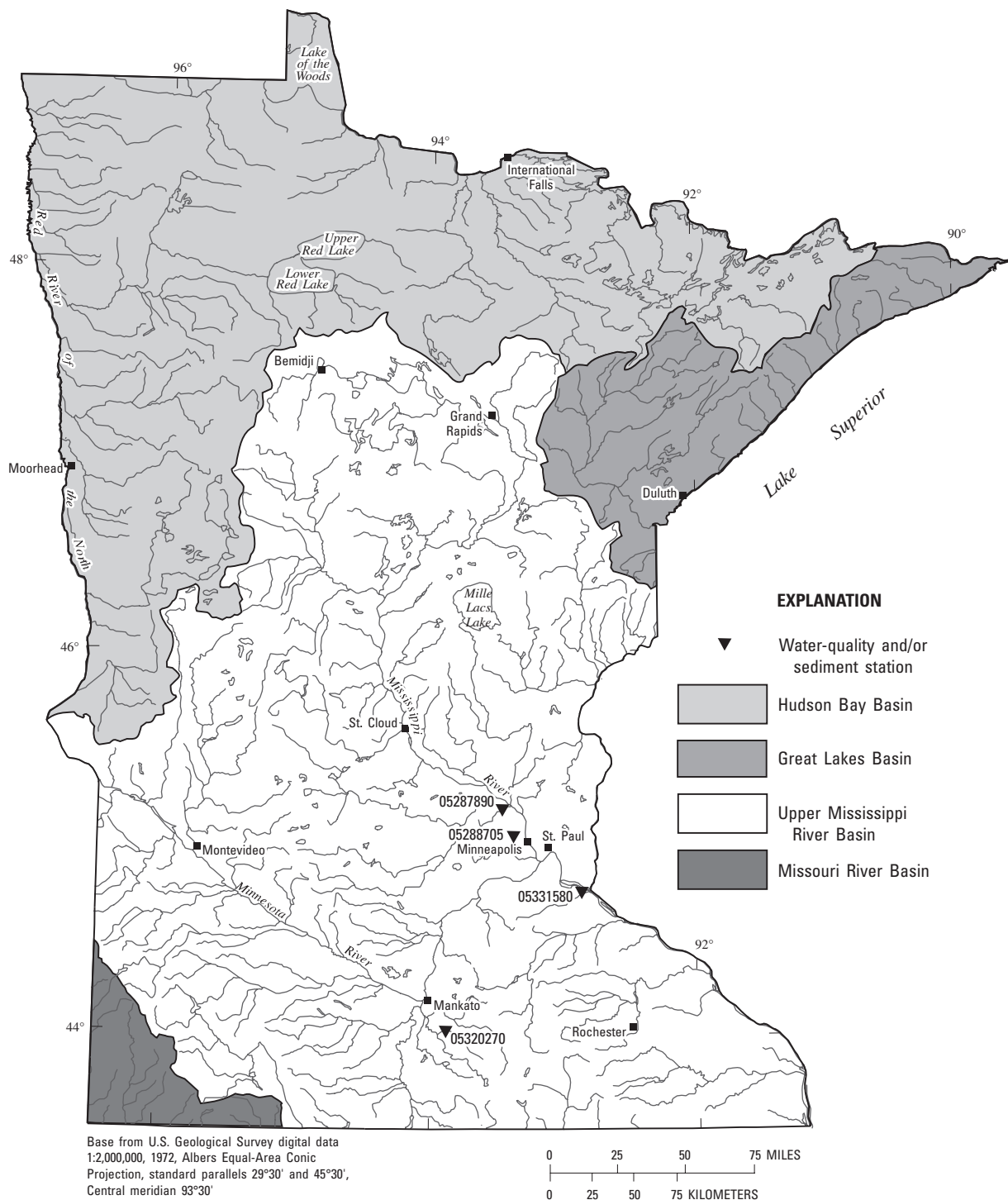


Figure 6. Location of surface-water quality stations.

STREAMS TRIBUTARY TO LAKE SUPERIOR

04010500 PIGEON RIVER AT MIDDLE FALLS, NEAR GRAND PORTAGE, MN

LOCATION.--Lat 48°00'44", long 89°36'58", in SW¹/₄NE¹/₄ sec. 24, T.64 N., R.6 E., Cook County, Hydrologic Unit 04010101, on the Grand Portage Indian Reservation, on right bank 400 ft upstream from Middle Falls, 2.5 mi upstream from Grand Portage Port of Entry, 3.5 mi upstream from mouth, and 4.7 mi northeast of city of Grand Portage.

DRAINAGE AREA.--609 mi².

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.

REVISED RECORDS.--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).

GAGE.--Water-stage recorder. Datum of gage is 787.58 ft above sea level (NGVD of 1929). Prior to Sept. 30, 1940, nonrecording gage at International Bridge, 5.8 mi upstream at datum 102.24 ft higher. Oct. 1, 1940 to Dec. 31, 1975, at present site at datum 2.00 ft higher.

REMARKS.--Records good except those for estimated daily discharges, which are poor.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 2,700 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Apr 22	0400	*3,550	*8.65	No other peak greater than base discharge.			

Minimum discharge, 25 ft³/s, estimated daily-mean.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	48	e99	e40	e31	e27	e29	e100	642	956	368	273	172
2	47	e97	e38	e30	e27	e29	e88	528	807	359	286	158
3	45	e95	e35	e30	e27	e29	e80	482	701	383	281	149
4	156	e91	e33	e30	e26	e28	e70	450	618	384	271	140
5	318	87	e31	e30	e26	e28	e64	429	560	343	257	134
6	321	81	e31	e29	e26	e28	e60	398	511	316	252	127
7	284	82	e30	e29	e26	e28	e57	385	471	316	252	118
8	241	84	e30	e29	e26	e28	e77	376	434	318	245	110
9	212	80	e30	e28	e26	e28	e110	549	416	317	235	105
10	188	78	e30	e28	e25	e28	e145	1,970	409	314	236	99
11	168	e73	e31	e28	e25	e29	e210	1,770	391	362	241	93
12	151	e60	e31	e27	e25	e29	e290	2,570	368	422	241	96
13	139	e50	e31	e27	e25	e30	e400	1,880	348	393	228	97
14	129	e47	e31	e26	e26	e31	e555	1,350	330	352	209	96
15	123	e45	e31	e26	e26	e33	e755	1,100	324	377	193	94
16	116	e48	e31	e26	e26	e35	e960	954	301	414	181	94
17	109	e51	e31	e26	e27	e37	e1,170	842	309	388	172	90
18	108	e55	e32	e26	e27	e44	e1,350	769	766	341	161	87
19	136	e58	e33	e26	e28	e52	e1,550	738	831	306	154	88
20	144	e57	e35	e26	e29	e65	e2,300	1,020	618	295	147	97
21	134	e56	e35	e25	e30	e95	e3,000	1,020	490	429	193	134
22	126	e54	e35	e25	e29	e155	3,390	875	421	543	245	167
23	119	e54	e34	e25	e29	e220	2,220	790	386	477	288	157
24	114	e53	e34	e25	e28	e290	1,360	698	375	411	259	148
25	110	e50	e33	e25	e28	e270	1,080	627	488	365	224	143
26	108	e46	e32	e25	e28	e248	927	575	578	331	198	142
27	106	e42	e32	e26	e28	e232	838	528	566	308	177	144
28	102	e43	e32	e26	e29	e205	791	513	518	290	171	143
29	100	e45	e31	e26	---	e180	745	529	446	274	176	141
30	103	e44	e31	e27	---	e150	683	661	404	273	187	140
31	e102	---	e31	e27	---	e125	---	1,030	---	269	189	---
TOTAL	4,407	1,905	1,005	840	755	2,838	25,425	27,048	15,141	11,038	6,822	3,703
MEAN	142	63.5	32.4	27.1	27.0	91.5	848	873	505	356	220	123
MAX	321	99	40	31	30	290	3,390	2,570	956	543	288	172
MIN	45	42	30	25	25	28	57	376	301	269	147	87
AC-FT	8,740	3,780	1,990	1,670	1,500	5,630	50,430	53,650	30,030	21,890	13,530	7,340
CFSM	0.23	0.10	0.05	0.04	0.04	0.15	1.39	1.43	0.83	0.58	0.36	0.20
IN.	0.27	0.12	0.06	0.05	0.05	0.17	1.55	1.65	0.92	0.67	0.42	0.23

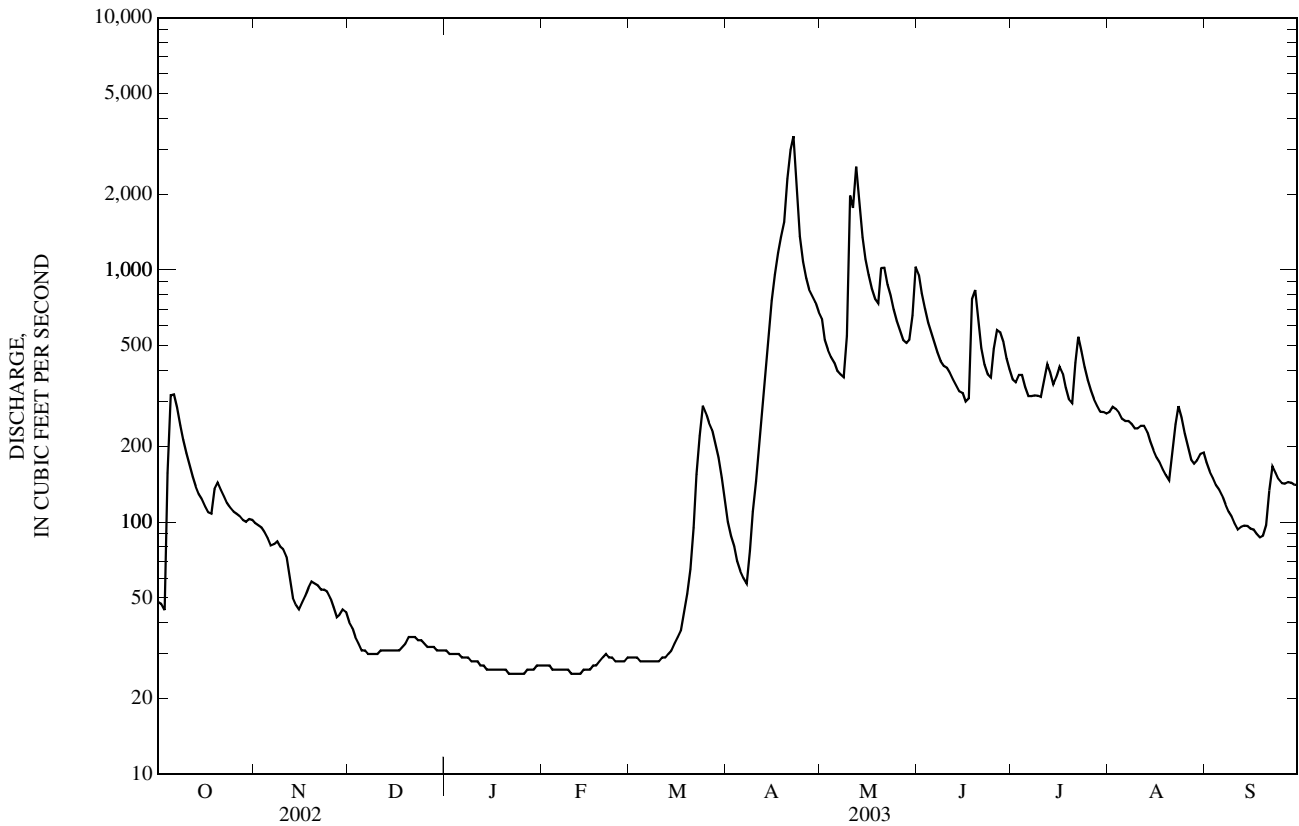
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1921 - 2003, BY WATER YEAR (WY)

MEAN	357	352	207	150	125	175	1,198	1,593	832	416	241	284
MAX	2,095	1,461	720	431	300	1,169	2,724	4,016	2,801	1,127	1,029	2,985
(WY)	(1978)	(1971)	(1978)	(1975)	(1969)	(1945)	(2001)	(1950)	(1947)	(1968)	(1950)	(1977)
MIN	17.4	11.4	2.85	2.18	8.02	60.0	290	138	125	78.0	46.5	40.2
(WY)	(1977)	(1977)	(1977)	(1977)	(1977)	(1941)	(1977)	(1977)	(1977)	(1958)	(1998)	(1976)

04010500 PIGEON RIVER AT MIDDLE FALLS, NEAR GRAND PORTAGE, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1921 - 2003	
ANNUAL TOTAL	82,433		100,927		497	
ANNUAL MEAN	226		277		158	
HIGHEST ANNUAL MEAN					840 1971	
LOWEST ANNUAL MEAN					158 1958	
HIGHEST DAILY MEAN	2,180	Apr 17	3,390	Apr 22	10,700	May 5, 1934
LOWEST DAILY MEAN	30	Dec 7	25	aJan 21	b1.0	Jan15-21,1977
ANNUAL SEVEN-DAY MINIMUM	30	Dec 5	25	Jan 20	1.0	Jan 15, 1977
MAXIMUM PEAK FLOW			3,550	Apr 22	c11,000	May 5, 1934
MAXIMUM PEAK STAGE			8.65	Apr 22	d12.37	Sep 24, 1977
INSTANTANEOUS LOW FLOW					b1.0	Jan 15, 1977
ANNUAL RUNOFF (AC-FT)	163,500		200,200		359,800	
ANNUAL RUNOFF (CFSM)	0.37		0.45		0.82	
ANNUAL RUNOFF (INCHES)	5.04		6.16		11.08	
10 PERCENT EXCEEDS	570		689		1,270	
50 PERCENT EXCEEDS	125		127		222	
90 PERCENT EXCEEDS	45		27		83	

- a Also occurred Jan. 22-26 and Feb. 10-13.
- b Minimum observed.
- c Gage height 7.60 ft, site and datum then in use.
- d At present site and datum, discharge 10,500 ft³/s.
- e Estimated.



STREAMS TRIBUTARY TO LAKE SUPERIOR

04010520 HOLLOW ROCK CREEK NEAR RED ROCK, MN

LOCATION.--Lat 47°55'07", long 89°44'46", in SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 24, T.63 N., R.5 E., Cook County, Hydrologic Unit 04010101, on Grand Portage Indian Band property, on left bank, 800 ft upstream from U.S. Highway 61, 0.4 miles west of Red Rock, and 4.4 mi southwest of Grand Portage.

DRAINAGE AREA.--

PERIOD OF RECORD.--May 2003 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 670 ft above sea level (from topographic map).

REMARKS.--Records good.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	---	---	---	---	13	0.93	0.74	0.12
2	---	---	---	---	---	---	---	---	9.0	1.8	0.58	0.10
3	---	---	---	---	---	---	---	---	6.8	1.7	0.40	0.23
4	---	---	---	---	---	---	---	---	5.4	1.3	0.28	0.15
5	---	---	---	---	---	---	---	---	4.4	0.93	0.19	0.07
6	---	---	---	---	---	---	---	---	3.8	0.66	0.23	0.06
7	---	---	---	---	---	---	---	---	3.2	1.8	0.35	0.05
8	---	---	---	---	---	---	---	---	3.0	1.2	0.18	0.04
9	---	---	---	---	---	---	---	---	3.0	0.86	0.11	0.04
10	---	---	---	---	---	---	---	---	2.8	1.5	0.30	0.04
11	---	---	---	---	---	---	---	---	2.5	2.6	0.26	0.04
12	---	---	---	---	---	---	---	---	2.2	1.6	0.11	0.21
13	---	---	---	---	---	---	---	---	2.2	1.1	0.06	0.78
14	---	---	---	---	---	---	---	---	1.9	0.81	0.05	0.35
15	---	---	---	---	---	---	---	---	1.6	2.1	0.04	0.32
16	---	---	---	---	---	---	---	---	1.4	1.3	0.03	0.48
17	---	---	---	---	---	---	---	---	3.1	0.97	0.02	0.22
18	---	---	---	---	---	---	---	---	3.8	0.57	0.02	0.13
19	---	---	---	---	---	---	---	---	2.6	0.39	0.01	0.17
20	---	---	---	---	---	---	---	---	2.0	0.35	0.19	0.64
21	---	---	---	---	---	---	---	13	1.5	4.4	3.7	0.36
22	---	---	---	---	---	---	---	11	1.2	2.8	1.9	0.57
23	---	---	---	---	---	---	---	9.2	1.7	1.6	1.0	0.59
24	---	---	---	---	---	---	---	8.1	1.9	1.0	0.67	0.38
25	---	---	---	---	---	---	---	7.2	2.8	0.67	0.32	0.35
26	---	---	---	---	---	---	---	6.4	2.9	0.47	0.18	0.44
27	---	---	---	---	---	---	---	5.6	2.4	0.30	0.09	0.80
28	---	---	---	---	---	---	---	6.0	1.9	0.18	0.37	0.66
29	---	---	---	---	---	---	---	6.5	1.5	0.19	0.77	0.52
30	---	---	---	---	---	---	---	21	1.2	0.93	0.27	0.45
31	---	---	---	---	---	---	---	21	---	1.00	0.18	---
TOTAL	---	---	---	---	---	---	---	---	96.7	38.01	13.60	9.36
MEAN	---	---	---	---	---	---	---	---	3.22	1.23	0.44	0.31
MAX	---	---	---	---	---	---	---	---	13	4.4	3.7	0.80
MIN	---	---	---	---	---	---	---	---	1.2	0.18	0.01	0.04
AC-FT	---	---	---	---	---	---	---	---	192	75	27	19

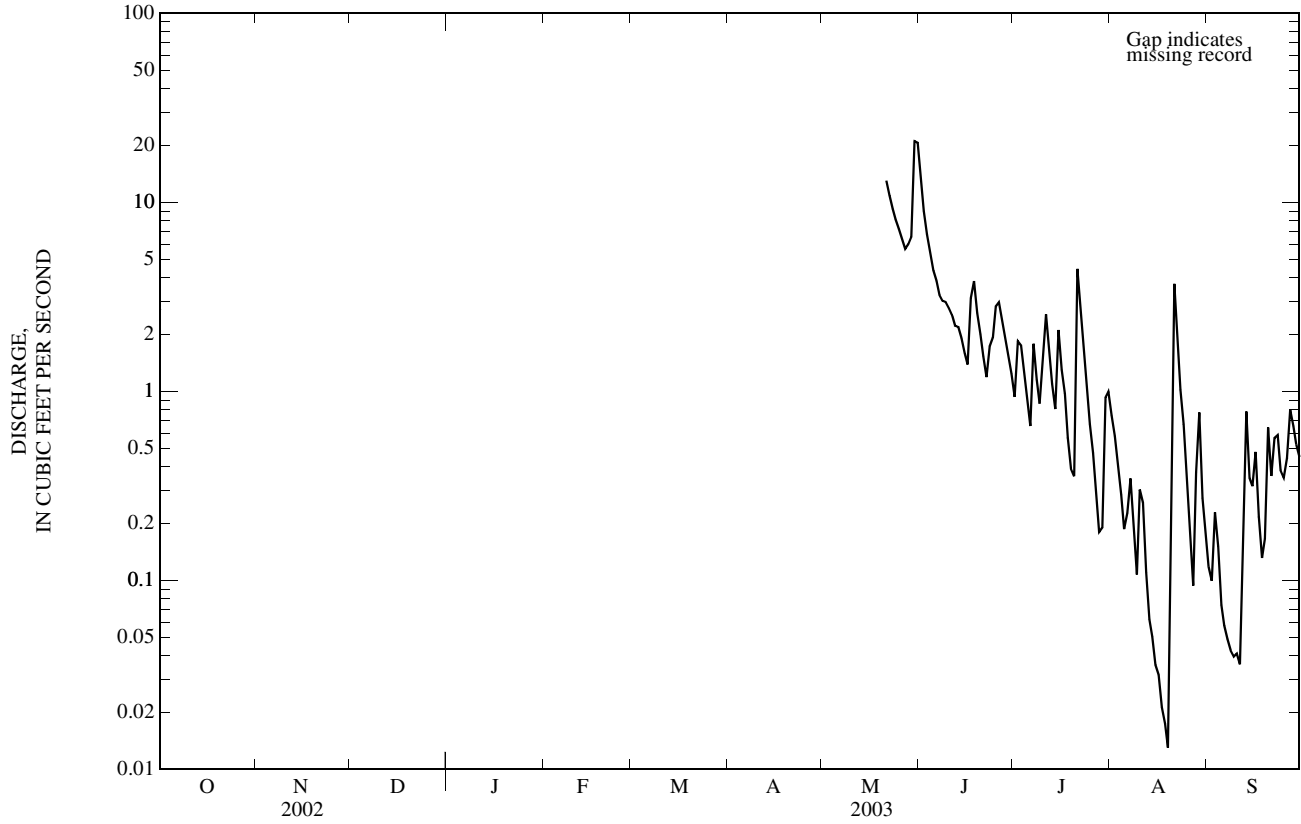
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 2003 - 2003, BY WATER YEAR (WY)

MEAN	---	---	---	---	---	---	---	---	3.22	1.23	0.44	0.31
MAX	---	---	---	---	---	---	---	---	3.22	1.23	0.44	0.31
(WY)	---	---	---	---	---	---	---	---	(2003)	(2003)	(2003)	(2003)
MIN	---	---	---	---	---	---	---	---	3.22	1.23	0.44	0.31
(WY)	---	---	---	---	---	---	---	---	(2003)	(2003)	(2003)	(2003)

04010520 HOLLOW ROCK CREEK NEAR RED ROCK, MN—Continued

SUMMARY STATISTICS FOR 2003 WATER YEAR

HIGHEST DAILY MEAN	21	May 30,31
LOWEST DAILY MEAN	0.01	Aug 19
MAXIMUM PEAK FLOW	40	May 30
MAXIMUM PEAK STAGE	4.79	May 30
INSTANTANEOUS LOW FLOW	0.01	Aug 18



STREAMS TRIBUTARY TO LAKE SUPERIOR

04010528 RESERVATION RIVER NEAR GRAND PORTAGE, MN

LOCATION.--Lat 47°54'49", long 89°51'15", in SW¹/₄NE¹/₄ sec. 30, T.63 N., R.5 E., Cook County, Hydrologic Unit 04010101, on Grand Portage Indian Band property, on left bank 3.4 miles upstream from mouth and 8.6 mi southwest of Grand Portage.

DRAINAGE AREA.--

PERIOD OF RECORD.--May 2003 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 1,080 ft above sea level (from topographic map).

REMARKS.--Records good.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	---	---	---	---	19	2.9	2.1	0.76
2	---	---	---	---	---	---	---	---	17	3.8	2.0	0.79
3	---	---	---	---	---	---	---	---	15	3.3	1.8	1.2
4	---	---	---	---	---	---	---	---	14	2.9	1.8	0.85
5	---	---	---	---	---	---	---	---	12	2.6	1.7	0.74
6	---	---	---	---	---	---	---	---	11	2.5	1.7	0.70
7	---	---	---	---	---	---	---	---	9.6	3.5	1.6	0.66
8	---	---	---	---	---	---	---	---	8.8	2.7	1.4	0.67
9	---	---	---	---	---	---	---	---	8.2	2.4	1.3	0.65
10	---	---	---	---	---	---	---	---	7.6	3.5	1.4	0.61
11	---	---	---	---	---	---	---	---	7.0	3.8	1.3	0.60
12	---	---	---	---	---	---	---	---	6.5	3.0	1.1	1.2
13	---	---	---	---	---	---	---	---	6.3	2.7	1.0	1.3
14	---	---	---	---	---	---	---	---	5.5	2.6	0.99	0.99
15	---	---	---	---	---	---	---	---	5.1	3.9	0.95	0.91
16	---	---	---	---	---	---	---	---	4.7	3.0	0.83	0.84
17	---	---	---	---	---	---	---	---	6.7	2.7	0.80	0.79
18	---	---	---	---	---	---	---	---	6.3	2.5	0.72	0.73
19	---	---	---	---	---	---	---	---	5.1	2.3	0.82	1.3
20	---	---	---	---	---	---	---	---	4.5	2.3	1.0	1.6
21	---	---	---	---	---	---	---	---	3.9	2.7	4.9	1.0
22	---	---	---	---	---	---	---	---	17	3.5	1.7	1.2
23	---	---	---	---	---	---	---	---	16	4.4	2.3	1.1
24	---	---	---	---	---	---	---	---	15	5.0	2.2	1.0
25	---	---	---	---	---	---	---	---	14	4.9	2.1	0.98
26	---	---	---	---	---	---	---	---	13	4.5	2.1	0.90
27	---	---	---	---	---	---	---	---	12	3.9	1.9	0.84
28	---	---	---	---	---	---	---	---	12	3.6	1.8	1.4
29	---	---	---	---	---	---	---	---	11	3.4	1.8	1.4
30	---	---	---	---	---	---	---	---	25	3.2	2.7	1.00
31	---	---	---	---	---	---	---	---	22	---	2.4	0.91
TOTAL	---	---	---	---	---	---	---	---	220.2	83.3	42.64	29.28
MEAN	---	---	---	---	---	---	---	---	7.34	2.69	1.38	0.98
MAX	---	---	---	---	---	---	---	---	19	3.9	4.9	1.6
MIN	---	---	---	---	---	---	---	---	3.2	1.8	0.72	0.60
AC-FT	---	---	---	---	---	---	---	---	437	165	85	58

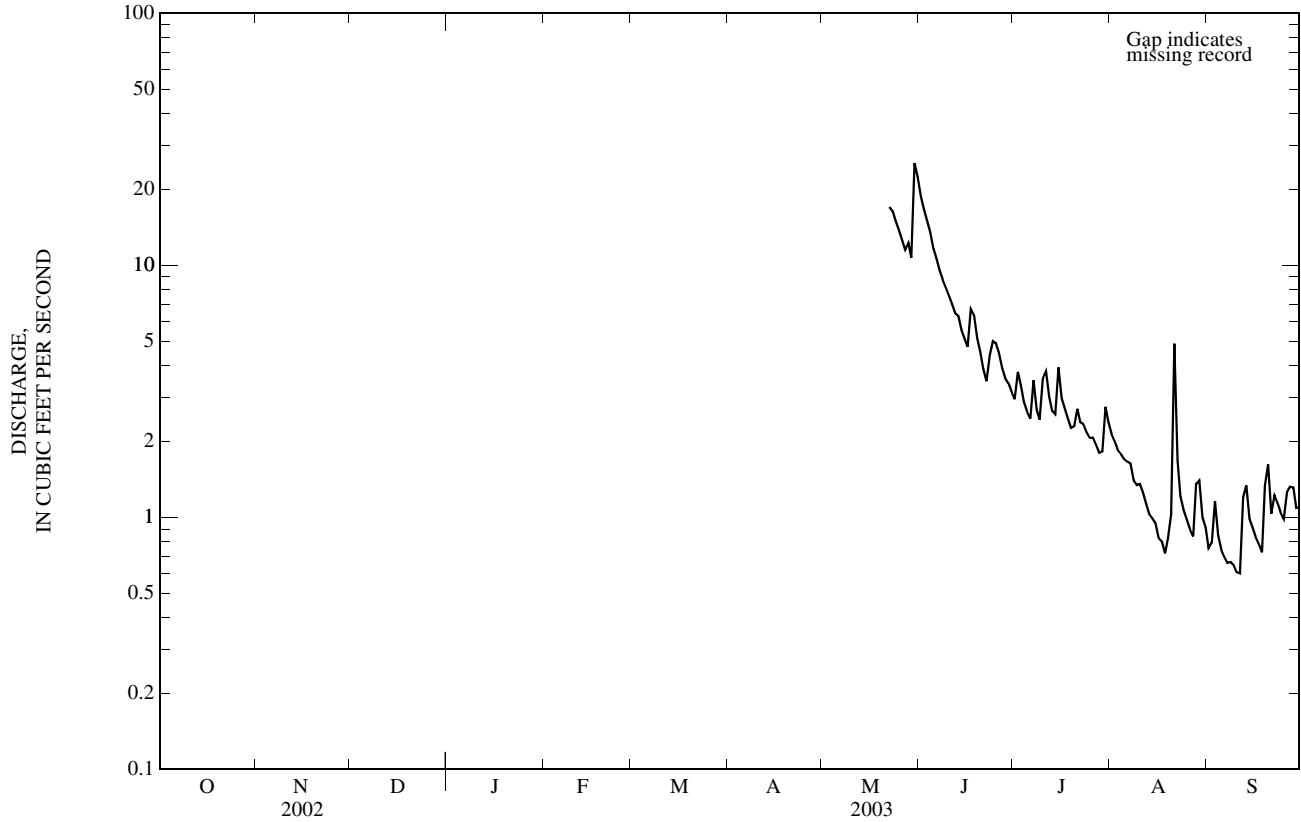
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 2003 - 2003, BY WATER YEAR (WY)

MEAN	---	---	---	---	---	---	---	---	7.34	2.69	1.38	0.98
MAX	---	---	---	---	---	---	---	---	7.34	2.69	1.38	0.98
(WY)	---	---	---	---	---	---	---	---	(2003)	(2003)	(2003)	(2003)
MIN	---	---	---	---	---	---	---	---	7.34	2.69	1.38	0.98
(WY)	---	---	---	---	---	---	---	---	(2003)	(2003)	(2003)	(2003)

04010528 RESERVATION RIVER NEAR GRAND PORTAGE, MN—Continued

SUMMARY STATISTICS FOR 2003 WATER YEAR

HIGHEST DAILY MEAN	25	May 30
LOWEST DAILY MEAN	0.60	Sep 11
MAXIMUM PEAK FLOW	42	May 30
MAXIMUM PEAK STAGE	5.20	May 30
INSTANTANEOUS LOW FLOW	0.49	Aug 17



04015330 KNIFE RIVER NEAR TWO HARBORS, MN

LOCATION.--Lat 46°56'49", long 91°47'32", in SW¹/₄NW¹/₄ sec. 31, T.52 N., R.11 W., Lake County, Hydrologic Unit 04010102, on right bank 600 ft downstream from bridge on U.S. Highway 61, 0.5 mi upstream from bridge on County Highway 102, in town of Knife River, 0.8 mi upstream from Lake Superior, and 7.8 mi southwest of Two Harbors.

DRAINAGE AREA.--83.6 mi².

PERIOD OF RECORD.--July 1974 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 640 ft above sea level (from topographic map).

REMARKS.--Records good except those for estimated daily discharges, which are poor. Flow regulated intermittently by fish ladder operation just upstream of gage.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,800 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Apr 10	1030	*1,780	*6.09	No peak greater than base discharge.			

Minimum discharge, 0.00 ft³/s, many days.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	19	43	e18	e4.3	0.00	0.00	e21	60	51	22	29	8.6
2	18	38	e13	e4.0	0.00	0.00	e25	60	42	19	29	7.7
3	15	37	e11	e3.7	e0.00	0.00	e29	49	35	91	25	7.2
4	119	33	e9.2	e3.5	e0.00	0.00	e70	44	30	83	21	6.9
5	180	30	e9.9	e3.4	e0.00	0.00	e170	43	25	49	14	6.4
6	116	29	e10	e3.2	e0.00	0.00	e400	44	23	40	12	6.1
7	116	27	e12	e2.9	e0.00	0.00	e530	45	23	68	11	5.7
8	84	28	e14	e2.7	e0.00	0.00	852	45	22	80	9.7	5.5
9	65	28	e15	e2.6	e0.00	0.00	1,070	471	30	49	9.7	5.3
10	59	28	e16	e2.5	e0.00	0.00	1,280	753	56	59	10	4.8
11	47	28	e16	e2.2	e0.00	0.00	749	401	117	101	10	4.9
12	68	26	e16	e1.7	0.00	0.00	463	221	78	71	9.1	6.8
13	95	e28	e17	e1.0	0.00	0.00	218	142	56	48	7.9	11
14	70	e29	e17	e0.70	0.00	e0.01	216	110	40	34	7.3	9.3
15	55	e30	e17	e0.20	0.00	e0.05	212	89	30	35	7.0	7.7
16	46	e29	e17	e0.05	0.00	e0.60	125	75	28	33	6.4	6.7
17	40	e28	e17	e0.00	0.00	e4.0	78	64	24	29	5.6	5.7
18	41	e27	e17	e0.00	0.00	e21	84	57	20	25	5.3	6.4
19	73	27	e17	e0.00	0.00	e50	397	402	17	19	4.9	46
20	65	25	e17	e0.10	0.00	e150	521	631	14	22	4.7	68
21	61	24	e17	e0.05	0.00	e260	660	265	12	24	6.4	40
22	56	e24	e17	e0.00	0.00	e370	329	164	11	22	11	26
23	51	23	e15	e0.00	0.00	e500	169	238	21	16	8.7	19
24	52	e23	e13	e0.00	0.00	e300	126	155	35	14	9.9	15
25	48	e23	e10	e0.00	0.00	e170	110	113	39	12	11	12
26	54	e25	e8.0	e0.00	0.00	e126	89	87	56	11	25	11
27	59	e24	e6.6	0.00	0.00	e60	83	69	47	10	33	11
28	56	e24	e6.0	0.00	0.00	e18	84	63	36	9.0	20	11
29	55	e26	e5.4	0.00	---	e22	79	64	37	8.6	15	12
30	57	e22	e5.0	0.00	---	e23	67	57	29	8.7	12	9.8
31	52	---	e4.6	0.00	---	e22	---	59	---	8.9	9.9	---
TOTAL	1,992	836	403.7	38.80	0.00	2,096.66	9,306	5,140	1,084	1,121.2	400.5	403.5
MEAN	64.3	27.9	13.0	1.25	0.000	67.6	310	166	36.1	36.2	12.9	13.4
MAX	180	43	18	4.3	0.00	500	1,280	753	117	101	33	68
MIN	15	22	4.6	0.00	0.00	0.00	21	43	11	8.6	4.7	4.8
AC-FT	3,950	1,660	801	77	0.00	4,160	18,460	10,200	2,150	2,220	794	800
CFSM	0.77	0.33	0.16	0.01	0.00	0.81	3.71	1.98	0.43	0.43	0.15	0.16
IN.	0.89	0.37	0.18	0.02	0.00	0.93	4.14	2.29	0.48	0.50	0.18	0.18

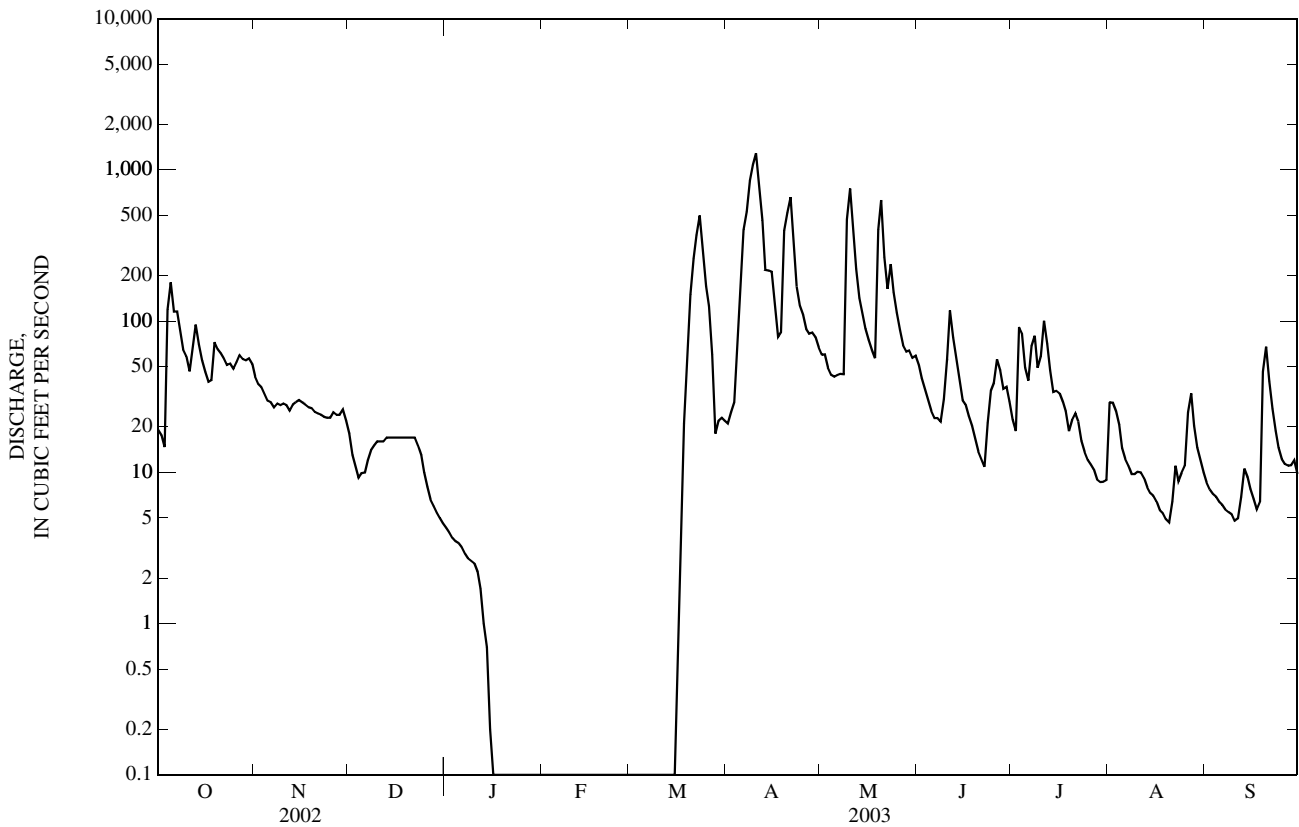
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1974 - 2003, BY WATER YEAR (WY)

MEAN	89.8	81.0	24.0	11.1	12.9	60.3	377	155	87.4	88.8	35.9	77.6
MAX	267	238	75.1	31.4	79.2	204	889	427	240	402	163	314
(WY)	(1996)	(1999)	(1999)	(1975)	(1998)	(1998)	(2001)	(1979)	(1984)	(1999)	(1988)	(1977)
MIN	3.06	1.58	0.000	0.000	0.000	6.30	73.6	16.0	13.0	4.87	2.95	1.43
(WY)	(1977)	(1977)	(1977)	(1977)	(1977)	(2002)	(1977)	(1976)	(1995)	(1988)	(1976)	(1976)

04015330 KNIFE RIVER NEAR TWO HARBORS, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1974 - 2003	
ANNUAL TOTAL	24,511.6		22,822.36		92.2	
ANNUAL MEAN	67.2		62.5		44.2	
HIGHEST ANNUAL MEAN					164	1999
LOWEST ANNUAL MEAN					44.2	1977
HIGHEST DAILY MEAN	1,510	Jun 23	1,280	Apr 10	4,840	Jul 5, 1999
LOWEST DAILY MEAN	2.8	Mar 6	a0.00	Jan 17	b0.00	Dec 2, 1976
ANNUAL SEVEN-DAY MINIMUM	2.9	Mar 2	0.00	Jan 22	0.00	Dec 2, 1976
MAXIMUM PEAK FLOW			1,780	Apr 10	9,100	Jul 5, 1999
MAXIMUM PEAK STAGE			6.09	Apr 10	12.14	Jul 5, 1999
INSTANTANEOUS LOW FLOW			c0.00	Jan 17	b0.00	Dec 2, 1976
ANNUAL RUNOFF (AC-FT)	48,620		45,270		66,770	
ANNUAL RUNOFF (CFSM)	0.80		0.75		1.10	
ANNUAL RUNOFF (INCHES)	10.91		10.16		14.98	
10 PERCENT EXCEEDS	118		125		224	
50 PERCENT EXCEEDS	19		22		23	
90 PERCENT EXCEEDS	4.4		0.00		4.9	

a Also occurred Jan, 18, 19, Jan. 22 to Mar. 13.
 b Many days in 1977 and 2003.
 c Many days.
 e Estimated.



04024000 ST. LOUIS RIVER AT SCANLON, MN

LOCATION.--Lat 46°42'12", long 92°25'07", in NW¹/₄ sec. 30, T.49 N., R.16 W., Carlton County, Hydrologic Unit 04010201, on right bank 80 ft downstream from lower bridge on U.S. Highway 61 at Scanlon, 0.6 mi downstream from Minnesota Power Co. power plant, 3 mi upstream from Thomson Reservoir, and 3.2 mi upstream from Midway River.

DRAINAGE AREA.--3,430 mi² (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.

REVISED RECORDS.--WSP 1337: 1911-12.

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

REMARKS.--Records good except those for estimated daily discharges, which are fair. Diurnal fluctuation caused by power plant upstream. Flow regulated by Whiteface Reservoir and Boulder, Island, Rice and Fish Lakes, combined capacity, 332,160 acre-ft; the water-discharge table shows the monthly change in contents (+).

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1,230	1,870	1,160	930	e790	e640	1,200	1,890	1,990	2,340	1,110	578
2	1,090	1,890	1,020	913	e790	e640	1,370	1,720	1,970	2,180	1,230	530
3	1,080	1,780	879	960	e760	e640	1,530	1,720	1,770	2,100	1,210	508
4	1,320	1,810	964	957	e730	e650	1,370	1,600	1,720	2,480	1,290	527
5	2,220	1,620	1,060	912	e710	e650	1,290	1,530	1,570	2,830	1,210	551
6	2,960	1,670	704	890	e700	e650	1,330	1,540	1,430	2,640	1,140	491
7	3,070	1,650	1,220	939	e700	e660	1,090	1,530	1,380	3,050	1,130	437
8	3,060	1,550	1,130	1,000	e700	e670	1,100	1,520	1,370	3,070	990	443
9	2,930	1,580	742	990	e700	e680	1,240	1,560	1,360	2,850	1,120	430
10	2,810	1,590	1,390	959	e700	e700	1,520	2,130	1,370	3,170	952	392
11	2,670	1,580	1,300	852	e690	e720	1,700	2,560	1,640	5,230	971	321
12	2,630	1,540	1,170	793	e680	e740	1,830	2,670	1,790	5,740	913	870
13	2,720	1,460	1,140	e820	e670	e770	1,820	2,580	1,940	5,030	805	1,170
14	2,810	1,290	1,140	e830	e660	e800	1,750	2,390	1,940	4,240	791	1,860
15	2,660	1,170	1,180	742	e640	830	1,870	2,210	1,730	3,630	740	1,810
16	2,490	1,210	1,080	e770	e650	849	1,920	2,090	1,600	3,060	658	1,710
17	2,280	1,280	1,080	e780	e650	930	1,730	2,030	1,480	2,790	645	1,430
18	2,250	1,360	1,180	e780	e660	1,050	1,600	1,850	1,390	2,390	563	1,400
19	2,200	1,430	1,150	e770	e670	993	1,710	2,130	1,380	2,160	556	1,770
20	2,460	1,420	1,180	e740	e680	1,050	2,540	2,860	1,280	2,070	556	2,280
21	2,460	1,400	1,140	e750	e680	1,460	3,330	3,100	1,210	2,420	555	2,850
22	2,390	1,270	1,120	e780	e680	1,390	3,550	2,950	1,100	2,240	518	2,920
23	2,290	1,360	1,110	e770	e680	1,450	3,260	2,850	1,290	1,980	469	2,750
24	2,160	1,220	1,070	e750	e670	1,570	2,950	3,000	1,330	1,680	510	2,810
25	2,120	1,260	1,110	e720	e660	1,590	2,600	2,880	1,710	1,470	600	2,640
26	1,950	1,140	1,120	e700	e650	1,590	2,480	2,530	2,470	1,340	486	2,480
27	1,950	928	963	e710	e640	1,550	2,350	2,310	2,840	1,170	614	2,300
28	1,930	928	1,020	e720	e640	1,380	2,120	2,240	2,930	1,040	618	2,170
29	1,910	1,400	1,050	e730	---	1,180	2,090	2,060	2,810	1,070	609	2,010
30	2,040	1,200	1,030	e750	---	1,140	2,010	2,060	2,590	962	701	1,930
31	2,040	---	983	e780	---	1,140	---	1,930	---	960	636	---
TOTAL	70,180	42,856	33,585	25,487	19,230	30,752	58,250	68,020	52,380	79,382	24,896	44,368
MEAN	2,264	1,429	1,083	822	687	992	1,942	2,194	1,746	2,561	803	1,479
MAX	3,070	1,890	1,390	1,000	790	1,590	3,550	3,100	2,930	5,740	1,290	2,920
MIN	1,080	928	704	700	640	640	1,090	1,520	1,100	960	469	321
AC-FT	139,200	85,000	66,620	50,550	38,140	61,000	115,500	134,900	103,900	157,500	49,380	88,000
CFSM	0.66	0.42	0.32	0.24	0.20	0.29	0.57	0.64	0.51	0.75	0.23	0.43
IN.	0.76	0.46	0.36	0.28	0.21	0.33	0.63	0.74	0.57	0.86	0.27	0.48
+	98.8	-347	-799	-232	-459	-238	-262	310	305	131	-126	137
MEAN ‡	2,363	1,082	284	590	228	754	2,204	2,504	2,051	2,692	677	1,616
CFSM ‡	.69	.32	.08	.17	.07	.22	.64	.73	.60	.78	.20	.47
IN ‡	.80	.36	.09	.20	.07	.25	.71	.84	.67	.90	.23	.52

CAL. YR. 02 TOTAL 856,550 MEAN 2,347 MAX 25,400 MIN 532 MEAN ‡ 2,303 CFSM ‡ 0.67 IN ‡ 9.12
WTR. YR. 03 TOTAL 549,386 MEAN 1,505 MAX 5,740 MIN 321 MEAN ‡ 1,427 CFSM ‡ 0.42 IN ‡ 5.65

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1908 - 2003, BY WATER YEAR (WY)

	2,037	1,752	1,293	1,076	1,059	1,456	5,693	5,081	3,549	2,503	1,664	1,762
MEAN	2,037	1,752	1,293	1,076	1,059	1,456	5,693	5,081	3,549	2,503	1,664	1,762
MAX	7,508	8,518	2,993	2,272	2,200	6,026	15,860	22,210	16,480	12,630	9,197	7,594
(WY)	(1974)	(1972)	(1972)	(1966)	(1966)	(1945)	(2001)	(1950)	(1908)	(1999)	(1953)	(1928)
MIN	407	473	282	265	249	301	667	593	458	199	377	402
(WY)	(1935)	(1935)	(1911)	(1911)	(1924)	(1924)	(1977)	(1977)	(1988)	(1988)	(1977)	(1934)

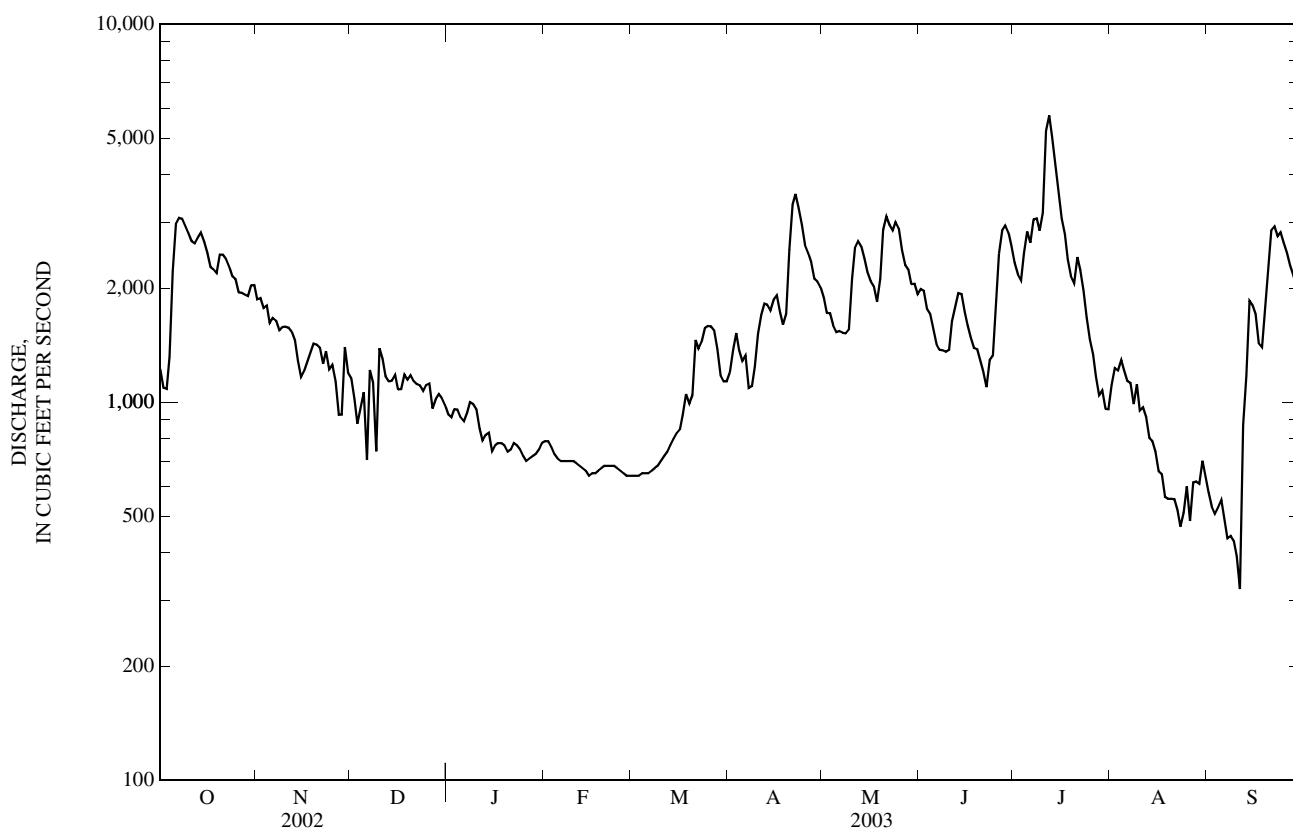
04024000 ST. LOUIS RIVER AT SCANLON, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1908 - 2003	
ANNUAL TOTAL	856,550		549,386			
ANNUAL MEAN	2,347		1,505		2,399	
HIGHEST ANNUAL MEAN					4,276 1972	
LOWEST ANNUAL MEAN					945 1924	
HIGHEST DAILY MEAN	25,400	Jun 25	5,740	Jul 12	37,900	May 9, 1950
LOWEST DAILY MEAN	532	Mar 5	321	Sep 11	88	Aug 24, 1977
ANNUAL SEVEN-DAY MINIMUM	739	Feb 27	438	Sep 5	134	Jul 26, 1988
MAXIMUM PEAK FLOW			5,970		37,900 May 9, 1950	
MAXIMUM PEAK STAGE			6.08		15.80 May 9, 1950	
ANNUAL RUNOFF (AC-FT)	1,699,000		1,090,000		1,738,000	
ANNUAL RUNOFF (CFSM)	0.68		0.44		0.70	
ANNUAL RUNOFF (INCHES)	9.29		5.96		9.50	
10 PERCENT EXCEEDS	4,390		2,690		5,260	
50 PERCENT EXCEEDS	1,460		1,290		1,400	
90 PERCENT EXCEEDS	982		650		656	

+ Change in contents, equivalent in cubic feet per second, in Whiteface Reservoir, and Boulder, Island, Rice and Fish Lakes; records furnished by Minnesota Power Co.

‡ Adjusted for change in reservoir contents.

e Estimated.



05030500 OTTER TAIL RIVER NEAR ELIZABETH, MN

LOCATION.--Lat 46°22'10", long 96°01'02", in SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 31, T.134 N., R.42 W., Otter Tail County, Hydrologic Unit 09020103, on right bank at County Highway 10, 2.5 miles below Taplin Gorge Dam, 5.0 miles above the Diversion Dam, 5.7 miles east of Elizabeth and 6.6 miles northeast of Fergus Falls.

DRAINAGE AREA.--1,230 mi² (approximately).

PERIOD OF RECORD.--May 1904 to September 1917, monthly discharge only, published as "at German Church near Fergus Falls" in WSP 1308. July 1992 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 1,250 ft above sea level (from topographic map). Nonrecording gage at same site Nov. 1913 to Sept. 1917 at elevation 1,265 ft (from topographic map).

REMARKS.--Records good except those for estimated daily discharge, which are fair. Flow regulated by power plant upstream.

REVISIONS.--Minimum instantaneous discharges for the 2000 and 2001 water years have been revised to 80 ft³/s, September 20, 2000, and 38 ft³/s, November 1, 2000.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	234	215	221	234	e210	e190	238	382	434	507	475	133
2	224	215	221	235	e210	e190	244	379	440	497	464	133
3	192	214	222	e234	e210	e190	245	377	436	496	454	133
4	176	214	222	233	e210	e180	245	380	428	493	426	133
5	177	209	222	233	e210	e180	245	384	405	458	407	129
6	184	196	222	233	e210	e181	246	390	400	458	410	121
7	227	192	222	233	e210	e182	247	394	404	496	395	121
8	251	192	223	232	e210	e183	249	406	399	504	373	121
9	246	192	230	233	e210	e183	250	447	391	525	378	114
10	240	192	235	e232	e210	e185	251	456	400	592	370	108
11	238	192	235	e231	e195	e186	252	451	425	601	378	108
12	235	204	235	e231	e180	e186	255	449	430	599	366	101
13	234	214	235	e230	e180	e186	257	451	401	594	354	95
14	234	221	235	e230	e180	e186	263	475	405	592	334	94
15	224	222	235	e229	e180	e193	253	479	405	587	318	89
16	207	219	231	e229	e180	e220	303	472	407	584	306	82
17	201	219	213	e228	e180	272	347	467	435	579	304	79
18	215	219	205	e228	e180	307	346	465	450	574	283	80
19	224	219	215	e230	e213	301	401	469	444	569	265	80
20	223	223	226	e230	e210	290	396	452	437	565	251	80
21	222	230	226	e230	e209	278	413	476	431	557	222	80
22	218	234	226	e220	e208	275	413	473	444	554	227	80
23	209	234	e226	e212	e207	272	405	471	444	556	201	80
24	206	233	e226	e212	e206	254	400	468	444	512	167	80
25	206	221	e226	e212	e205	231	395	465	479	504	209	80
26	206	218	e226	e211	e190	222	392	469	478	508	233	80
27	206	222	e226	e211	e190	222	388	468	481	504	230	80
28	208	222	226	e211	e190	222	384	465	516	497	195	80
29	208	222	226	e210	---	222	377	458	531	489	152	81
30	211	221	e230	e210	---	224	386	436	516	475	131	78
31	215	---	e230	e210	---	227	---	432	---	483	132	---
TOTAL	6,701	6,440	6,999	6,977	5,583	6,820	9,486	13,706	13,140	16,509	9,410	2,933
MEAN	216	215	226	225	199	220	316	442	438	533	304	97.8
MAX	251	234	235	235	213	307	413	479	531	601	475	133
MIN	176	192	205	210	180	180	238	377	391	458	131	78
AC-FT	13,290	12,770	13,880	13,840	11,070	13,530	18,820	27,190	26,060	32,750	18,660	5,820
CFSM	0.18	0.17	0.18	0.18	0.16	0.18	0.26	0.36	0.36	0.43	0.25	0.08
IN.	0.20	0.19	0.21	0.21	0.17	0.21	0.29	0.41	0.40	0.50	0.28	0.09

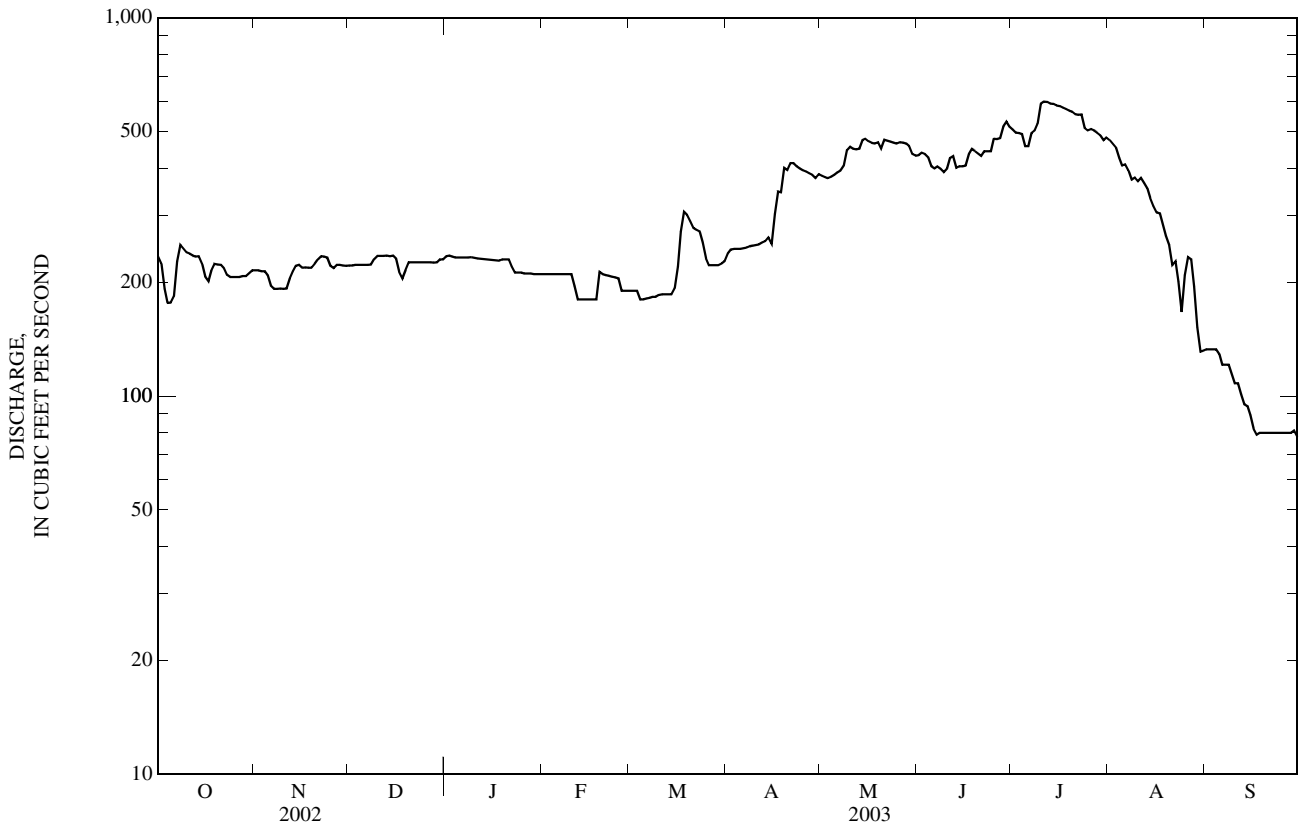
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1992 - 2003, BY WATER YEAR (WY)

MEAN	302	326	335	325	337	377	529	703	639	578	423	332
MAX	740	571	529	479	523	477	725	1,056	1,003	770	759	817
(WY)	(1994)	(1994)	(1999)	(1999)	(1999)	(1999)	(1999)	(2001)	(2001)	(1998)	(1993)	(1993)
MIN	112	143	141	181	199	220	316	442	429	358	218	97.8
(WY)	(1997)	(1993)	(1993)	(1993)	(2003)	(2003)	(2003)	(2003)	(2002)	(1995)	(1996)	(2003)

05030500 OTTER TAIL RIVER NEAR ELIZABETH, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1992 - 2003	
ANNUAL TOTAL	126,331		104,704			
ANNUAL MEAN	346		287		437	
HIGHEST ANNUAL MEAN					593 1999	
LOWEST ANNUAL MEAN					287 2003	
HIGHEST DAILY MEAN	589	Jul 11	601	Jul 11	1,110	May 23, 2001
LOWEST DAILY MEAN	176	Oct 4	78	Sep 30	78	Sep 30, 2003
ANNUAL SEVEN-DAY MINIMUM	194	Nov 6	80	Sep 17	80	Sep 17, 2003
MAXIMUM PEAK FLOW			611	Jul 11	1,170	May 23, 2001
MAXIMUM PEAK STAGE			7.10	Jul 11	9.37	May 23, 2001
INSTANTANEOUS LOW FLOW			a30	Aug 23	a30	Aug 23, 2003
ANNUAL RUNOFF (AC-FT)	250,600		207,700		316,400	
ANNUAL RUNOFF (CFSM)	0.28		0.23		0.36	
ANNUAL RUNOFF (INCHES)	3.82		3.17		4.82	
10 PERCENT EXCEEDS	524		475		732	
50 PERCENT EXCEEDS	324		230		400	
90 PERCENT EXCEEDS	219		179		207	

a Result of regulation.
 e Estimated.



05046000 OTTER TAIL RIVER BELOW ORWELL DAM, NEAR FERGUS FALLS, MN

LOCATION.--Lat 46°12'35", long 96°11'05", in NE $\frac{1}{4}$ sec. 34, T.132 N., R.44 W., Otter Tail County, Hydrologic Unit 09020103, on left bank 0.7 mi downstream from Orwell Dam on County Highway 15, 6.1 mi downstream from Dayton Hollow Dam, 8 mi southwest of Fergus Falls, and 11.1 mi downstream from Pelican River.

DRAINAGE AREA.--1,740 mi².

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.

REVISED RECORDS.--WSP 785: 1934(M). WSP 1208: 1947(M). WSP 1308: 1931(M).

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

REMARKS.--Records good. Flow regulated at Orwell Lake (station 05045950) beginning Mar. 21, 1953, and by power plant upstream.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	373	351	357	370	370	329	345	543	562	961	649	135
2	370	351	357	370	370	330	331	526	562	955	641	122
3	370	351	357	370	351	328	316	502	545	842	630	114
4	370	351	357	370	333	330	346	502	536	758	622	114
5	370	351	357	370	353	331	389	533	540	753	625	115
6	370	351	357	377	375	328	389	594	540	750	618	114
7	370	351	357	382	360	328	389	620	540	650	591	114
8	370	351	357	382	346	328	389	570	540	549	572	114
9	370	351	357	387	345	330	389	586	539	532	561	114
10	370	351	357	388	345	328	389	618	537	534	541	114
11	370	351	357	389	345	292	389	623	512	684	550	114
12	370	351	357	389	356	230	386	713	501	802	536	116
13	370	351	357	389	363	212	386	766	502	805	441	118
14	371	351	357	365	363	305	382	761	501	802	422	119
15	376	339	357	331	361	376	382	689	502	800	428	120
16	376	316	371	308	357	376	384	727	502	794	407	122
17	376	316	386	305	357	361	441	754	502	790	298	115
18	376	316	382	305	344	351	502	753	504	786	95	92
19	376	319	381	305	333	384	521	747	507	778	98	80
20	376	354	389	305	333	456	525	693	505	774	212	79
21	376	389	389	324	333	476	588	665	502	766	223	79
22	376	389	389	339	333	476	629	667	505	757	184	77
23	376	389	389	339	333	476	628	662	602	813	159	75
24	376	389	389	338	333	476	625	659	719	864	162	75
25	376	389	388	338	331	476	623	652	752	845	166	75
26	379	389	382	339	328	476	622	655	747	810	171	76
27	382	376	362	336	328	476	620	652	690	789	178	79
28	382	356	345	343	328	429	620	616	666	657	183	79
29	382	356	341	351	---	381	574	556	685	708	154	123
30	366	357	345	361	---	379	543	559	870	694	129	143
31	351	---	359	370	---	357	---	561	---	658	133	---
TOTAL	11,562	10,653	11,342	10,935	9,707	11,511	14,042	19,724	17,217	23,460	11,379	3,126
MEAN	373	355	366	353	347	371	468	636	574	757	367	104
MAX	382	389	389	389	375	476	629	766	870	961	649	143
MIN	351	316	341	305	328	212	316	502	501	532	95	75
AC-FT	22,930	21,130	22,500	21,690	19,250	22,830	27,850	39,120	34,150	46,530	22,570	6,200
CFSM	0.21	0.20	0.21	0.20	0.20	0.21	0.27	0.37	0.33	0.43	0.21	0.06
IN.	0.25	0.23	0.24	0.23	0.21	0.25	0.30	0.42	0.37	0.50	0.24	0.07

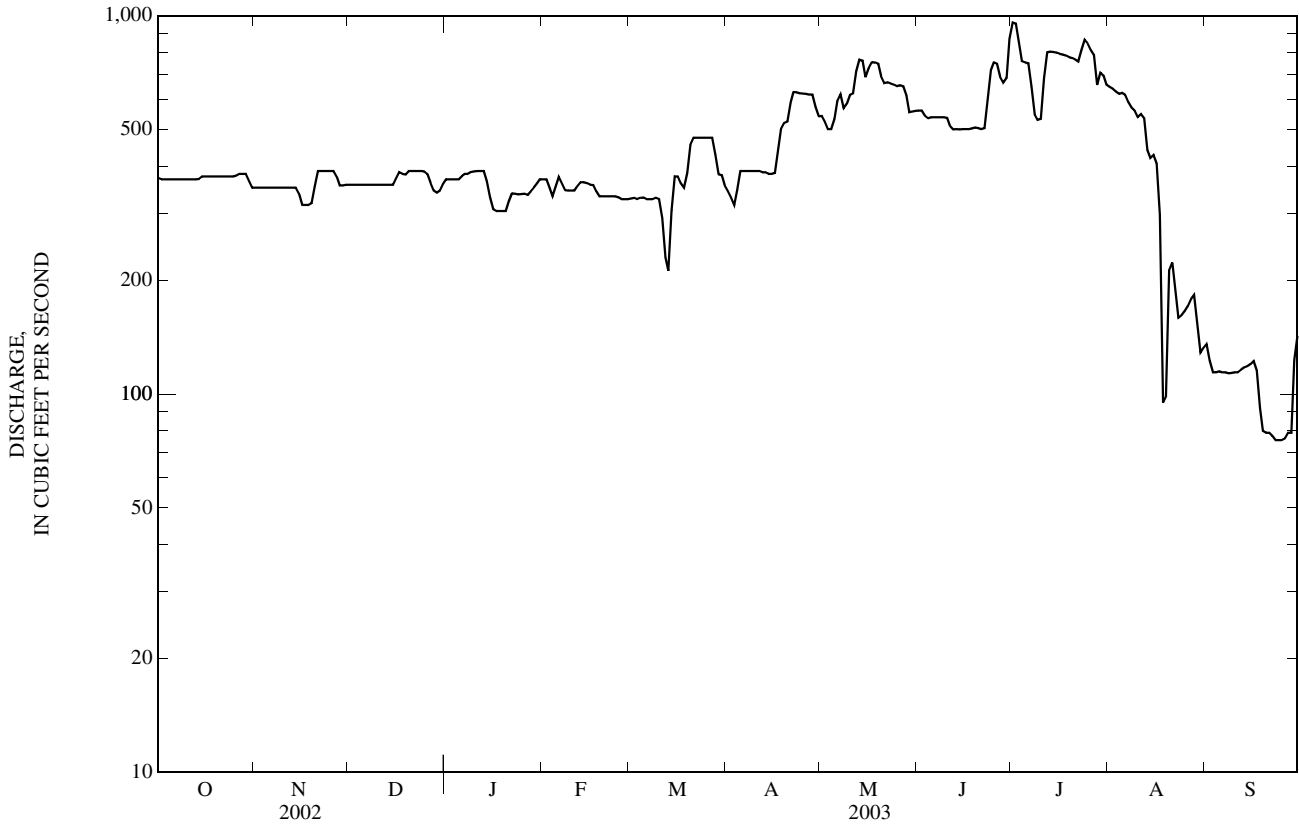
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 2003, BY WATER YEAR (WY)

MEAN	258	269	262	254	258	342	508	612	597	457	309	257
MAX	973	831	740	737	742	785	1,199	1,427	1,442	1,246	1,080	1,026
(WY)	(1994)	(1986)	(1999)	(1999)	(1999)	(1999)	(1997)	(1986)	(2001)	(1953)	(1985)	(1993)
MIN	9.15	8.42	8.10	15.1	10.8	23.5	39.5	14.1	14.2	12.8	11.5	7.99
(WY)	(1977)	(1977)	(1977)	(1937)	(1935)	(1937)	(1934)	(1977)	(1934)	(1936)	(1934)	(1934)

05046000 OTTER TAIL RIVER BELOW ORWELL DAM, NEAR FERGUS FALLS, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1931 - 2003	
ANNUAL TOTAL	187,165		154,658		366	
ANNUAL MEAN	513		424		846	
HIGHEST ANNUAL MEAN					1999	
LOWEST ANNUAL MEAN					1934	
HIGHEST DAILY MEAN	1,070	Jul 11	961	Jul 1	1,670	Jun 20, 1953
LOWEST DAILY MEAN	179	Aug 26	a75	Sep 23	b1.6	Feb 7, 1937
ANNUAL SEVEN-DAY MINIMUM	327	Aug 24	77	Sep 20	5.9	Sep 15, 1934
MAXIMUM PEAK FLOW			968	Jun 30	2,040	May 29, 2001
MAXIMUM PEAK STAGE			3.88	Jun 30	5.60	Jun 17, 1953
INSTANTANEOUS LOW FLOW			a60	Aug 18, Sep 18	b0.70	Aug 5, 1970
ANNUAL RUNOFF (AC-FT)	371,200		306,800		264,800	
ANNUAL RUNOFF (CFSM)	0.29		0.24		0.21	
ANNUAL RUNOFF (INCHES)	4.00		3.31		2.85	
10 PERCENT EXCEEDS	718		691		789	
50 PERCENT EXCEEDS	478		376		300	
90 PERCENT EXCEEDS	357		161		38	

a Due to regulation.
 b Due in part to regulation.



05049995 MUD LAKE ABOVE WHITE ROCK DAM NEAR WHITE ROCK, SD

LOCATION.--Lat 45°51'41", long 96°34'20", in NW¹/₄NW¹/₄ sec. 34, T.128 N., R.47 W., Roberts County, Hydrologic Unit 09020101, on Sisseton Indian Reservation, on left bank, 10 ft west of White Rock Dam, 4 mi south of White Rock and 5 mi northwest of Wheaton, MN.

DRAINAGE AREA.--

PERIOD OF RECORD.--October 2000 to current year. Gage height record prior to October 2000 can be obtained from Corp of Engineers.

GAGE.--Water-stage recorder. Datum of gage is 960.00 ft, adjustment of 1912 (levels by U.S. Army Corps of Engineers).

REMARKS.--Records poor. Lake regulated by Lake Traverse-Boise de Sioux Flood Control and Water Conservation project.

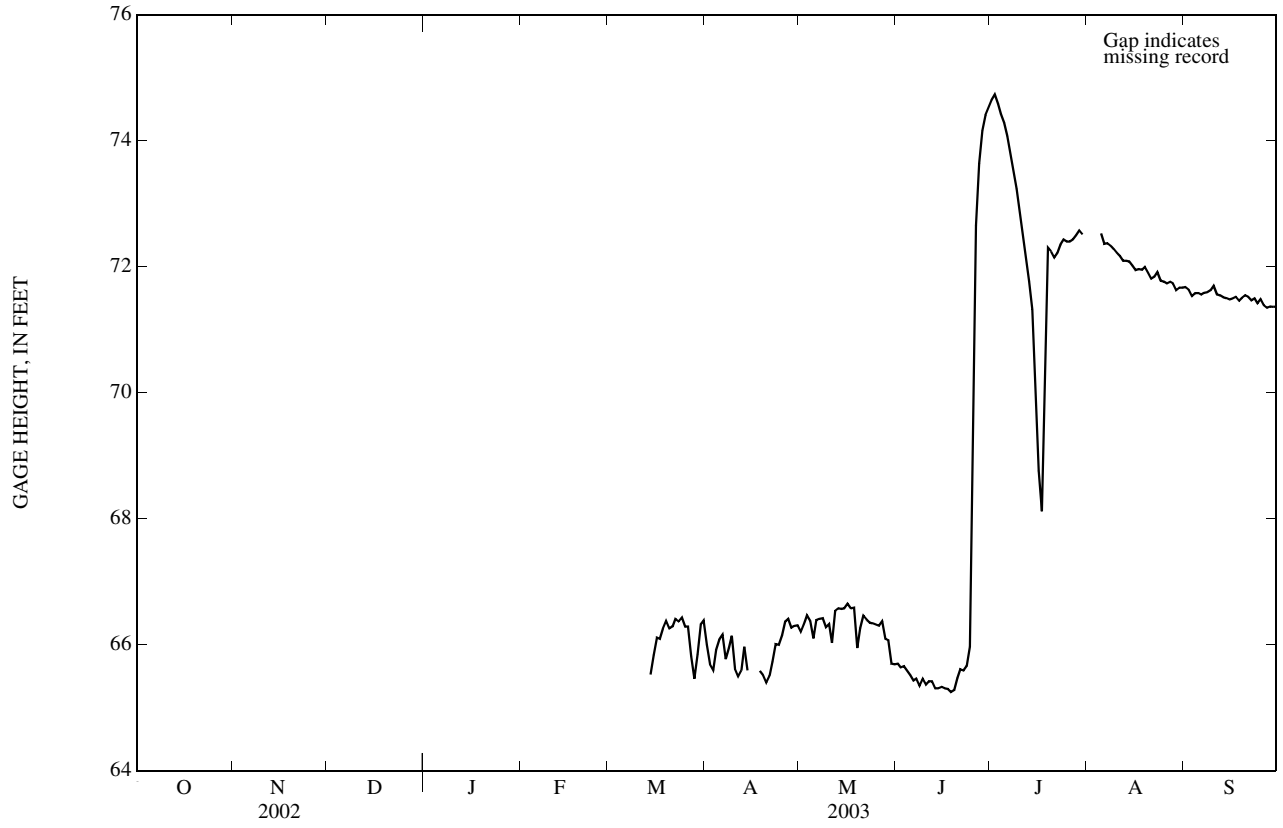
EXTREMES FOR PERIOD OF RECORD.--Maximum gage-height, 80.90 ft, Apr. 29, 2001; maximum daily, 80.76 ft, Apr. 19, 2001; minimum gage-height recorded, 65.14 ft, many days, several years (due in part to regulation), stage was observed lower than the detection limits of gage but precise stage readings were not determined; minimum daily recorded, 65.22 ft, June 14, 2002.

EXTREMES FOR CURRENT YEAR.--Maximum gage-height, 74.76 ft, July 2; maximum daily, 74.73 ft, July 2; minimum gage-height recorded, 65.14 ft (minimum detection limit), but was observed lower at times between Oct. 1 and Mar. 13 but precise stage readings were not determined.

GAGE HEIGHT, FEET
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	---	---	66.00	66.21	65.70	74.64	---	71.68
2	---	---	---	---	---	---	65.69	66.32	65.64	74.73	---	71.63
3	---	---	---	---	---	---	65.60	66.47	65.66	74.58	---	71.53
4	---	---	---	---	---	---	65.92	66.38	65.59	74.42	---	71.58
5	---	---	---	---	---	---	66.08	66.10	65.52	74.28	72.52	71.58
6	---	---	---	---	---	---	66.16	66.39	65.43	74.07	72.36	71.56
7	---	---	---	---	---	---	65.77	66.41	65.46	73.78	72.37	71.58
8	---	---	---	---	---	---	65.95	66.42	65.35	73.48	72.33	71.59
9	---	---	---	---	---	---	66.14	66.28	65.46	73.24	72.27	71.63
10	---	---	---	---	---	---	65.62	66.33	65.37	72.84	72.22	71.69
11	---	---	---	---	---	---	65.50	66.03	65.42	72.45	72.17	71.56
12	---	---	---	---	---	---	65.60	66.54	65.42	72.09	72.10	71.55
13	---	---	---	---	---	---	65.97	66.58	65.31	71.77	72.10	71.52
14	---	---	---	---	---	65.53	65.59	66.57	65.31	71.32	72.08	71.50
15	---	---	---	---	---	65.84	---	66.58	65.33	70.14	72.02	71.48
16	---	---	---	---	---	66.11	---	66.65	65.31	68.76	71.95	71.49
17	---	---	---	---	---	66.09	---	66.58	65.30	68.12	71.96	71.52
18	---	---	---	---	---	66.26	65.59	66.59	65.25	70.44	71.95	71.46
19	---	---	---	---	---	66.38	65.52	65.95	65.28	72.30	72.00	71.50
20	---	---	---	---	---	66.26	65.40	66.26	65.47	72.24	71.90	71.54
21	---	---	---	---	---	66.29	65.51	66.46	65.61	72.15	71.81	71.52
22	---	---	---	---	---	66.41	65.73	66.40	65.59	72.21	71.84	71.46
23	---	---	---	---	---	66.37	66.01	66.35	65.66	72.35	71.91	71.50
24	---	---	---	---	---	66.43	66.00	66.34	65.97	72.43	71.78	71.42
25	---	---	---	---	---	66.29	66.15	66.32	68.44	72.40	71.77	71.48
26	---	---	---	---	---	66.29	66.37	66.30	72.65	72.40	71.73	71.39
27	---	---	---	---	---	65.82	66.41	66.37	73.64	72.43	71.76	71.35
28	---	---	---	---	---	65.46	66.27	66.09	74.16	72.50	71.73	71.36
29	---	---	---	---	---	65.85	66.30	66.07	74.41	72.57	71.63	71.36
30	---	---	---	---	---	66.32	66.31	65.70	74.52	72.51	71.67	71.37
31	---	---	---	---	---	66.38	---	65.69	---	---	71.67	---
MEAN	---	---	---	---	---	---	---	66.31	66.97	---	---	71.51
MAX	---	---	---	---	---	---	---	66.65	74.52	---	---	71.69
MIN	---	---	---	---	---	---	---	65.69	65.25	---	---	71.35

05049995 MUD LAKE ABOVE WHITE ROCK DAM NEAR WHITE ROCK, SD—Continued



05050000 BOIS DE SIOUX RIVER NEAR WHITE ROCK, SD

LOCATION.--Lat 45°51'45", long 96°34'25", in SW¹/₄SW¹/₄ sec. 27, T.128 N., R.47 W., Roberts County, Hydrologic Unit 09020101, on Sisseton Indian Reservation, on left bank at Big Slough Outlet, 300 ft downstream from White Rock Dam, 4 mi south of White Rock and 5 mi northwest of Wheaton, MN.

DRAINAGE AREA.--1,160 mi² (approximately).

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

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

REMARKS.--Records good except those for estimated daily discharges, which are poor. Flow regulated by Lake Traverse-Boise de Sioux Flood Control and Water Conservation project.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.8	4.1	e3.1	e0.44	e0.00	e0.00	98	105	33	625	e77	0.12
2	1.3	3.9	e2.7	e0.43	e0.00	e0.00	51	118	28	695	e78	0.13
3	1.2	3.7	e2.3	e0.42	e0.00	e0.00	39	142	30	735	e79	0.11
4	2.5	3.9	e1.9	e0.41	e0.00	e0.00	75	128	23	773	80	<0.10
5	5.5	3.7	e1.6	e0.40	e0.00	e0.00	103	85	16	762	79	<0.10
6	7.5	3.7	e1.3	e0.38	e0.00	e0.00	109	134	9.1	744	79	<0.10
7	23	4.1	e1.1	e0.37	e0.00	e0.00	58	138	15	757	78	<0.10
8	11	4.0	e0.94	e0.36	e0.00	e0.00	77	137	9.9	759	107	<0.10
9	6.3	3.9	e0.84	e0.33	e0.00	e0.00	100	122	15	742	126	0.00
10	5.8	4.3	e0.79	e0.28	e0.00	e0.00	41	143	10	745	126	<0.10
11	9.7	4.5	e0.77	e0.24	e0.00	e0.00	26	89	12	743	126	0.00
12	e6.8	4.1	e0.76	e0.21	e0.00	e0.00	32	164	11	712	124	<0.10
13	e5.0	3.8	e0.76	e0.20	e0.00	e8.2	75	167	6.4	681	69	<0.10
14	e4.0	4.6	e0.77	e0.18	e0.00	e50	41	181	5.9	653	40	<0.10
15	e3.0	3.6	e0.78	e0.17	e0.00	e130	6.5	194	5.9	639	17	<0.10
16	3.2	4.4	e0.79	e0.15	e0.00	e150	18	192	5.3	606	5.5	<0.10
17	3.4	3.8	e0.76	e0.14	e0.00	135	37	175	8.6	553	4.8	0.00
18	4.2	4.2	e0.72	e0.13	e0.00	144	57	176	5.1	336	2.0	<0.10
19	3.7	4.4	e0.68	e0.12	e0.00	169	59	87	4.8	174	0.69	0.00
20	3.8	4.4	e0.63	e0.11	e0.00	143	52	116	12	174	0.56	0.00
21	3.8	4.3	e0.58	e0.10	e0.00	148	47	149	21	174	0.54	0.00
22	3.7	5.5	e0.54	e0.10	e0.00	166	58	136	22	90	0.49	0.00
23	3.7	4.0	e0.50	e0.10	e0.00	159	87	124	43	5.7	0.35	0.00
24	3.6	e3.8	e0.47	e0.00	e0.00	176	84	123	122	13	0.27	0.00
25	3.8	e3.7	e0.45	e0.00	e0.00	148	103	120	314	8.3	0.32	0.00
26	3.8	e3.7	e0.45	e0.00	e0.00	140	135	117	132	11	0.38	0.00
27	3.8	e3.6	e0.46	e0.00	e0.00	78	147	126	62	15	0.38	0.00
28	4.4	e3.7	e0.47	e0.00	e0.00	35	119	84	228	16	0.29	0.00
29	4.0	e3.9	e0.47	e0.00	---	72	120	74	427	56	0.25	0.00
30	4.0	e3.5	e0.46	e0.00	---	146	121	39	539	75	0.25	0.00
31	4.1	---	e0.45	e0.00	---	158	---	33	---	e76	0.16	---
TOTAL	155.4	120.8	29.29	5.77	0.00	2,355.20	2,175.5	3,918	2,176.0	13,148.0	1,302.23	1.56
MEAN	5.01	4.03	0.94	0.19	0.000	76.0	72.5	126	72.5	424	42.0	0.052
MAX	23	5.5	3.1	0.44	0.00	176	147	194	539	773	126	0.13
MIN	1.2	3.5	0.45	0.00	0.00	0.00	6.5	33	4.8	5.7	0.16	0.00
AC-FT	308	240	58	11	0.00	4,670	4,320	7,770	4,320	26,080	2,580	3.1
CFSM	0.00	0.00	0.00	0.00	0.00	0.07	0.06	0.11	0.06	0.37	0.04	0.00
IN.	0.00	0.00	0.00	0.00	0.00	0.08	0.07	0.13	0.07	0.42	0.04	0.00

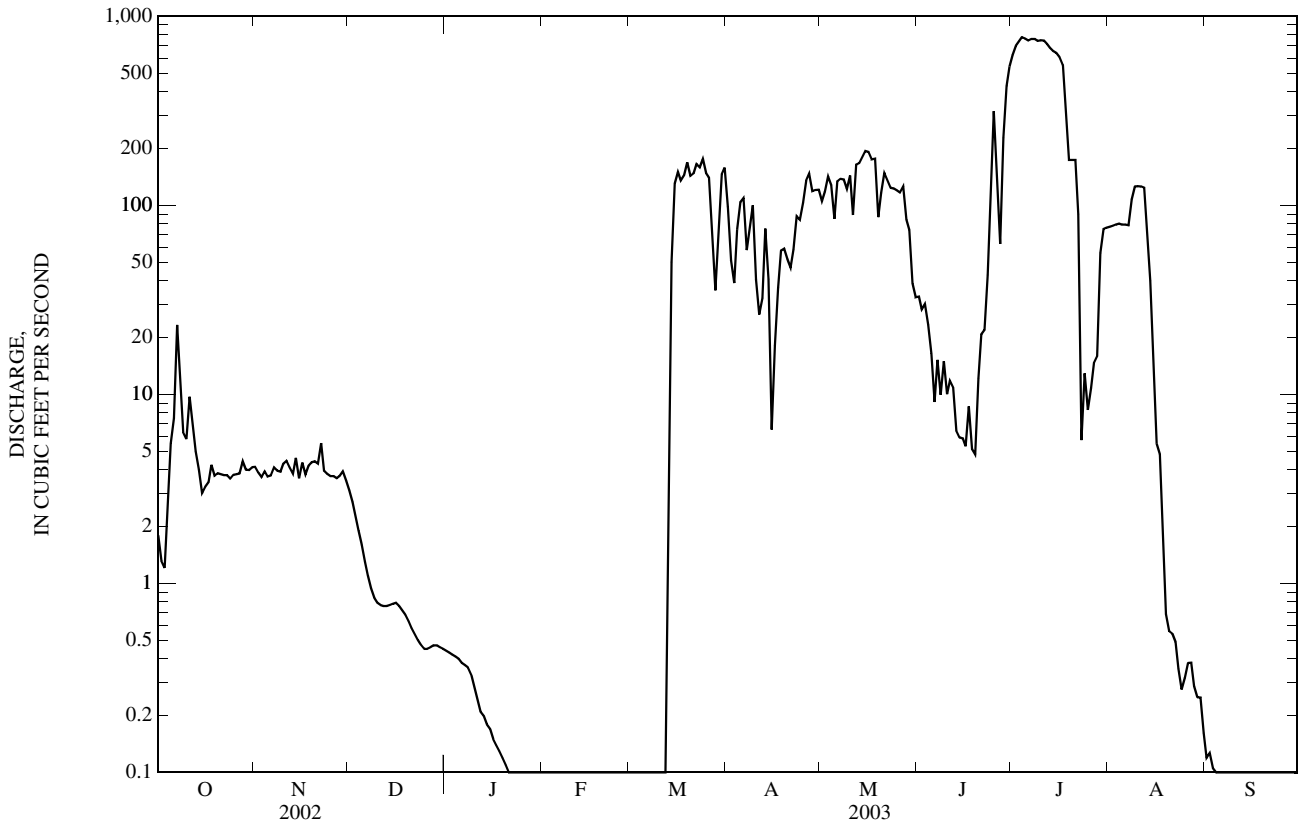
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1942 - 2003, BY WATER YEAR (WY)

MEAN	28.2	16.1	10.2	3.38	7.43	73.2	327	314	251	179	71.7	34.7
MAX	535	307	207	42.4	148	628	3,814	1,445	1,103	1,035	1,182	1,062
(WY)	(1994)	(1996)	(1999)	(1997)	(1997)	(1996)	(1997)	(1997)	(1986)	(1962)	(1993)	(1993)
MIN	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.23	0.010	0.000	0.000	0.000
(WY)	(1942)	(1942)	(1942)	(1942)	(1942)	(1942)	(1942)	(1977)	(1977)	(1961)	(1970)	(1960)

05050000 BOIS DE SIOUX RIVER NEAR WHITE ROCK, SD—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1942 - 2003	
ANNUAL TOTAL	31,859.00		25,387.75		a110	
ANNUAL MEAN	87.3		69.6		536	
HIGHEST ANNUAL MEAN					1997	
LOWEST ANNUAL MEAN					0.38	
HIGHEST DAILY MEAN	554	Jul 18	773	Jul 4	7,710	Apr 16, 1997
LOWEST DAILY MEAN	0.45	Dec 25	b0.00	Jan 24	c0.00	Oct 1, 1941
ANNUAL SEVEN-DAY MINIMUM	0.46	Dec 25	0.00	Jan 24	0.00	Oct 1, 1941
MAXIMUM PEAK FLOW			792	Jul 4	d8,750	Apr 20, 1997
MAXIMUM PEAK STAGE			8.45	Jul 4	16.90	Apr 20, 1997
INSTANTANEOUS LOW FLOW			0.00	Jan 24		
ANNUAL RUNOFF (AC-FT)	63,190		50,360		79,630	
ANNUAL RUNOFF (CFSM)	0.075		0.060		0.095	
ANNUAL RUNOFF (INCHES)	1.02		0.81		1.29	
10 PERCENT EXCEEDS	276		158		357	
50 PERCENT EXCEEDS	8.0		4.0		3.4	
90 PERCENT EXCEEDS	1.5		0.00		0.00	

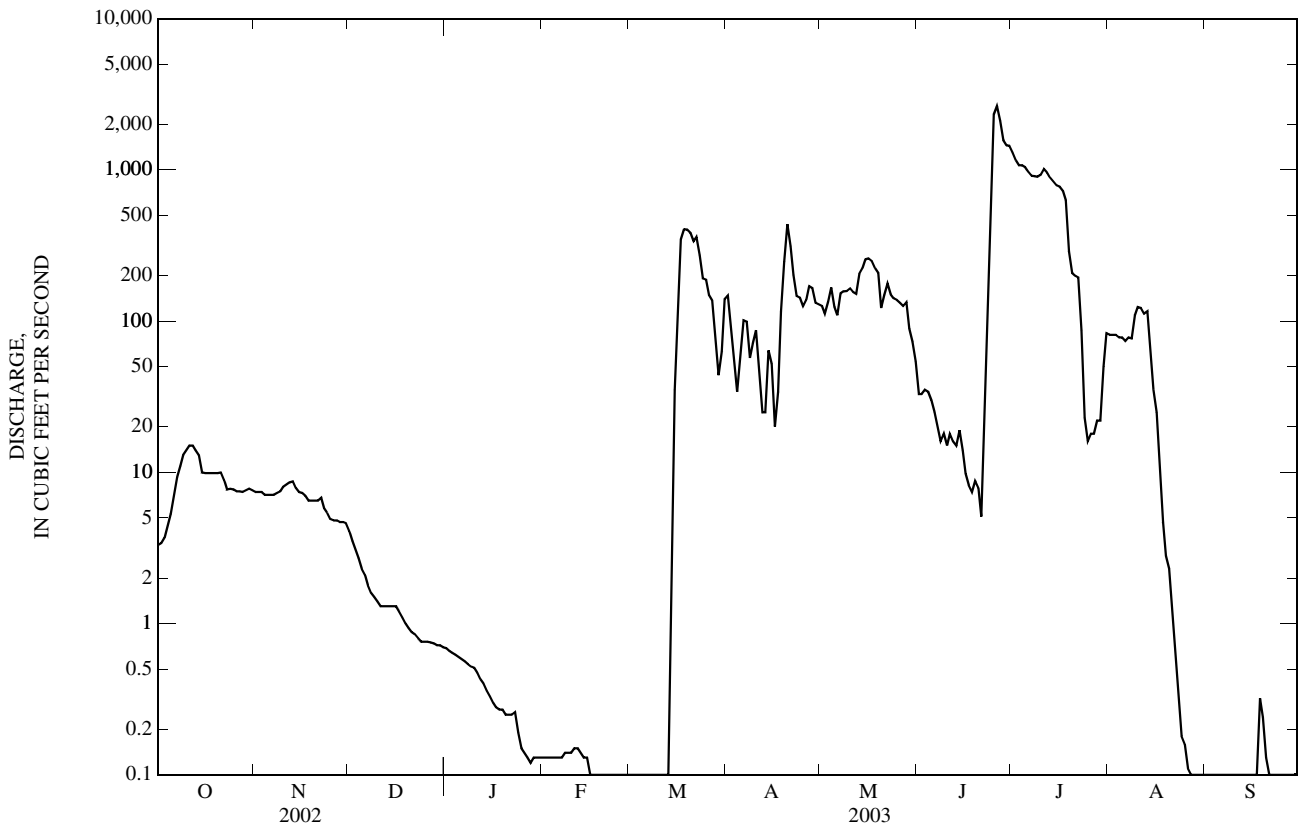
- a Median of annual mean discharges is 64 ft³/s.
- b Many days.
- c Many days, several years; result of regulation.
- d Estimated, from observed readings made under non-ideal conditions. Some evidence that peak occurred Apr. 16 at 7,930 ft³/s.
- e Estimated.
- < Actual value is known to be less than the value shown



05051300 BOIS DE SIOUX RIVER NEAR DORAN, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1990 - 2003	
ANNUAL TOTAL	48,377.47		44,751.76		318	
ANNUAL MEAN	133		123		786	
HIGHEST ANNUAL MEAN					8.77	2001
LOWEST ANNUAL MEAN						1990
HIGHEST DAILY MEAN	1,650	Jul 12	2,640	Jun 26	11,500	Apr 16, 1997
LOWEST DAILY MEAN	0.70	Dec 31	a0.00	Feb 27	b0.00	Jan 7, 1990
ANNUAL SEVEN-DAY MINIMUM	0.74	Dec 25	0.00	Feb 27	0.00	Jan 7, 1990
MAXIMUM PEAK FLOW			2,740	Jun 26	12,300	Apr 16, 1997
MAXIMUM PEAK STAGE			17.76	Jun 26	24.42	Apr 16, 1997
INSTANTANEOUS LOW FLOW			a0.00	Feb 27	b0.00	Jan 7, 1990
ANNUAL RUNOFF (AC-FT)	95,960		88,770		230,000	
ANNUAL RUNOFF (CFSM)	0.071		0.065		0.17	
ANNUAL RUNOFF (INCHES)	0.96		0.89		2.29	
10 PERCENT EXCEEDS	400		258		1,110	
50 PERCENT EXCEEDS	14		7.5		13	
90 PERCENT EXCEEDS	3.4		0.06		0.24	

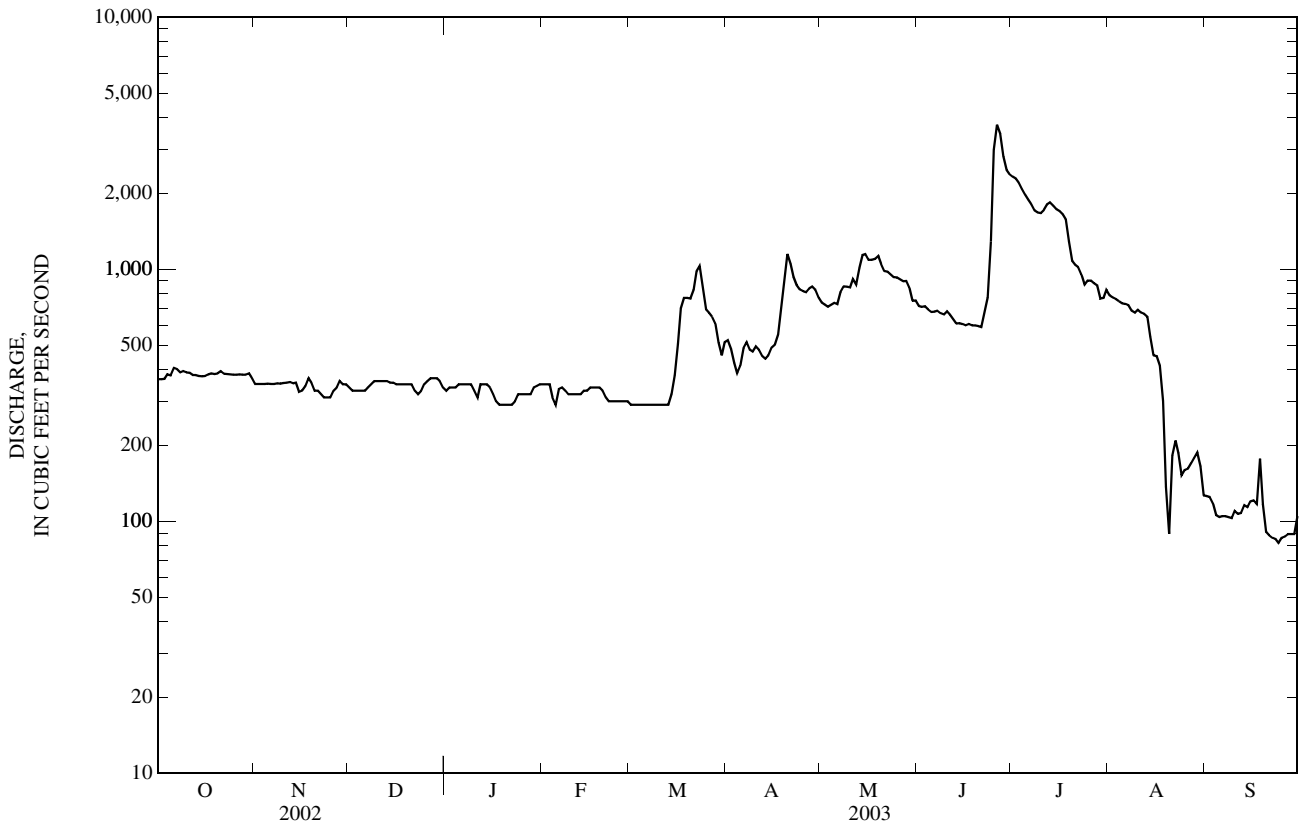
a Many days.
 b Many days, several years; result of regulation.
 e Estimated.
 < Actual value is known to be less than the value shown



05051500 RED RIVER OF THE NORTH AT WAHPETON, ND—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1942 - 2003	
ANNUAL TOTAL	240,724		211,936			
ANNUAL MEAN	660		581		628	
HIGHEST ANNUAL MEAN					1,600	1997
LOWEST ANNUAL MEAN					54.0	1977
HIGHEST DAILY MEAN	3,300	Jul 12	3,740	Jun 26	12,700	Apr 15, 1997
LOWEST DAILY MEAN	278	Aug 27	82	Sep 24	1.7	Aug 28, 1976
ANNUAL SEVEN-DAY MINIMUM	320	Nov 20	86	Sep 21	1.7	Aug 28, 1976
MAXIMUM PEAK FLOW			3,800	Jun 26	12,800	Apr 15, 1997
MAXIMUM PEAK STAGE			10.72	Jun 26	a19.42	Apr 6, 1997
INSTANTANEOUS LOW FLOW					1.7	Aug 28, 1976
ANNUAL RUNOFF (AC-FT)	477,500		420,400		454,600	
10 PERCENT EXCEEDS	1,110		1,040		1,440	
50 PERCENT EXCEEDS	571		377		390	
90 PERCENT EXCEEDS	351		168		110	

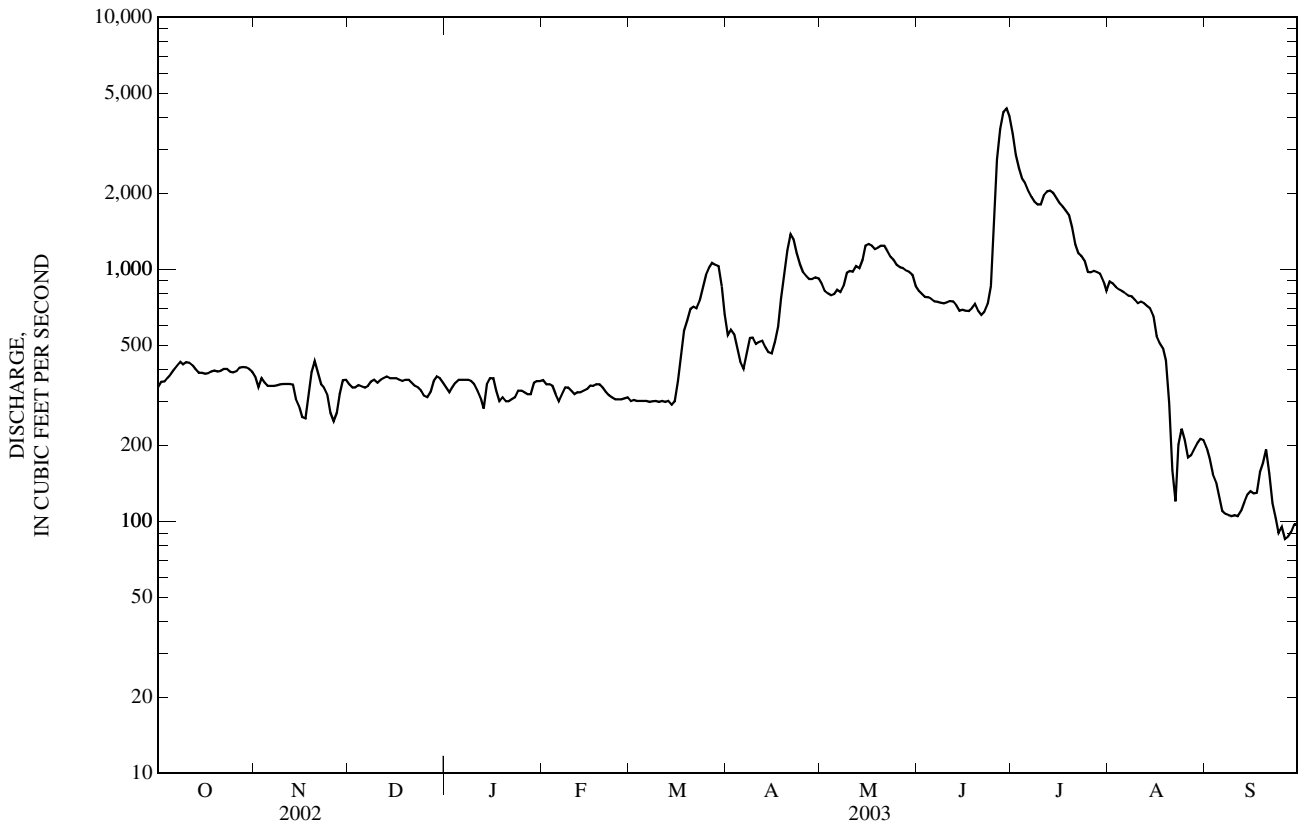
a Backwater from ice; from floodmark.
 e Estimated.



05051522 RED RIVER OF THE NORTH AT HICKSON, ND—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1975 - 2003	
ANNUAL TOTAL	262,127		233,427			
ANNUAL MEAN	718		640		788	
HIGHEST ANNUAL MEAN					1,772	2001
LOWEST ANNUAL MEAN					53.1	1977
HIGHEST DAILY MEAN	3,760	Jul 14	4,350	Jun 29	13,100	Apr 15, 1997
LOWEST DAILY MEAN	250	Nov 26	85	Sep 26	0.00	Oct 26, 1976
ANNUAL SEVEN-DAY MINIMUM	303	Nov 22	92	Sep 24	0.00	Oct 26, 1976
MAXIMUM PEAK FLOW			4,390	Jun 29	13,300	Apr 14, 1997
MAXIMUM PEAK STAGE			20.69	Jun 29	37.60	Apr 16, 1997
ANNUAL RUNOFF (AC-FT)	519,900		463,000		571,000	
ANNUAL RUNOFF (CFSM)	0.17		0.15		0.18	
ANNUAL RUNOFF (INCHES)	2.27		2.02		2.49	
10 PERCENT EXCEEDS	1,200		1,190		1,820	
50 PERCENT EXCEEDS	593		388		449	
90 PERCENT EXCEEDS	351		203		100	

e Estimated.



05054000 RED RIVER OF THE NORTH AT FARGO, ND

LOCATION.--Lat 46°51'40", long 96°47'00", in NW¼NE¼ sec.18, T.139 N., R.48 W., Cass County, Hydrologic Unit 09020104, at waterplant on 4th St. S. in Fargo, 25 mi upstream from mouth of Sheyenne River, and at mile 453.

DRAINAGE AREA.--6,800 mi² (approximately).

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

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

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

REMARKS.--Records good except for periods where discharge is less than 200 ft³/s, which are fair, and for estimated daily discharges, which are poor. Flow regulated by Orwell Reservoir, flood storage capacity, 13,300 acre-ft at elevation 1,070 ft above mean sea level, adjustment of 1912; Mud Lake, flood storage capacity, 78,600 acre-ft at elevation 981 ft above mean sea level, adjustment of 1912; Lake Traverse, flood storage capacity, 75,100 acre-ft at elevation 981 ft above mean sea level, adjustment of 1912; and numerous other controlled lakes and ponds and several powerplants. Figures of daily discharge do not include diversions from the Sheyenne River to the cities of Fargo, ND and Moorhead, MN.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 7, 1897, reached a stage of 39.1 ft present datum, discharge, 25,000 ft³/s at site 1.5 mi downstream.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	360	418	e385	e350	e365	e320	648	854	916	6,500	908	187
2	372	394	e370	e335	e355	e330	589	794	876	5,930	934	175
3	377	377	e355	e340	e350	e310	608	744	824	4,950	904	126
4	391	404	e345	e355	e340	e305	579	753	796	3,760	864	107
5	388	388	e340	e365	e330	e305	468	800	784	3,150	850	97
6	453	374	e345	e365	e315	e305	417	871	916	2,920	814	95
7	421	375	e345	e365	e300	e305	413	806	808	2,760	786	88
8	427	376	e345	e365	e325	e305	496	773	717	2,610	771	84
9	434	382	e360	e360	e330	e305	551	979	699	2,660	756	86
10	432	388	e375	e360	e330	e305	532	1,020	741	2,540	754	95
11	448	389	e380	e355	e330	e305	516	1,000	724	2,780	718	90
12	437	383	e380	e340	e330	e305	539	1,010	847	3,090	724	88
13	424	384	e380	e307	e330	e305	544	1,040	755	3,110	703	154
14	405	374	e380	e330	e330	e300	498	1,120	700	3,020	685	110
15	397	291	e380	e360	e330	e310	484	1,210	671	2,900	660	105
16	399	e280	e380	e375	e340	e335	538	1,330	672	2,780	581	104
17	407	281	e380	e375	e360	e410	620	1,410	661	2,660	497	116
18	425	295	e380	e345	e370	e630	722	1,390	645	2,550	467	169
19	409	357	e375	e325	e370	e740	1,060	1,430	670	2,470	434	143
20	419	439	e370	e315	e355	e780	1,310	1,390	650	2,330	360	159
21	421	467	e365	e310	e345	e800	1,670	1,390	606	1,960	229	190
22	425	422	e360	e310	e330	e800	1,780	1,330	820	1,630	142	149
23	433	388	e350	e320	e310	e770	1,540	1,270	2,130	1,470	127	89
24	423	334	e340	e330	e305	e740	1,310	1,240	1,670	1,390	170	63
25	409	e325	e330	e330	e305	e820	1,140	1,190	2,340	1,260	180	51
26	413	280	e310	e325	e310	e940	1,030	1,150	3,370	1,170	165	48
27	421	261	e330	e325	e325	948	e960	1,120	4,440	1,160	143	46
28	437	279	e350	e325	e330	948	e900	1,090	5,720	1,120	146	48
29	436	326	e370	e350	---	882	885	1,070	6,480	1,070	132	52
30	431	e365	e380	e360	---	799	886	1,050	6,680	1,050	154	61
31	425	---	e365	e365	---	712	---	991	---	933	171	---
TOTAL	12,899	10,796	11,200	10,637	9,345	16,674	24,233	33,615	49,328	79,683	15,929	3,175
MEAN	416	360	361	343	334	538	808	1,084	1,644	2,570	514	106
MAX	453	467	385	375	370	948	1,780	1,430	6,680	6,500	934	190
MIN	360	261	310	307	300	300	413	744	606	933	127	46
AC-FT	25,590	21,410	22,220	21,100	18,540	33,070	48,070	66,680	97,840	158,100	31,600	6,300
CFSM	0.06	0.05	0.05	0.05	0.05	0.08	0.12	0.16	0.24	0.38	0.08	0.02
IN.	0.07	0.06	0.06	0.06	0.05	0.09	0.13	0.18	0.27	0.44	0.09	0.02
+	1,300	1,240	1,230	1,290	1,180	1,300	1,240	860	1,340	1,520	1,940	1,680
*	26,890	22,650	23,450	22,390	19,720	34,370	49,310	67,540	99,180	159,620	33,540	7,980

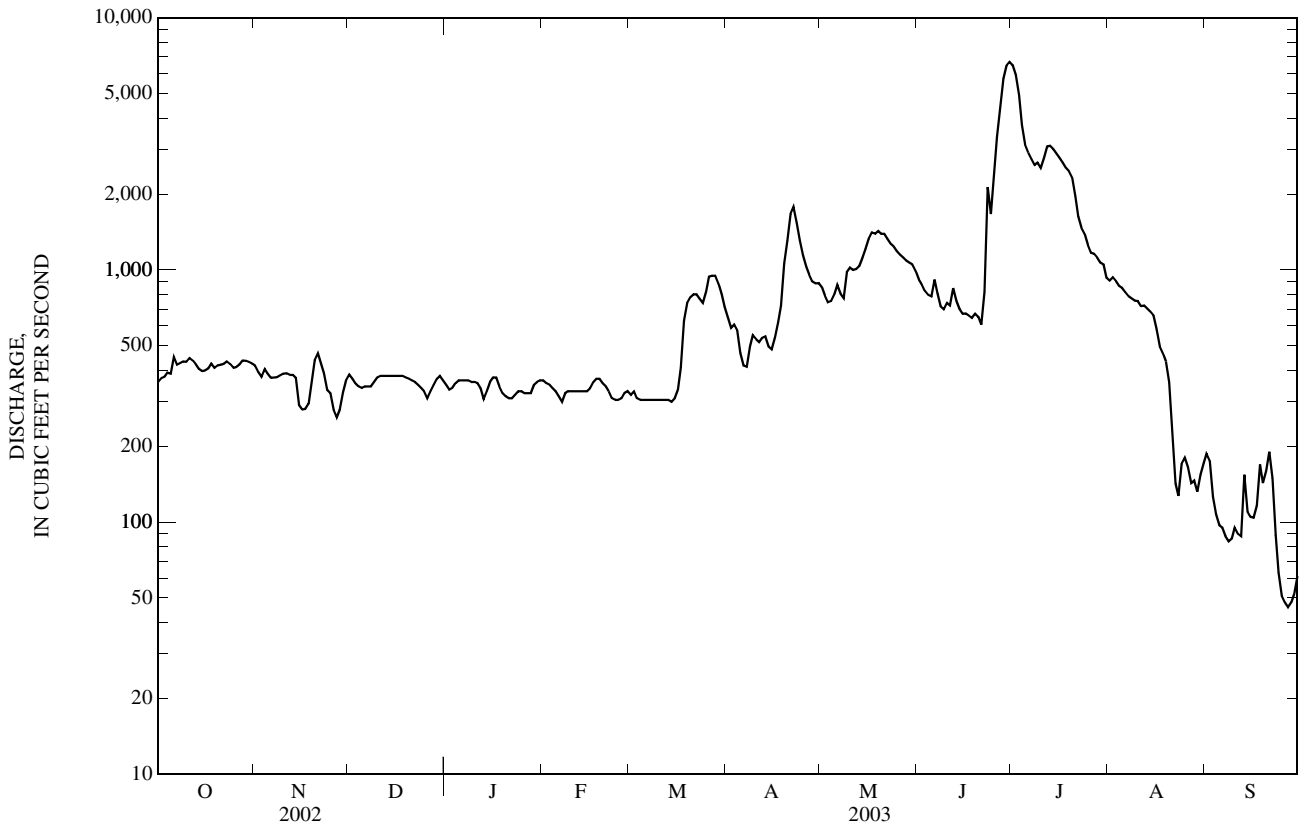
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1901 - 2003, BY WATER YEAR (WY)

MEAN	329	290	244	226	237	771	1,998	1,156	1,085	939	439	328
MAX	1,741	942	801	740	1,353	4,722	17,920	5,365	5,120	5,690	3,293	2,280
(WY)	(1994)	(1907)	(1987)	(1986)	(1998)	(1995)	(1997)	(1997)	(1962)	(1962)	(1993)	(1993)
MIN	0.000	0.000	0.000	0.000	0.18	26.8	102	8.12	2.87	0.000	0.000	0.000
(WY)	(1935)	(1937)	(1938)	(1933)	(1933)	(1937)	(1934)	(1934)	(1936)	(1934)	(1932)	(1934)

05054000 RED RIVER OF THE NORTH AT FARGO, ND—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1901 - 2003	
ANNUAL TOTAL	324,847		277,514			
ANNUAL MEAN	890 *(911)		760 *(782)		681	
HIGHEST ANNUAL MEAN					2,619	1997
LOWEST ANNUAL MEAN					17.5	1934
HIGHEST DAILY MEAN	4,210	Jul 13	6,680	Jun 30	27,800	Apr 17, 1997
LOWEST DAILY MEAN	261	Nov 27	46	Sep 27	0.00	Jul 25, 1932
ANNUAL SEVEN-DAY MINIMUM	310	Nov 24	53	Sep 24	0.00	Jul 25, 1932
MAXIMUM PEAK FLOW			6,710	Jun 30	28,000	Apr 17, 1997
MAXIMUM PEAK STAGE			22.63	Jun 30	39.72	Apr 18, 1997
ANNUAL RUNOFF (AC-FT)	644,300 *(660,100)		550,400 *(566,600)		486,500 *(493,200)	
ANNUAL RUNOFF (CFSM)	0.13		0.11		0.099	
ANNUAL RUNOFF (INCHES)	1.78		1.52		1.34	
10 PERCENT EXCEEDS	1,520		1,400		1,500	
50 PERCENT EXCEEDS	755		407		330	
90 PERCENT EXCEEDS	375		173		42	

+ Diversions, in acre-ft, to cities of Fargo and Moorhead.
 * Adjusted for diversions to cities of Fargo and Moorhead.
 e Estimated.



05061000 BUFFALO RIVER NEAR HAWLEY, MN

LOCATION.--Lat 46°51'00", long 96°19'45", in NW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 14, T.139 N., R.45 W., Clay County, Hydrologic Unit 09020106, near left downstream end of bridge on farm lane, 2 mi southwest of Hawley.

DRAINAGE AREA.--325 mi².

PERIOD OF RECORD.--March 1945 to current year. Water year 1981 (annual maximum only); March 1982 to September 1985 (no winter records).

REVISED RECORDS.--WSP 1308: 1945-46(M), 1948(M).

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

REMARKS.--Records good except those for estimated daily discharges, which are poor.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage known, about 11.3 ft, present datum, spring of 1921, from information by local resident.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	47	45	e32	e33	e36	e34	94	64	62	227	40	19
2	48	54	e31	e33	e36	e34	92	62	67	181	39	19
3	46	54	e31	e33	e36	e34	83	60	65	152	38	18
4	56	51	e31	e33	e36	e34	55	60	59	134	38	18
5	58	47	e31	e33	e36	e34	77	72	58	116	41	18
6	60	47	e31	e34	e35	e34	82	92	57	101	41	17
7	59	49	e32	e34	e35	e34	71	102	59	92	38	17
8	60	50	e32	e35	e35	e34	65	102	60	88	35	17
9	57	51	e33	e35	e35	e34	63	122	59	94	33	17
10	56	52	e33	e35	e35	e34	62	186	65	93	32	18
11	54	54	e34	e35	e35	e34	64	208	77	90	30	18
12	52	50	e34	e35	e35	e35	61	198	88	84	29	19
13	51	42	e34	e35	e34	e36	60	175	95	79	28	21
14	50	e40	e33	e34	e34	e39	64	154	96	76	26	20
15	48	e39	e33	e34	e34	e49	66	130	85	80	25	20
16	50	e40	e33	e34	e34	e66	89	116	74	77	25	20
17	57	e41	e34	e33	e34	e86	106	105	66	69	24	20
18	60	42	e34	e33	e34	e113	104	100	61	61	23	30
19	64	42	e35	e33	e35	153	115	141	54	59	23	35
20	64	42	e35	e33	e35	209	123	164	48	57	23	30
21	65	42	e34	e33	e35	232	116	150	45	55	22	25
22	68	44	e33	e33	e34	182	110	135	78	53	22	25
23	71	43	e32	e33	e34	195	100	120	147	52	21	25
24	65	35	e32	e33	e33	187	91	107	181	50	21	25
25	63	e30	e31	e33	e33	163	82	97	343	49	22	23
26	59	e31	e32	e33	e33	142	77	88	424	49	23	23
27	59	e32	e33	e34	e34	139	74	83	404	49	22	23
28	59	e32	e34	e34	e34	126	70	81	382	47	22	23
29	58	e33	e34	e34	---	110	68	70	347	45	21	24
30	56	e32	e34	e35	---	96	66	67	282	43	19	24
31	48	---	e34	e35	---	95	---	63	---	42	20	---
TOTAL	1,768	1,286	1,019	1,047	969	2,827	2,450	3,474	3,988	2,544	866	651
MEAN	57.0	42.9	32.9	33.8	34.6	91.2	81.7	112	133	82.1	27.9	21.7
MAX	71	54	35	35	36	232	123	208	424	227	41	35
MIN	46	30	31	33	33	34	55	60	45	42	19	17
AC-FT	3,510	2,550	2,020	2,080	1,920	5,610	4,860	6,890	7,910	5,050	1,720	1,290
CFSM	0.18	0.13	0.10	0.10	0.11	0.28	0.25	0.34	0.41	0.25	0.09	0.07
IN.	0.20	0.15	0.12	0.12	0.11	0.32	0.28	0.40	0.46	0.29	0.10	0.07

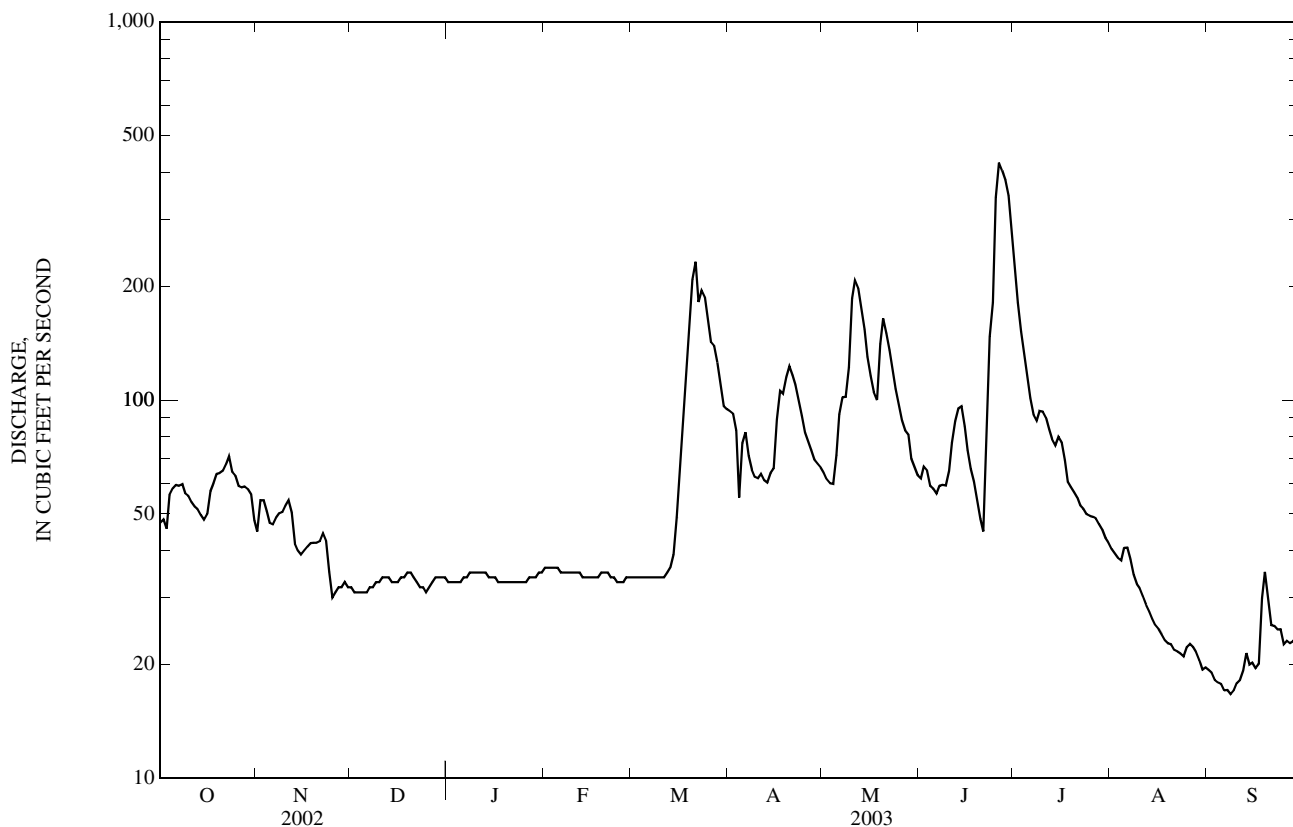
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1945 - 2003, BY WATER YEAR (WY)

MEAN	44.8	45.8	31.0	24.7	27.5	92.2	271	140	118	114	53.0	42.8
MAX	151	298	127	70.2	170	434	1,036	383	589	784	472	192
(WY)	(1974)	(2001)	(1999)	(2001)	(1998)	(1966)	(1997)	(1998)	(2000)	(1993)	(1955)	(1999)
MIN	11.6	12.2	10.6	9.94	9.88	15.0	33.3	21.5	12.7	10.1	5.87	8.52
(WY)	(1979)	(1977)	(1977)	(1962)	(1949)	(1969)	(1981)	(1977)	(1977)	(1976)	(1976)	(1976)

05061000 BUFFALO RIVER NEAR HAWLEY, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1945 - 2003	
ANNUAL TOTAL	34,370		22,889		84.4	
ANNUAL MEAN	94.2		62.7		188	
HIGHEST ANNUAL MEAN					16.7	1998
LOWEST ANNUAL MEAN					a2,360	Apr 6, 1997
HIGHEST DAILY MEAN	921	Jul 11	424	Jun 26	3.2	Aug 25, 1976
LOWEST DAILY MEAN	30	Nov 25	17	Sep 6-9	4.3	Aug 22, 1976
ANNUAL SEVEN-DAY MINIMUM	31	Nov 30	17	Sep 3	a2,360	Apr 6, 1997
MAXIMUM PEAK FLOW			431	Jun 26	10.86	Jun 22, 2000
MAXIMUM PEAK STAGE			6.46	Jun 26	2.8	Aug 26, 1977
INSTANTANEOUS LOW FLOW			15	Sep 6		
ANNUAL RUNOFF (AC-FT)	68,170		45,400		61,170	
ANNUAL RUNOFF (CFSM)	0.29		0.19		0.26	
ANNUAL RUNOFF (INCHES)	3.93		2.62		3.53	
10 PERCENT EXCEEDS	170		116		193	
50 PERCENT EXCEEDS	55		43		35	
90 PERCENT EXCEEDS	35		24		14	

a Estimated daily discharge, backwater from ice.
 e Estimated.



05061500 SOUTH BRANCH BUFFALO RIVER AT SABIN, MN

LOCATION--Lat 46°46'20", long 96°37'40", in SW¹/₄ SW¹/₄ sec. 9, T.138 N., R.47 W., Clay County, Hydrologic Unit 09020106, on left bank, on downstream side of County Road 67 bridge, 0.3 mi downstream from Stony Creek and 1 mi east of Sabin.

DRAINAGE AREA.--454 mi².

PERIOD OF RECORD.--March 1945 to current year. Water year 1981, annual maximum only; March 1982 to September 1985, no winter records.

REVISED RECORDS.--WSP 1308: 1949(M). WRIR 97-4249: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 902.39 ft above sea level (NGVD of 1929, levels by Soil Conservation Service). Prior to April 17, 1948, nonrecording gage at site 1 mi downstream at different datum. Aug. 17, 1948 to Oct. 4, 1989, nonrecording gage at present site and datum.

REMARKS.--Records good except those for estimated daily discharges, which are poor.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	13	e35	e17	e9.8	e6.6	e6.2	62	63	57	897	10	2.1
2	13	e37	e16	e9.7	e6.5	e6.1	66	59	52	749	11	1.5
3	14	e38	e15	e9.6	e6.5	e6.1	73	57	48	569	11	1.2
4	15	e37	e15	e9.5	e6.4	e6.1	70	59	43	428	9.8	0.95
5	17	e36	e14	e9.5	e6.4	e6.1	65	62	40	232	9.2	0.72
6	26	e34	e13	e9.5	e6.3	e6.0	66	73	38	122	9.4	0.63
7	35	e35	e13	e9.4	e6.3	e6.0	58	99	38	81	10	0.49
8	49	e35	e12	e9.4	e6.2	e6.0	49	133	38	60	9.3	0.25
9	51	e36	e12	e9.4	e6.2	e6.0	43	149	47	57	9.7	e0.10
10	48	e37	e12	e9.4	e6.2	e6.1	41	172	64	68	9.9	e0.09
11	45	e36	e12	e9.3	e6.2	e6.2	41	247	70	98	10	e0.10
12	43	e34	e12	e9.1	e6.1	e6.3	46	284	80	129	9.5	e0.13
13	46	e32	e13	e9.0	e6.1	e6.6	49	270	86	155	9.0	2.3
14	44	e31	e13	e8.8	e6.1	e7.5	50	232	90	147	9.1	2.6
15	39	e29	e13	e8.6	e6.2	e9.5	52	190	82	119	9.1	2.1
16	35	e28	e12	e8.5	e6.3	e18	59	163	67	89	9.0	2.0
17	34	e26	e12	e8.3	e6.4	e60	76	138	55	65	7.3	2.4
18	37	e26	e12	e8.1	e6.4	e130	116	122	45	50	6.7	2.3
19	42	e26	e12	e8.0	e6.4	e200	168	134	39	41	6.3	3.1
20	51	e26	e11	e7.9	e6.5	e228	199	140	36	33	7.3	5.3
21	54	e26	e11	e7.8	e6.4	e220	e210	195	30	26	6.1	5.4
22	55	e25	e11	e7.7	e6.4	e185	176	189	49	22	5.8	3.0
23	54	e24	e11	e7.5	e6.3	e170	148	163	99	19	5.0	2.1
24	49	e22	e10	e7.4	e6.2	e155	118	144	72	19	4.7	2.5
25	47	e20	e10	e7.3	e6.2	e130	97	129	203	15	4.9	0.70
26	45	e19	e10	e7.2	e6.2	103	83	126	351	13	4.5	1.4
27	45	e18	e10	e7.1	e6.2	92	75	e117	581	12	3.8	2.0
28	46	e18	e10	e7.0	e6.2	91	70	e94	869	11	3.7	2.0
29	49	e18	e10	e6.9	---	74	68	82	1,030	11	3.6	1.8
30	e44	e17	e10	e6.8	---	60	66	72	993	10	3.1	2.9
31	e39	---	e9.9	e6.7	---	61	---	61	---	11	2.6	---
TOTAL	1,224	861	373.9	260.2	176.4	2,073.8	2,560	4,218	5,392	4,358	230.4	54.16
MEAN	39.5	28.7	12.1	8.39	6.30	66.9	85.3	136	180	141	7.43	1.81
MAX	55	38	17	9.8	6.6	228	210	284	1,030	897	11	5.4
MIN	13	17	9.9	6.7	6.1	6.0	41	57	30	10	2.6	0.09
AC-FT	2,430	1,710	742	516	350	4,110	5,080	8,370	10,700	8,640	457	107
CFSM	0.09	0.06	0.03	0.02	0.01	0.15	0.19	0.30	0.40	0.31	0.02	0.00
IN.	0.10	0.07	0.03	0.02	0.01	0.17	0.21	0.35	0.44	0.36	0.02	0.00

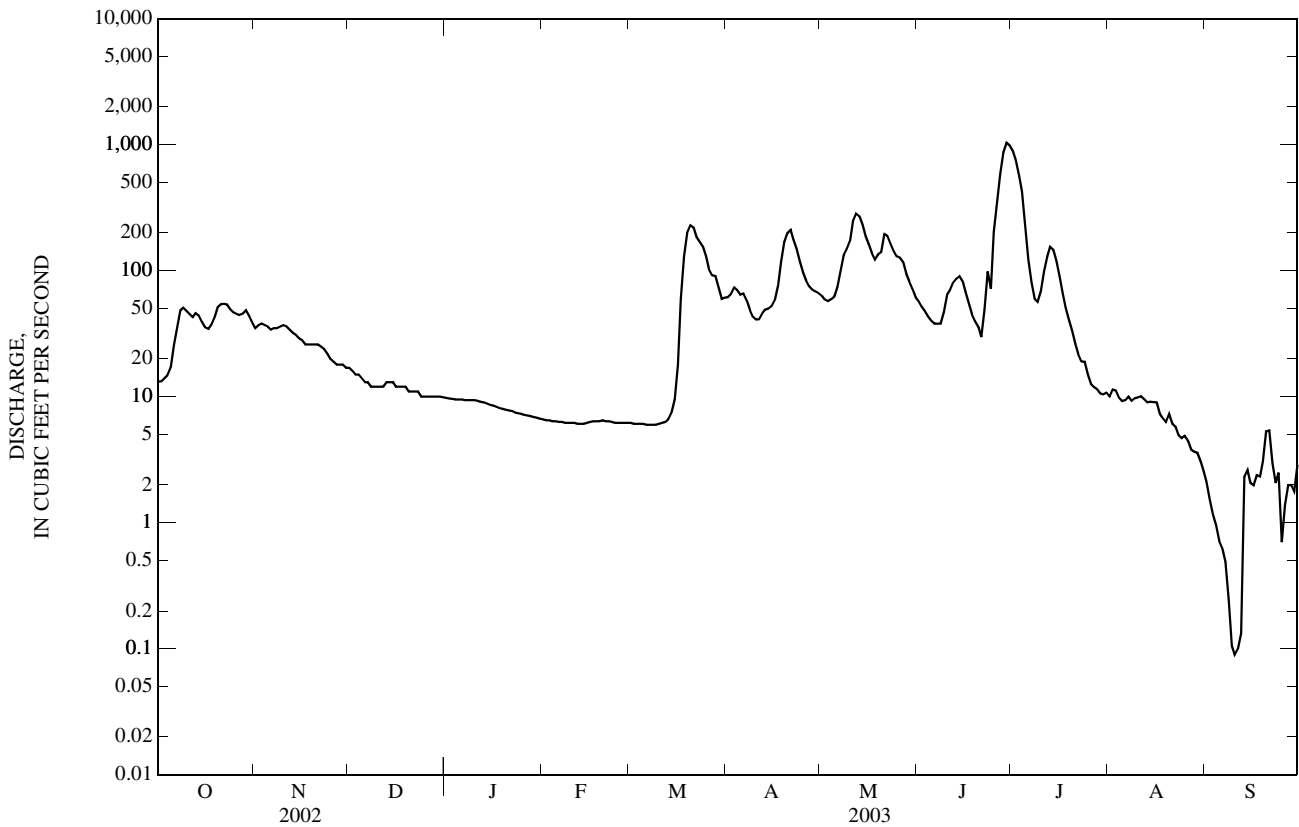
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1945 - 2003, BY WATER YEAR (WY)

	19.8	21.7	8.19	2.94	6.90	109	288	94.0	102	86.7	11.9	17.0
MEAN	19.8	21.7	8.19	2.94	6.90	109	288	94.0	102	86.7	11.9	17.0
MAX	108	194	66.8	18.5	205	581	1,683	580	1,068	1,112	152	186
(WY)	(1999)	(2001)	(1999)	(2001)	(1998)	(1966)	(1997)	(1962)	(1962)	(1975)	(1993)	(1999)
MIN	0.023	2.05	0.006	0.000	0.000	0.000	27.9	8.28	1.30	0.000	0.000	0.000
(WY)	(1977)	(1977)	(1961)	(1946)	(1946)	(1951)	(1973)	(1980)	(1976)	(1988)	(1976)	(1976)

05061500 SOUTH BRANCH BUFFALO RIVER AT SABIN, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1945 - 2003	
ANNUAL TOTAL	25,111.3		21,781.86			
ANNUAL MEAN	68.8		59.7		a64.8	
HIGHEST ANNUAL MEAN					198	1962
LOWEST ANNUAL MEAN					12.2	1977
HIGHEST DAILY MEAN	893	Jul 14	1,030	Jun 29	8,200	Jul 1, 1975
LOWEST DAILY MEAN	6.9	Sep 17	0.09	Sep 10	b0.00	Dec 13, 1945
ANNUAL SEVEN-DAY MINIMUM	10	Aug 21	0.26	Sep 6	0.00	Dec 13, 1945
MAXIMUM PEAK FLOW			1,040	Jun 29	8,500	Jul 2, 1975
MAXIMUM PEAK STAGE			12.95	Jun 29	19.90	Jul 2, 1975
INSTANTANEOUS LOW FLOW			c0.09	Sep 10	b0.00	Dec 13, 1945
ANNUAL RUNOFF (AC-FT)	49,810		43,200		46,930	
ANNUAL RUNOFF (CFSM)	0.15		0.13		0.14	
ANNUAL RUNOFF (INCHES)	2.06		1.78		1.94	
10 PERCENT EXCEEDS	143		142		117	
50 PERCENT EXCEEDS	31		18		8.6	
90 PERCENT EXCEEDS	12		5.0		0.10	

- a Median of annual mean discharges is 52 ft³/s.
- b Many days, several years.
- c Estimated, daily-minimum.
- e Estimated.



05062000 BUFFALO RIVER NEAR DILWORTH, MN

LOCATION--Lat 46°57'40", long 96°39'40", in SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 6, T.140 N., R.47 W., Clay County, Hydrologic Unit 09020106, on left bank, at County Road 94 bridge, 4.5 mi southeast of Kragnes, 6.5 mi northeast of Dilworth, and 9 mi downstream from South Branch.

DRAINAGE AREA.--975 mi².

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

REVISED RECORDS.--WSP 1308: 1931(M).

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

REMARKS.--Records good except those for estimated daily discharges, which are poor.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	76	e102	e59	e48	e43	e42	184	158	166	1,310	50	24
2	73	e108	e57	e48	e43	e42	183	153	149	1,300	47	23
3	77	e113	e54	e48	e42	e42	175	142	138	1,190	45	22
4	79	e112	e51	e47	e42	e42	170	134	134	996	43	22
5	82	e108	e48	e47	e42	e42	161	140	122	766	43	22
6	92	e105	e49	e47	e42	e42	146	161	115	521	45	21
7	102	e100	e50	e47	e42	e42	157	210	127	330	46	21
8	110	e97	e51	e48	e42	e42	152	234	120	236	42	20
9	116	e95	e52	e48	e42	e42	138	266	115	200	40	19
10	127	e94	e53	e47	e43	e43	126	394	115	217	39	19
11	129	e93	e54	e47	e43	e43	119	456	128	234	39	19
12	127	e92	e54	e47	e43	e44	117	494	152	240	37	21
13	130	e88	e54	e46	e43	e47	115	519	182	256	35	21
14	124	e84	e54	e46	e43	e50	115	515	192	268	33	22
15	118	e74	e53	e46	e43	e64	119	468	199	265	33	23
16	115	e72	e53	e46	e43	e100	123	404	198	240	31	23
17	115	e73	e52	e46	e44	e175	144	350	182	208	31	22
18	117	e74	e51	e45	e44	e260	185	320	155	172	30	22
19	121	e74	e50	e45	e44	e320	233	316	136	137	30	24
20	124	e74	e49	e45	e45	e372	307	407	122	117	28	27
21	127	e73	e48	e45	e44	e450	360	407	107	103	28	29
22	134	e72	e48	e44	e44	e505	359	398	98	90	27	31
23	140	e70	e47	e44	e43	e525	335	387	575	81	26	33
24	144	e67	e47	e44	e43	e515	306	357	886	74	26	35
25	145	e62	e47	e44	e42	e480	266	331	785	68	25	35
26	138	e58	e48	e44	e42	e424	230	303	843	66	26	35
27	132	e59	e48	e44	e42	e370	204	272	913	64	26	35
28	127	e60	e49	e43	e42	e300	186	251	1,010	59	26	35
29	126	e61	e49	e43	---	269	173	233	1,130	57	26	34
30	124	e60	e48	e43	---	230	165	205	1,240	53	25	33
31	e107	---	e48	e43	---	199	---	185	---	51	25	---
TOTAL	3,598	2,474	1,575	1,415	1,200	6,163	5,753	9,570	10,534	9,969	1,053	772
MEAN	116	82.5	50.8	45.6	42.9	199	192	309	351	322	34.0	25.7
MAX	145	113	59	48	45	525	360	519	1,240	1,310	50	35
MIN	73	58	47	43	42	42	115	134	98	51	25	19
AC-FT	7,140	4,910	3,120	2,810	2,380	12,220	11,410	18,980	20,890	19,770	2,090	1,530
CFSM	0.12	0.08	0.05	0.05	0.04	0.20	0.20	0.32	0.36	0.33	0.03	0.03
IN.	0.14	0.09	0.06	0.05	0.05	0.24	0.22	0.37	0.40	0.38	0.04	0.03

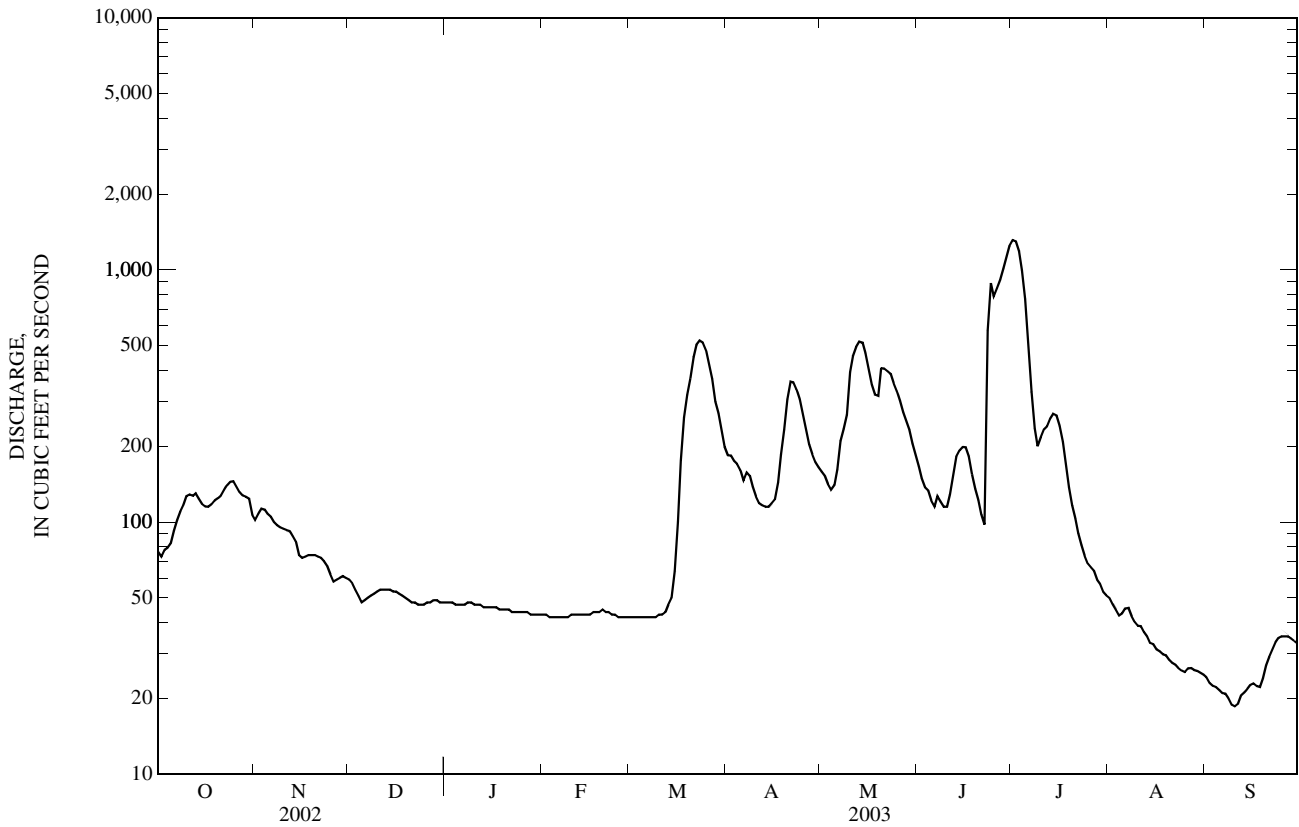
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 2003, BY WATER YEAR (WY)

MEAN	63.6	65.6	38.9	24.8	28.0	199	604	252	230	216	73.6	62.7
MAX	279	575	240	99.0	285	1,308	3,412	1,144	2,138	2,814	910	517
(WY)	(1999)	(2001)	(1999)	(2001)	(1998)	(1966)	(1997)	(1998)	(1962)	(1975)	(1993)	(1944)
MIN	5.48	8.74	4.75	0.87	0.76	2.26	33.5	27.2	15.1	2.23	0.000	0.79
(WY)	(1940)	(1937)	(1938)	(1940)	(1940)	(1940)	(1931)	(1931)	(1934)	(1936)	(1936)	(1936)

05062000 BUFFALO RIVER NEAR DILWORTH, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1931 - 2003	
ANNUAL TOTAL	73,010		54,076		156	
ANNUAL MEAN	200		148		477	
HIGHEST ANNUAL MEAN					1998	
LOWEST ANNUAL MEAN					1934	
HIGHEST DAILY MEAN	1,630	Jun 11	1,310	Jul 1	13,500	Jul 2, 1975
LOWEST DAILY MEAN	47	Dec 23	19	Sep 9-11	a0.00	Jul 22, 1936
ANNUAL SEVEN-DAY MINIMUM	48	Dec 21	20	Sep 6	0.00	Jul 28, 1936
MAXIMUM PEAK FLOW			1,350	Jul 1	13,600	Jul 2, 1975
MAXIMUM PEAK STAGE			13.45	Jul 1	27.10	Jul 2, 1975
INSTANTANEOUS LOW FLOW			18	Sep 9	a0.00	Jul 22, 1936
ANNUAL RUNOFF (AC-FT)	144,800		107,300		113,300	
ANNUAL RUNOFF (CFSM)	0.21		0.15		0.16	
ANNUAL RUNOFF (INCHES)	2.79		2.06		2.18	
10 PERCENT EXCEEDS	374		353		339	
50 PERCENT EXCEEDS	110		72		43	
90 PERCENT EXCEEDS	55		31		10	

a Occurred many days in 1936.
 e Estimated.



05062500 WILD RICE RIVER AT TWIN VALLEY, MN

LOCATION.--Lat 47°16'00", long 96°14'40", in NW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 27, T.144 N., R.44, Norman County, Hydrologic Unit 09020108, on left bank, 100 ft upstream from County Highway 29 bridge, 0.8 mi northeast of Twin Valley, and 2 mi upstream from small tributary.

DRAINAGE AREA.--934 mi².

PERIOD OF RECORD.--June 1909 to September 1917, July 1930 to September 1983, October 1989 to current year. Monthly discharge only for some periods, published in WSP 1308. October 1983 to September 1989, annual maximums only.

REVISED RECORDS.--WSP 955: 1941. WSP 1308: 1915(M), 1917(M).

GAGE.--Water-stage recorder. Datum of gage is 1,008.16 ft above sea level (NGVD of 1929, U.S. Army Corps of Engineers bench mark). June 1909 to September 1917, nonrecording gage at site 0.2 mi downstream at different datum. July 23, 1930 to Nov. 24, 1934, nonrecording gage at highway bridge 100 ft downstream from present site at present datum. Nov. 25, 1934 to Aug. 2, 1950, water-stage recorder 80 ft upstream from present site at present datum.

REMARKS.--Records fair except those for estimated daily discharges, which are poor. Flow slightly regulated by Rice Lake and many other small lakes above station.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	157	165	e178	e135	e90	e80	391	294	282	565	112	28
2	154	171	e177	e130	e90	e80	380	286	269	468	106	22
3	151	175	e176	e125	e92	e80	368	280	258	439	100	21
4	149	173	e175	e120	e93	e80	358	275	250	468	94	21
5	149	168	e176	e118	e94	e80	341	272	243	406	89	20
6	150	163	e178	e115	e94	e80	326	272	238	342	81	21
7	153	159	e178	e115	e92	e80	322	274	228	306	75	19
8	154	157	e179	e115	e92	e79	323	272	217	275	69	19
9	155	157	e180	e115	e91	e79	319	273	214	261	63	18
10	154	157	e182	e115	e90	e79	316	298	230	284	58	24
11	154	157	e183	e112	e88	e79	313	342	257	292	53	29
12	154	157	e185	e105	e86	e79	310	378	267	358	50	24
13	154	163	e190	e100	e85	e79	305	394	327	286	45	26
14	153	160	e185	e95	e85	e80	304	385	344	268	43	28
15	152	153	e182	e94	e85	e80	304	376	286	262	40	30
16	151	154	e178	e94	e85	e85	307	366	260	246	38	30
17	150	156	e175	e93	e85	e100	312	355	253	228	35	29
18	149	163	e172	e92	e84	e150	313	344	277	213	33	40
19	149	172	e170	e92	e83	e250	317	354	246	202	32	82
20	149	185	e165	e92	e81	e400	324	424	230	193	31	77
21	149	194	e155	e91	e80	606	330	488	219	185	31	57
22	149	196	e152	e91	e80	593	333	483	238	176	e29	61
23	149	197	e150	e91	e80	577	331	455	925	168	e27	59
24	150	201	e150	e91	e80	554	328	434	851	159	e25	57
25	151	210	e150	e91	e80	529	326	410	1,070	150	e23	43
26	151	202	e150	e91	e80	506	324	386	1,360	147	20	39
27	151	195	e150	e91	e80	480	319	362	1,110	144	21	34
28	152	e190	e148	e91	e80	462	316	341	834	137	24	35
29	154	e182	e145	e90	---	444	313	322	706	131	24	36
30	156	e179	e140	e90	---	413	304	307	635	125	26	35
31	160	---	e138	e90	---	401	---	294	---	117	29	---
TOTAL	4,713	5,211	5,192	3,170	2,405	7,744	9,777	10,796	13,124	8,001	1,526	1,064
MEAN	152	174	167	102	85.9	250	326	348	437	258	49.2	35.5
MAX	160	210	190	135	94	606	391	488	1,360	565	112	82
MIN	149	153	138	90	80	79	304	272	214	117	20	18
AC-FT	9,350	10,340	10,300	6,290	4,770	15,360	19,390	21,410	26,030	15,870	3,030	2,110
CFSM	0.16	0.19	0.18	0.11	0.09	0.27	0.35	0.37	0.47	0.28	0.05	0.04
IN.	0.19	0.21	0.21	0.13	0.10	0.31	0.39	0.43	0.52	0.32	0.06	0.04

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 2003, BY WATER YEAR (WY)

MEAN	100	102	66.8	49.6	49.1	156	624	446	380	282	119	99.8
MAX	614	941	343	200	336	828	2,471	2,259	3,441	1,926	1,024	842
(WY)	(1974)	(2001)	(2001)	(2001)	(1998)	(1995)	(1997)	(1950)	(2002)	(1909)	(1993)	(1999)
MIN	6.10	9.31	6.00	4.00	4.00	12.8	73.8	30.9	26.4	8.04	3.02	2.96
(WY)	(1933)	(1933)	(1933)	(1933)	(1933)	(1940)	(1931)	(1977)	(1977)	(1934)	(1932)	(1936)

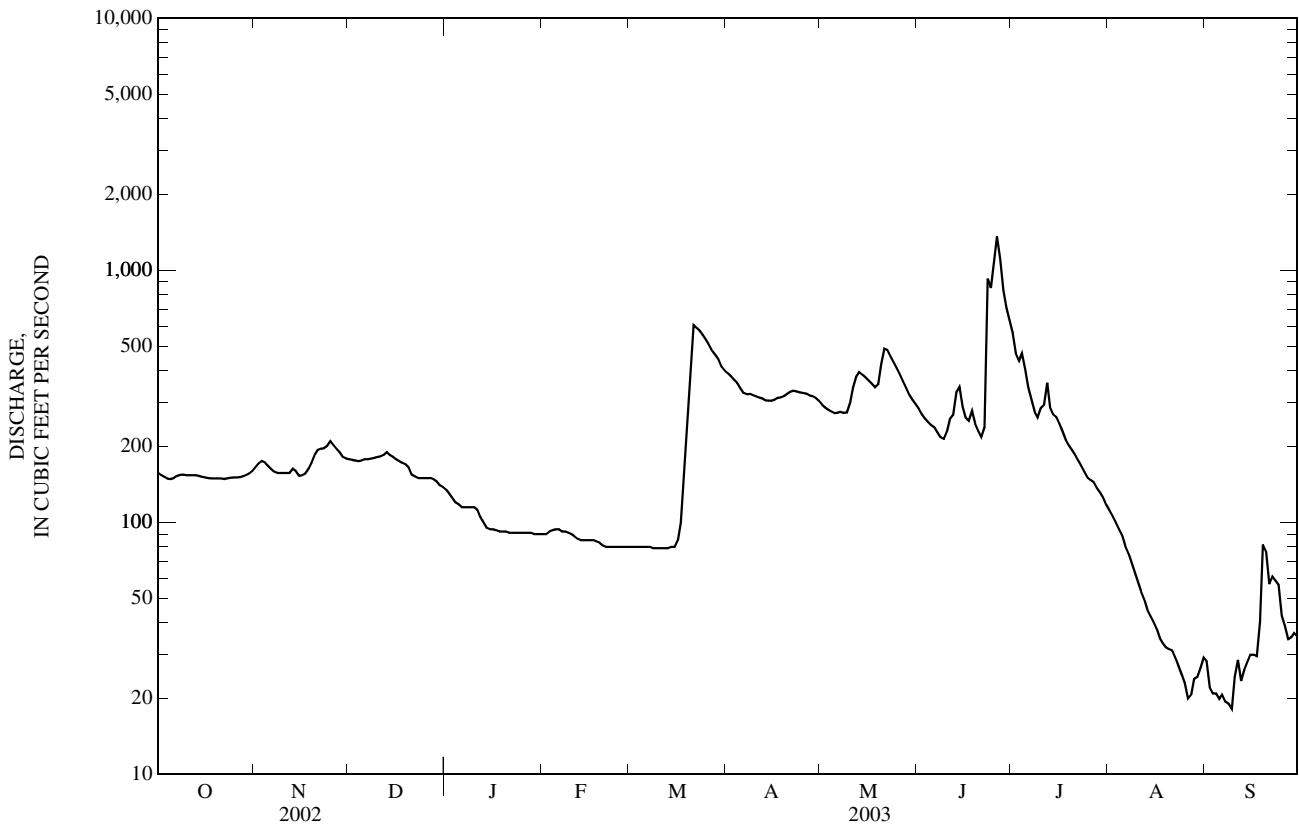
05062500 WILD RICE RIVER AT TWIN VALLEY, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1909 - 2003	
ANNUAL TOTAL	235,538		72,723			
ANNUAL MEAN	645		199		a204	
HIGHEST ANNUAL MEAN					656	2002
LOWEST ANNUAL MEAN					22.7	1977
HIGHEST DAILY MEAN	16,600	Jun 24	1,360	Jun 26	16,600	Jun 24, 2002
LOWEST DAILY MEAN	113	Mar 9	18	Sep 9	1.1	Aug 13, 1932
ANNUAL SEVEN-DAY MINIMUM	115	Mar 4	20	Sep 3	1.3	Aug 11, 1932
MAXIMUM PEAK FLOW			1,400	Jun 26	20,300	Jun 24, 2002
MAXIMUM PEAK STAGE			6.74	Jun 26	b17.96	Jun 24, 2002
INSTANTANEOUS LOW FLOW					0.50	Nov 4, 1939
ANNUAL RUNOFF (AC-FT)	467,200		144,200		147,500	
ANNUAL RUNOFF (CFSM)	0.69		0.21		0.22	
ANNUAL RUNOFF (INCHES)	9.38		2.90		2.96	
10 PERCENT EXCEEDS	1,230		379		510	
50 PERCENT EXCEEDS	201		154		77	
90 PERCENT EXCEEDS	130		37		16	

a Median of annual mean discharges is 170 ft³/s.

b From floodmark. Gage-height 20.00 ft., July 22, 1909; site and datum then in use. Equivalent stage at present site is approximately 16.0 ft.

c Estimated.



05064000 WILD RICE RIVER AT HENDRUM, MN

LOCATION.--Lat 47°16'05", long 96°47'50", in SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 19, T.144 N., R.48 W., Norman County, Hydrologic Unit 09020108, on right bank 30 ft downstream from County Highway 25 bridge, 0.5 mi east of Hendrum and 4 mi upstream from mouth.

DRAINAGE AREA.--1,560 mi².

PERIOD OF RECORD.--March 1944 to September 1984 and May 1985 to current year. Operated as a high-flow partial-record station October 1984 to April 1985.

REVISED RECORDS.--WSP 1728: 1958.

GAGE.--Water-stage recorder. Datum of gage is 836.75 ft above sea level (NGVD of 1929, levels by U.S. Army Corps of Engineers). Prior to July 18, 1989, nonrecording gage at same site and datum.

REMARKS.--Records fair except those for estimated daily discharges, which are poor. Large part of high flow diverted into Marsh River Basin at overflow section 3.5 mi east of Ada. Another diversion into the Marsh River basin formed in 1947, 1.5 mi 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 contamination from Ada sewage plant effluent. Amount of diversion not known.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	231	264	e200	e130	e89	e88	579	369	348	1,320	135	45
2	229	e250	e200	e128	e89	e87	551	345	332	1,050	131	45
3	226	e230	e200	e125	e88	e87	476	339	309	904	124	45
4	224	e220	e200	e123	e88	e87	436	336	287	806	121	42
5	230	e220	e200	e122	e89	e86	418	348	275	714	112	41
6	247	e220	e200	e122	e90	e86	350	373	258	581	109	41
7	268	e220	e200	e120	e92	e86	352	415	286	494	101	40
8	277	e220	e205	e120	e93	e86	419	416	549	445	95	40
9	278	e220	e210	e120	e94	e86	432	426	471	420	89	38
10	292	e220	e218	e119	e95	e85	410	604	377	429	84	38
11	295	e218	e220	e118	e95	e85	393	853	382	477	80	38
12	271	e216	e222	e110	e94	e85	392	908	482	506	75	41
13	264	e212	e225	e105	e94	e86	388	835	506	568	70	46
14	259	e208	e225	e98	e94	e90	377	735	601	519	66	47
15	250	e202	e222	e98	e94	e105	381	631	589	465	63	46
16	247	e200	e225	e97	e93	e150	397	575	482	423	60	45
17	246	e200	e210	e97	e93	e300	419	524	422	368	58	45
18	249	e205	e210	e96	e93	e440	439	488	380	318	56	45
19	256	e215	e195	e95	e92	e625	467	634	372	282	54	45
20	262	e220	e180	e94	e92	e850	538	807	334	258	51	51
21	268	e220	e170	e93	e92	e1,050	593	932	291	240	49	65
22	269	e218	e155	e93	e91	e1,150	577	869	268	228	47	66
23	264	e216	e152	e92	e91	e1,150	531	728	404	216	47	63
24	263	e212	e150	e92	e90	e1,100	478	639	1,720	197	47	63
25	263	e215	e150	e91	e90	e1,000	452	587	2,250	189	47	61
26	263	e220	e150	e91	e90	e900	446	522	2,600	179	46	61
27	260	e210	e150	e91	e89	e800	436	463	2,970	172	45	56
28	262	e200	e150	e90	e88	e740	413	424	2,960	167	44	55
29	268	e200	e148	e90	---	e690	400	400	2,480	157	45	51
30	274	e200	e145	e90	---	e640	393	376	1,770	148	45	50
31	264	---	e142	e90	---	577	---	369	---	142	45	---
TOTAL	8,019	6,491	5,829	3,240	2,562	13,477	13,333	17,270	25,755	13,382	2,241	1,455
MEAN	259	216	188	105	91.5	435	444	557	858	432	72.3	48.5
MAX	295	264	225	130	95	1,150	593	932	2,970	1,320	135	66
MIN	224	200	142	90	88	85	350	336	258	142	44	38
AC-FT	15,910	12,870	11,560	6,430	5,080	26,730	26,450	34,260	51,090	26,540	4,450	2,890
CFSM	0.17	0.14	0.12	0.07	0.06	0.28	0.28	0.36	0.55	0.28	0.05	0.03
IN.	0.19	0.15	0.14	0.08	0.06	0.32	0.32	0.41	0.61	0.32	0.05	0.03

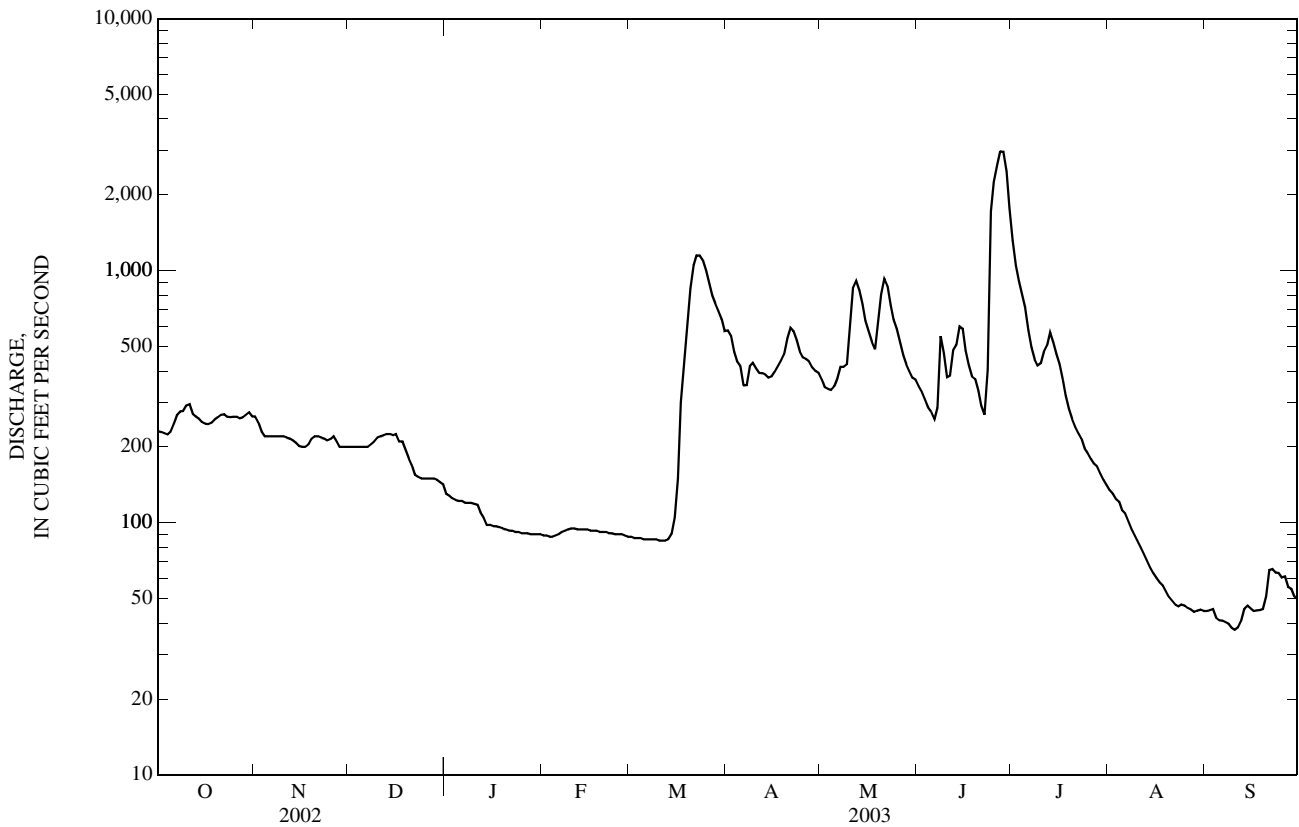
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1944 - 2003, BY WATER YEAR (WY)

MEAN	147	153	88.2	63.2	70.3	334	1,223	665	565	457	171	143
MAX	744	1,305	390	245	767	1,485	5,115	2,137	4,228	3,323	1,833	1,329
(WY)	(1972)	(2001)	(2001)	(2001)	(1998)	(1966)	(1997)	(1998)	(2002)	(2002)	(1993)	(1999)
MIN	0.44	3.32	1.08	0.092	0.22	0.46	106	56.1	9.15	8.82	1.07	0.18
(WY)	(1949)	(1949)	(1977)	(1977)	(1977)	(1949)	(1981)	(1977)	(1952)	(1951)	(1977)	(1948)

05064000 WILD RICE RIVER AT HENDRUM, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1944 - 2003	
ANNUAL TOTAL	336,572		113,054			
ANNUAL MEAN	922		310		a334	
HIGHEST ANNUAL MEAN					936 2002	
LOWEST ANNUAL MEAN					28.9 1977	
HIGHEST DAILY MEAN	8,660	Jun 28	2,970	Jun 27	10,300	Apr 18, 1997
LOWEST DAILY MEAN	120	Mar 8	38	Sep 9-11	b0.00	Sep 13, 1948
ANNUAL SEVEN-DAY MINIMUM	121	Mar 6	39	Sep 5	c0.00	Sep 27, 1948
MAXIMUM PEAK FLOW			3,060	Jun 28	c10,600	Apr 18, 1997
MAXIMUM PEAK STAGE			17.84	Jun 28	d33.85	Apr 18, 1997
ANNUAL RUNOFF (AC-FT)	667,600		224,200		242,200	
ANNUAL RUNOFF (CF5M)	0.59		0.20		0.21	
ANNUAL RUNOFF (INCHES)	8.03		2.70		2.91	
10 PERCENT EXCEEDS	2,180		602		773	
50 PERCENT EXCEEDS	290		216		103	
90 PERCENT EXCEEDS	141		56		17	

- a Median of annual mean discharges is 290 ft³/s.
- b Many days, Sep.-Oct. 1948.
- c From measurement of discharge.
- d Backwater from Red River of the North.
- e Estimated.



05064500 RED RIVER OF THE NORTH AT HALSTAD, MN

LOCATION.--Lat 47°21'10", long 96°50'50", on line between secs.24 and 25, T.145 N., R.49 W., Traill County, ND. Hydrologic Unit 09020107, on left bank on upstream side of highway bridge, 0.5 mi west of Halstad, MN, 2.5 mi downstream from Wild Rice River, and at mile 375.2.

DRAINAGE AREA.--21,800 mi² (approximately), including 3,800 mi² in closed basins.

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

REVISED RECORDS.--WSP 1388: 1936, 1950. WSP 1728: Drainage area.

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

REMARKS.--Records good except for periods of estimated discharge, which are poor.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in 1897 reached a stage of about 38.5 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	953	899	e1,060	e785	e555	e495	2,320	1,940	2,640	11,200	1,900	254
2	905	875	e1,090	e780	e560	e490	2,130	1,880	2,480	10,700	1,740	281
3	926	851	e1,100	e775	e565	e490	1,880	1,820	2,330	10,200	1,690	291
4	933	885	e1,090	e760	e570	e490	1,700	1,770	2,170	9,490	1,630	290
5	924	906	e1,080	e750	e565	e490	1,600	1,780	2,020	8,260	1,530	275
6	967	949	e1,070	e755	e560	e475	1,500	1,970	1,900	6,720	1,430	266
7	975	948	e1,060	e760	e560	e465	1,430	2,280	1,870	5,480	1,340	261
8	967	937	e1,040	e765	e555	e460	1,520	2,380	2,260	4,670	1,240	261
9	910	947	e1,030	e765	e550	e455	1,640	2,530	2,220	4,190	1,180	252
10	889	953	e1,020	e765	e540	e455	1,700	3,270	2,020	4,080	1,140	242
11	923	962	e1,030	e750	e535	e450	1,680	3,740	2,050	4,070	1,120	228
12	909	948	e1,030	e750	e530	e450	1,610	3,820	2,250	4,100	1,090	225
13	928	923	e1,030	e745	e530	e450	1,560	3,800	2,420	4,420	1,050	244
14	937	844	e1,020	e735	e525	e445	1,530	3,770	2,470	4,540	1,020	261
15	920	e850	e1,020	e725	e520	e447	1,520	3,730	2,390	4,380	986	353
16	902	e865	e1,010	e705	e520	e478	1,490	3,610	2,180	4,140	956	307
17	897	e920	e1,000	e690	e525	e566	1,480	3,600	2,020	3,850	913	276
18	903	e980	e965	e665	e530	e896	1,590	3,640	1,930	3,560	830	284
19	920	e1,030	e920	e655	e530	e1,380	1,720	3,950	1,820	3,320	741	288
20	941	e1,060	e870	e640	e530	e1,950	2,000	4,230	1,740	3,130	682	329
21	932	e1,090	e825	e630	e530	e2,230	2,350	4,450	1,650	2,930	631	346
22	941	e1,070	e780	e600	e520	e2,250	2,630	4,520	1,560	2,710	556	349
23	941	e1,030	e740	e580	e520	e2,080	2,830	4,210	1,650	2,530	450	358
24	943	e1,020	e700	e565	e510	e1,930	2,800	3,860	3,820	2,430	357	359
25	955	e1,020	e695	e555	e505	e1,960	2,620	3,680	6,440	2,410	313	349
26	962	e990	e705	e555	e500	e2,610	2,440	3,480	8,720	2,390	321	330
27	960	e1,030	e730	e550	e500	e3,380	2,290	3,260	10,100	2,310	345	318
28	958	e1,060	e775	e550	e500	e4,160	2,150	3,140	11,100	2,240	337	307
29	959	e1,050	e800	e550	---	e4,150	2,040	3,050	11,800	2,210	312	297
30	981	e1,060	e800	e545	---	e3,540	1,980	2,930	11,700	2,150	291	281
31	967	---	e795	e545	---	2,780	---	2,790	---	2,050	267	---
TOTAL	29,028	28,952	28,880	20,945	14,940	43,347	57,730	98,880	111,720	140,860	28,388	8,762
MEAN	936	965	932	676	534	1,398	1,924	3,190	3,724	4,544	916	292
MAX	981	1,090	1,100	785	570	4,160	2,830	4,520	11,800	11,200	1,900	359
MIN	889	844	695	545	500	445	1,430	1,770	1,560	2,050	267	225
AC-FT	57,580	57,430	57,280	41,540	29,630	85,980	114,500	196,100	221,600	279,400	56,310	17,380
CFSM	0.05	0.05	0.05	0.04	0.03	0.08	0.11	0.18	0.21	0.25	0.05	0.02
IN.	0.06	0.06	0.06	0.04	0.03	0.09	0.12	0.20	0.23	0.29	0.06	0.02

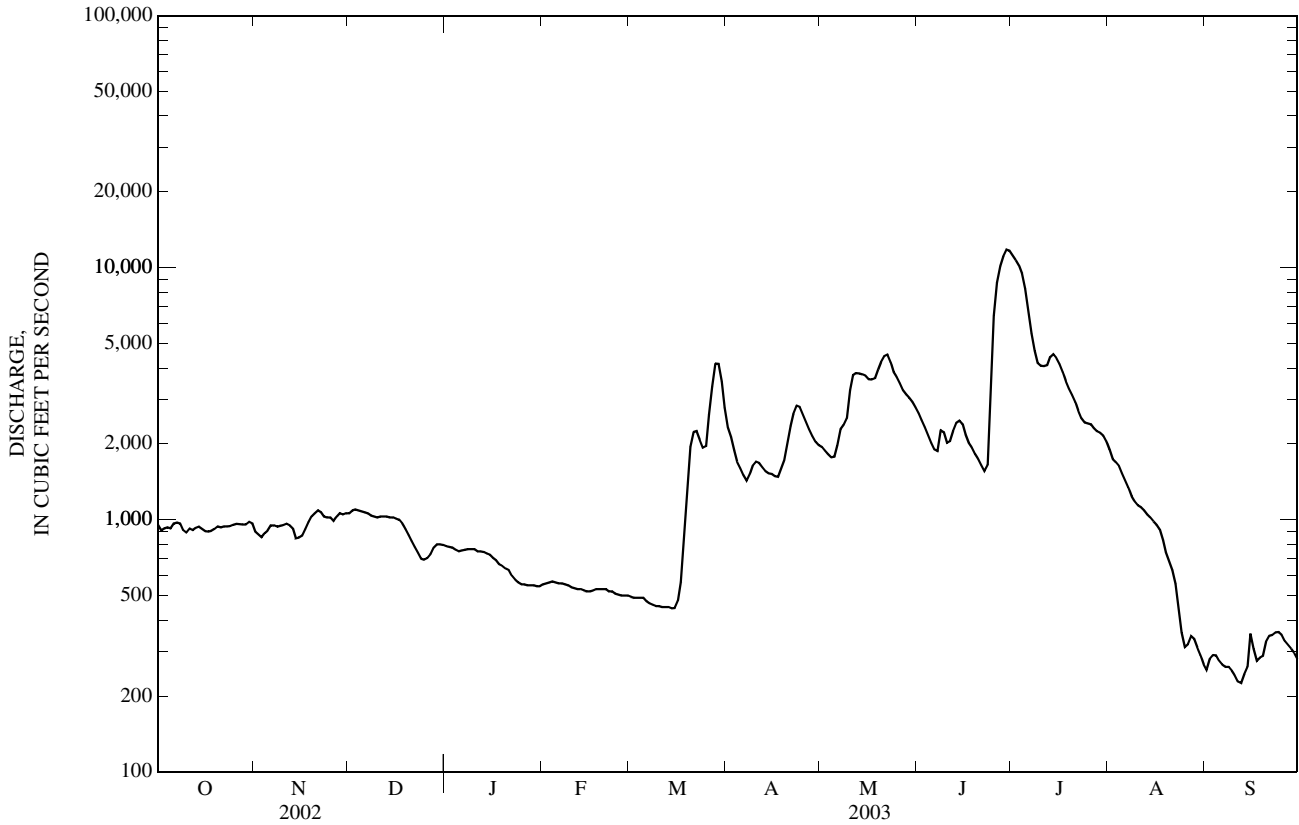
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1961 - 2003, BY WATER YEAR (WY)

MEAN	866	893	657	523	563	2,484	7,941	3,943	3,119	3,072	1,202	786
MAX	2,875	5,707	2,413	1,240	1,952	9,444	38,460	15,570	10,480	20,060	11,700	3,360
(WY)	(1995)	(2001)	(2001)	(2001)	(1998)	(1995)	(1997)	(1997)	(2000)	(1975)	(1993)	(1993)
MIN	61.5	92.3	51.2	32.1	45.9	249	705	449	242	153	59.5	38.4
(WY)	(1977)	(1977)	(1977)	(1977)	(1977)	(1962)	(1981)	(1977)	(1977)	(1988)	(1977)	(1976)

05064500 RED RIVER OF THE NORTH AT HALSTAD, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1961 - 2003	
ANNUAL TOTAL	882,503		612,432			
ANNUAL MEAN	2,418		1,678		2,186	
HIGHEST ANNUAL MEAN					6,028 1997	
LOWEST ANNUAL MEAN					214 1977	
HIGHEST DAILY MEAN	14,900	Jul 14	11,800	Jun 29	69,900	Apr 19, 1997
LOWEST DAILY MEAN	695	Dec 25	225	Sep 12	10	Sep 2, 1976
ANNUAL SEVEN-DAY MINIMUM	732	Dec 22	245	Sep 7	17	Aug 28, 1976
MAXIMUM PEAK FLOW			11,900	Jun 30	71,500	Apr 19, 1997
MAXIMUM PEAK STAGE			18.62	Jun 30	40.74	Apr 19, 1997
INSTANTANEOUS LOW FLOW					5.4	Oct 8, 1936
ANNUAL RUNOFF (AC-FT)	1,750,000		1,215,000		1,583,000	
ANNUAL RUNOFF (CFSM)	0.13		0.093		0.12	
ANNUAL RUNOFF (INCHES)	1.82		1.27		1.65	
10 PERCENT EXCEEDS	4,950		3,730		4,800	
50 PERCENT EXCEEDS	1,290		967		900	
90 PERCENT EXCEEDS	820		358		230	

e Estimated.



05067500 MARSH RIVER NEAR SHELLY, MN

LOCATION.--Lat 47°24'45", long 96°45'50", in NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 3, T.145 N., R.48W., Norman County, Hydrologic Unit 09020107, on left bank, 10 ft downstream of County Road 129 bridge, 3.8 mi southeast of Shelly and 10 mi upstream from mouth.

DRAINAGE AREA.--220 mi².

PERIOD OF RECORD.--March 1944 to September 1983 and April 1985 to current year (no winter records since 1989). Monthly discharge only for March 1944, published in WSP 1308. Operated as a high-flow partial-record station October 1983 to March 1985.

GAGE.--Water-stage recorder. Datum of gage is 841.14 ft above sea level (NGVD of 1929, levels by U.S. Army Corps of Engineers). Prior to Oct. 1, 1965, nonrecording gage at datum 3.0 ft higher. Oct. 1, 1965 to May 17, 1989, nonrecording gage at present site and datum.

REMARKS.--Records good except those for discharges below 1.0 ft³/s and those for estimated daily discharges, which are poor. Large part of high flow of Wild Rice River diverted into Marsh River Basin at overflow section 4.6 mi east of Ada. Another diversion from Wild Rice River Basin formed in 1947, 1.5 mi 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, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.88	---	---	---	---	e0.00	28	8.8	11	173	1.7	0.00
2	0.86	---	---	---	---	e0.00	22	9.0	10	120	1.4	0.00
3	0.86	---	---	---	---	e0.00	14	8.5	9.1	103	1.2	0.21
4	0.98	---	---	---	---	e0.00	12	15	8.3	65	0.89	0.59
5	1.0	---	---	---	---	e0.00	17	37	7.6	40	0.99	0.54
6	1.3	---	---	---	---	e0.00	14	50	7.5	27	0.93	0.36
7	1.6	---	---	---	---	e0.00	14	41	8.7	21	1.6	0.20
8	1.6	---	---	---	---	e0.00	13	32	10	17	2.2	0.10
9	1.5	---	---	---	---	e0.00	13	34	11	16	1.6	0.00
10	2.9	---	---	---	---	e0.00	13	156	12	18	1.1	0.00
11	2.4	---	---	---	---	e0.00	10	147	21	18	0.76	0.00
12	2.1	---	---	---	---	e0.00	9.9	115	29	20	0.60	0.00
13	2.0	---	---	---	---	e0.00	9.0	89	40	18	0.34	e0.10
14	e2.0	---	---	---	---	e0.10	7.8	66	37	16	0.20	e0.05
15	e1.9	---	---	---	---	e0.75	6.9	45	43	17	0.03	e0.05
16	e1.8	---	---	---	---	e2.0	6.9	31	34	15	0.00	e0.05
17	e1.7	---	---	---	---	e7.0	7.0	23	23	13	0.00	e0.03
18	e2.4	---	---	---	---	e18	8.4	20	19	11	0.00	0.03
19	e2.9	---	---	---	---	e50	11	77	15	9.5	0.00	0.00
20	e3.4	---	---	---	---	e120	15	104	13	8.6	0.00	0.00
21	e3.5	---	---	---	---	e150	18	99	11	7.6	0.00	0.00
22	3.6	---	---	---	---	e210	19	70	12	7.2	0.00	0.28
23	3.4	---	---	---	---	263	18	45	12	6.6	0.00	0.61
24	2.8	---	---	---	---	216	16	31	12	5.2	0.00	0.59
25	2.5	---	---	---	---	151	16	25	229	3.8	0.00	0.58
26	2.9	---	---	---	---	119	14	41	816	2.9	0.00	0.52
27	3.0	---	---	---	---	74	11	94	808	2.2	0.00	0.26
28	3.4	---	---	---	---	63	10	39	603	2.0	0.00	0.13
29	3.4	---	---	---	---	41	8.9	19	418	1.7	0.00	0.13
30	e3.6	---	---	---	---	33	8.9	14	278	1.6	0.00	0.05
31	e3.6	---	---	---	---	30	---	13	---	1.7	0.00	---
TOTAL	71.78	---	---	---	---	1,547.85	391.7	1,598.3	3,568.2	788.6	15.54	5.46
MEAN	2.32	---	---	---	---	49.9	13.1	51.6	119	25.4	0.50	0.18
MAX	3.6	---	---	---	---	263	28	156	816	173	2.2	0.61
MIN	0.86	---	---	---	---	0.00	6.9	8.5	7.5	1.6	0.00	0.00
AC-FT	142	---	---	---	---	3,070	777	3,170	7,080	1,560	31	11
CFSM	0.01	---	---	---	---	0.23	0.06	0.23	0.54	0.12	0.00	0.00
IN.	0.01	---	---	---	---	0.26	0.07	0.27	0.60	0.13	0.00	0.00

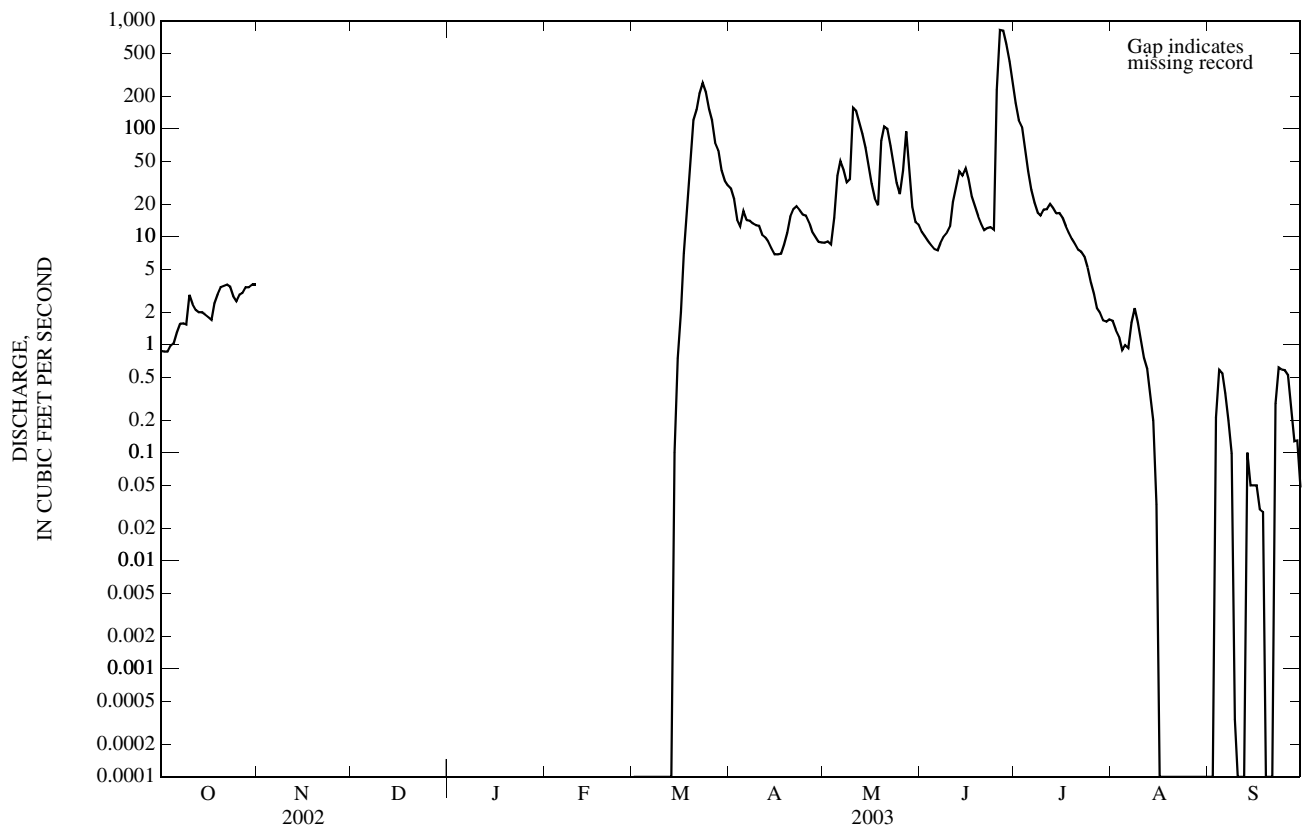
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1944 - 2003, BY WATER YEAR (WY)

MEAN	13.0	11.0	5.60	3.79	3.29	76.9	296	122	113	79.8	18.3	12.3
MAX	130	102	77.1	64.5	62.1	437	1,537	2,617	1,644	820	363	144
(WY)	(1952)	(1952)	(1951)	(1951)	(1951)	(1945)	(1950)	(1950)	(2002)	(1950)	(1949)	(1944)
MIN	0.000	0.000	0.000	0.000	0.000	0.000	0.078	0.87	0.000	0.000	0.000	0.000
(WY)	(1955)	(1956)	(1956)	(1946)	(1946)	(1964)	(1981)	(1980)	(1980)	(1961)	(1959)	(1954)

05067500 MARSH RIVER NEAR SHELLY, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1944-2003	
ANNUAL MEAN					63.3	
HIGHEST ANNUAL MEAN					a543	1950
LOWEST ANNUAL MEAN					1.24	1977
HIGHEST DAILY MEAN	5,290	Jun 27	816	Jun 26	5,290	Jun 27 2002
LOWEST DAILY MEAN	0.49	Sep 22	0.00	bMar 1	0.00	cSep 4 1945
ANNUAL SEVEN-DAY MINIMUM	0.66	Sep 17	0.00	Mar 1	0.00	Sep 12 1945
MAXIMUM PEAK FLOW			882	Jun 26	d5,530	Jun 26 2002
MAXIMUM PEAK STAGE			12.34	Jun 26	f25.45	Apr 18, 1997
ANNUAL RUNOFF (AC-FT)					45,850	
ANNUAL RUNOFF (CFSM)					0.29	
ANNUAL RUNOFF (INCHES)					3.91	
10 PERCENT EXCEEDS					106	
50 PERCENT EXCEEDS					0.80	
90 PERCENT EXCEEDS					0.00	

- a Based on complete years only, 1945-83, 86-89.
- b Many days.
- c Many days, most years.
- d Gage-height, 24.35 ft.
- e Estimated.
- f From floodmark.



05069000 SAND HILL RIVER AT CLIMAX, MN

LOCATION.--Lat 47°36'43", long 96°48'52", in NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 30, T.148 N., R.48 W., Polk County, Hydrologic Unit 09020301, on left bank 25 ft upstream from bridge on U.S. Highway 75 in Climax and 3.7 mi upstream from mouth.

DRAINAGE AREA.--420 mi².

PERIOD OF RECORD.--March 1943 to September 1984, June 1985 to current year (winter records incomplete prior to 1947). Monthly discharge only for some periods, published in WSP 1308 and 1728. October 1984 to May 1985, operated as a high-flow partial-record station.

REVISED RECORDS.--WSP 1388: 1943(M), 1944, 1947(M). WSP 1728: 1951(M), 1960 (average discharge).

GAGE.--Water-stage recorder. Datum of gage is 820.10 ft above sea level (NGVD or 1929, levels by U.S. Army Corps of Engineers). Prior to Oct. 1, 1966, nonrecording gage at site 3.2 mi upstream at datum 12.78 ft higher. Oct. 1, 1966 to Sept 5, 1989, nonrecording gage at present site and datum.

REMARKS.--Records good except those for estimated daily discharges, which are poor.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	71	67	40	e24	e16	e14	128	66	60	e230	33	17
2	69	61	e39	e24	e16	e14	91	57	56	e230	32	16
3	69	66	e38	e24	e16	e14	67	52	60	e210	32	18
4	69	59	e38	e24	e16	e14	77	65	59	e185	31	18
5	69	61	e38	e24	e16	e14	77	105	54	e165	32	17
6	67	60	e38	e24	e16	e15	77	112	51	e140	30	17
7	71	61	e37	e24	e16	e15	73	107	52	e125	29	16
8	68	63	e36	e23	e16	e16	78	94	65	112	27	16
9	68	60	e35	e21	e16	e17	85	99	68	104	24	15
10	68	60	e35	e20	e16	e18	91	244	73	105	24	16
11	66	58	e34	e19	e16	e20	78	220	147	102	24	18
12	65	58	e34	e19	e16	e23	61	193	139	98	24	19
13	62	52	e33	e19	e16	e26	57	159	130	91	21	21
14	62	47	e33	e19	e16	e35	62	135	115	93	19	24
15	62	52	e33	e19	e16	e45	57	112	104	101	17	21
16	62	51	e33	e19	e16	e56	52	97	93	88	16	20
17	61	e50	e33	e18	e16	e72	58	86	86	78	16	24
18	62	e50	e35	e18	e16	e90	64	83	77	71	16	26
19	63	e50	e35	e18	e16	e125	72	115	70	66	16	32
20	62	e51	e35	e18	e15	e160	95	166	60	63	15	25
21	61	e51	e34	e17	e15	e210	112	160	53	59	16	22
22	65	e50	e33	e17	e14	e275	118	156	69	59	14	21
23	64	e49	e31	e17	e14	e350	109	141	542	58	16	24
24	61	e49	e30	e17	e14	394	96	120	258	62	20	22
25	59	44	e29	e17	e14	288	86	108	261	54	24	21
26	58	31	e28	e17	e14	224	80	95	380	50	20	20
27	59	47	e28	e16	e14	199	74	83	375	46	20	19
28	60	55	e28	e16	e14	142	73	72	315	42	18	20
29	63	51	e28	e16	---	135	65	64	258	37	18	23
30	68	48	e28	e16	---	127	65	60	e240	36	18	27
31	59	---	e26	e16	---	122	---	63	---	35	17	---
TOTAL	1,993	1,612	1,035	600	432	3,269	2,378	3,489	4,370	2,995	679	615
MEAN	64.3	53.7	33.4	19.4	15.4	105	79.3	113	146	96.6	21.9	20.5
MAX	71	67	40	24	16	394	128	244	542	230	33	32
MIN	58	31	26	16	14	14	52	52	51	35	14	15
AC-FT	3,950	3,200	2,050	1,190	857	6,480	4,720	6,920	8,670	5,940	1,350	1,220
CFSM	0.15	0.13	0.08	0.05	0.04	0.25	0.19	0.27	0.35	0.23	0.05	0.05
IN.	0.18	0.14	0.09	0.05	0.04	0.29	0.21	0.31	0.39	0.27	0.06	0.05

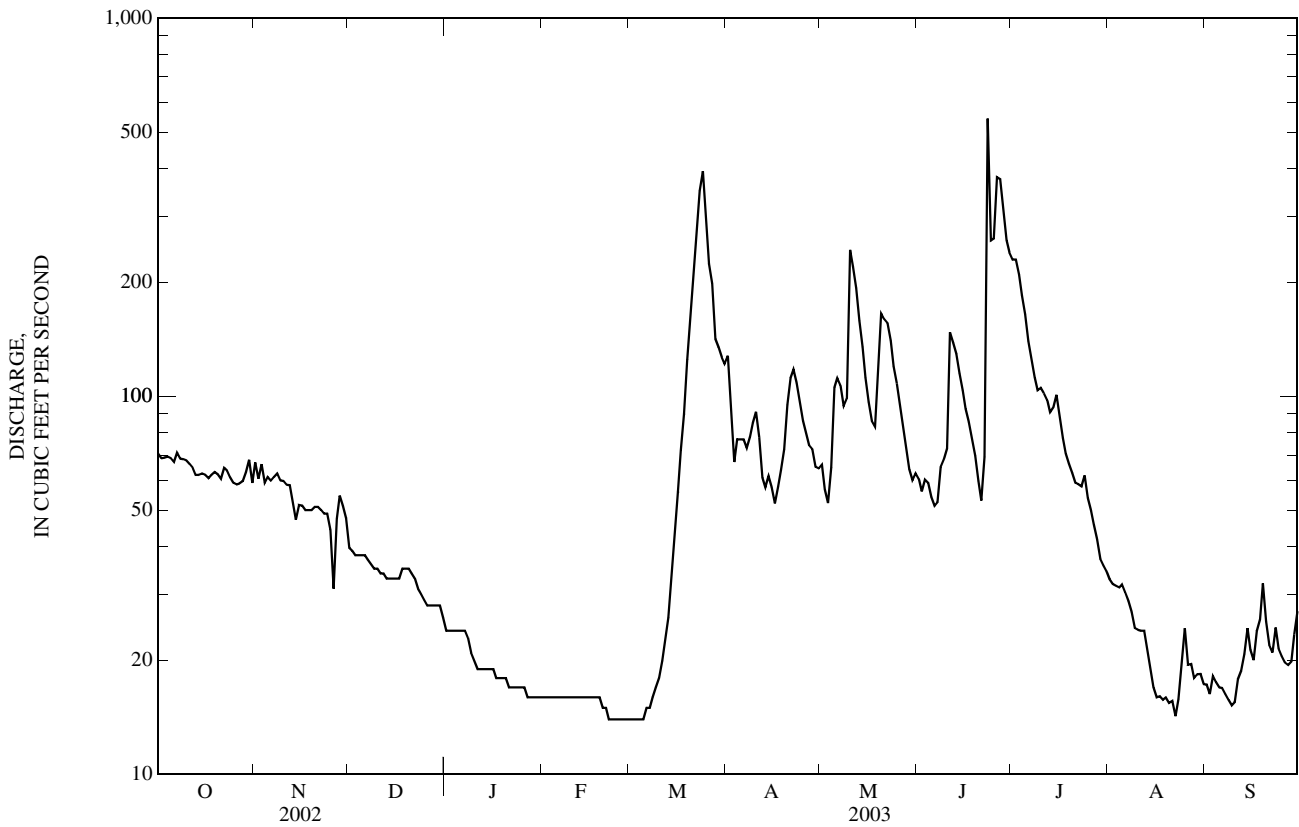
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1943 - 2003, BY WATER YEAR (WY)

MEAN	39.0	35.6	20.4	15.0	17.6	94.6	378	133	113	93.5	41.2	36.3
MAX	223	284	58.0	36.8	183	610	1,568	1,156	689	703	426	374
(WY)	(1972)	(2001)	(1999)	(2001)	(1998)	(1999)	(1997)	(1950)	(2002)	(2002)	(1993)	(1999)
MIN	9.43	8.64	5.11	2.02	3.55	5.81	25.3	23.7	11.5	8.95	6.30	6.49
(WY)	(1977)	(1956)	(1964)	(1962)	(1962)	(1948)	(1981)	(1958)	(1980)	(1980)	(1961)	(1955)

05069000 SAND HILL RIVER AT CLIMAX, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1943 - 2003	
ANNUAL TOTAL	66,924		23,467		a85.1	
ANNUAL MEAN	183		64.3		249	
HIGHEST ANNUAL MEAN					18.4 1999	
LOWEST ANNUAL MEAN					18.4 1977	
HIGHEST DAILY MEAN	3,360	Jul 11	542	Jun 23	4,360	Apr 14, 1965
LOWEST DAILY MEAN	23	Jan 1	14	Feb 22	1.0	Jan 17, 1962
ANNUAL SEVEN-DAY MINIMUM	23	Jan 20	14	Feb 22	1.1	Jan 12, 1962
MAXIMUM PEAK FLOW			670		b4,560 Apr 14, 1965	
MAXIMUM PEAK STAGE			8.24		c39.40 Apr 20, 1997	
ANNUAL RUNOFF (AC-FT)	132,700		46,550		61,620	
ANNUAL RUNOFF (CFSM)	0.44		0.15		0.20	
ANNUAL RUNOFF (INCHES)	5.93		2.08		2.75	
10 PERCENT EXCEEDS	425		129		164	
50 PERCENT EXCEEDS	67		50		25	
90 PERCENT EXCEEDS	27		16		9.0	

- a Median of annual mean discharges is 65 ft³/s.
- b Gage-height, 17.81 ft, site and datum then in use.
- c Backwater from Red River of the North.
- e Estimated.



05073500 UPPER RED LAKE AT WASKISH, MN

LOCATION.--Lat 48°10'32", long 94°30'51", in SW $\frac{1}{4}$ NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 8, T.154 N., R. 30 W., Beltrami County, Hydrologic Unit 09020302, on east side of Upper Red Lake, near mouth of Tamarac River, on Minnesota Department of Natural Resources property, 500 feet west of State Highway 72 bridge on north edge of Waskish.

PERIOD OF RECORD.-- October 1921 to September 1929, fragmentary gage height record in files of Minnesota Department of Natural Resources, April 1930 to September 1933, published as "Red Lake at Waskish", May 1940 to July 1946, October 1995 to current year.

GAGE.-- Water-stage recorder. Datum of gage is 1,100.00 ft above sea level, adjustment of 1912. October 1921 to September 1929, non-recording gage at datum 1,170.00 ft (no winter readings). April 1930 to September 1933, non-recording gage at datum 1,100.00 ft (some winter readings). May 1940 to July 1946, non-recording gage at datum 1,170.00 ft.

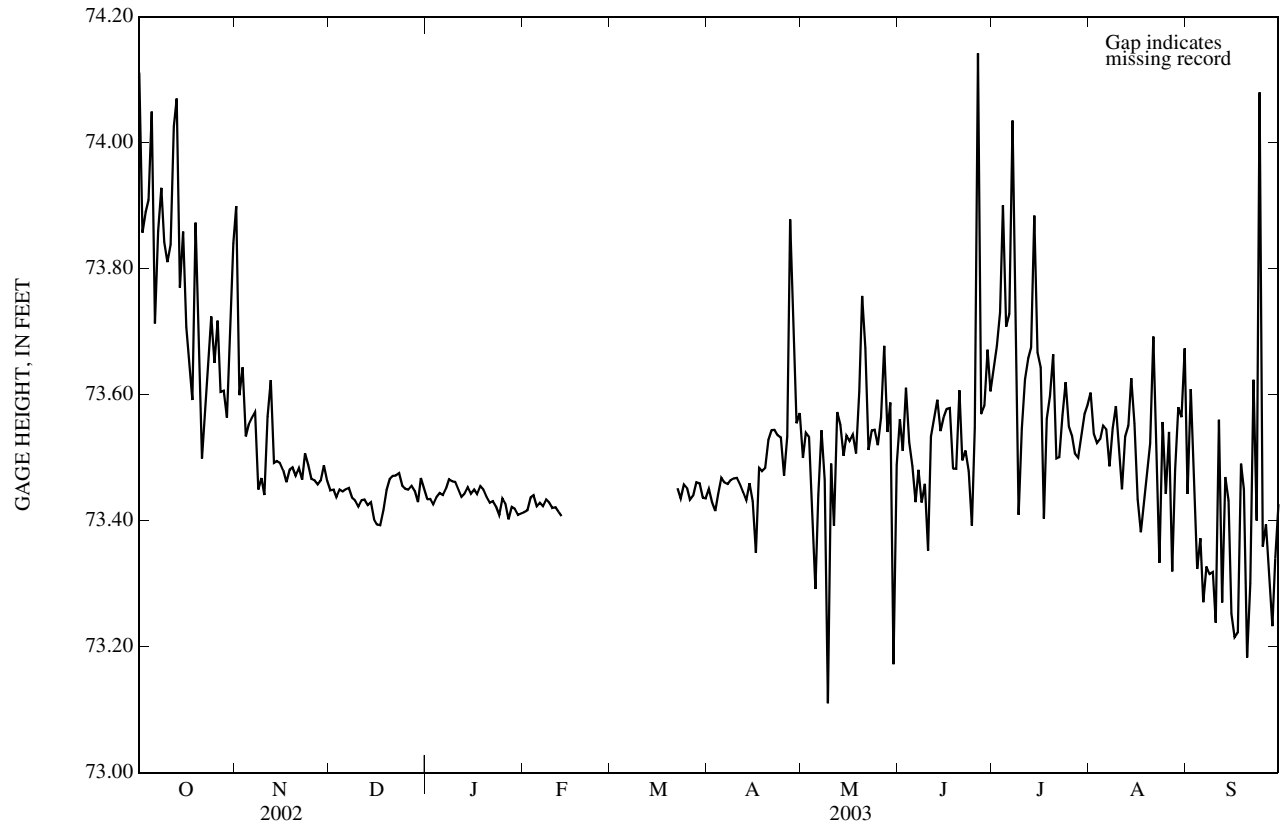
REMARKS.-- Records good. Water level subject to fluctuation caused by seiches, and the stage of the Tamarac River.

EXTREMES FOR PERIOD OF RECORD.-- Maximum gage height, 78.34 ft (present datum), June 28, 1943; minimum recorded, 72.10 ft, Oct. 17, 1932.

EXTREMES FOR CURRENT YEAR.-- Maximum gage height, 74.72 ft, Oct. 13; maximum daily, 74.14 ft, June 26; minimum gage height, 72.70 ft, June 25; minimum daily, 73.11 ft, May 9.

GAGE HEIGHT, FEET
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	74.11	73.90	73.45	73.43	73.41	---	73.45	73.50	73.56	73.64	73.60	73.44
2	73.86	73.60	73.45	73.43	73.42	---	73.43	73.54	73.51	73.68	73.54	73.61
3	73.89	73.64	73.44	73.43	73.44	---	73.42	73.53	73.61	73.73	73.52	73.49
4	73.91	73.53	73.45	73.44	73.44	---	73.44	73.39	73.53	73.90	73.53	73.32
5	74.05	73.55	73.45	73.44	73.42	---	73.47	73.29	73.49	73.71	73.55	73.37
6	73.71	73.56	73.45	73.44	73.43	---	73.46	73.44	73.43	73.73	73.54	73.27
7	73.86	73.57	73.45	73.45	73.42	---	73.46	73.54	73.48	74.03	73.49	73.33
8	73.93	73.45	73.44	73.47	73.43	---	73.46	73.46	73.43	73.64	73.55	73.32
9	73.84	73.47	73.43	73.46	73.43	---	73.47	73.11	73.46	73.41	73.58	73.32
10	73.81	73.44	73.42	73.46	73.42	---	73.47	73.49	73.35	73.55	73.52	73.24
11	73.84	73.57	73.43	73.45	73.42	---	73.46	73.39	73.53	73.62	73.45	73.56
12	74.03	73.62	73.43	73.44	73.41	---	73.44	73.57	73.56	73.66	73.53	73.27
13	74.07	73.49	73.42	73.44	73.41	---	73.43	73.55	73.59	73.67	73.55	73.47
14	73.77	73.49	73.43	73.45	---	---	73.46	73.50	73.54	73.88	73.63	73.43
15	73.86	73.49	73.40	73.44	---	---	73.43	73.53	73.56	73.67	73.55	73.25
16	73.71	73.48	73.39	73.45	---	---	73.35	73.53	73.58	73.64	73.43	73.22
17	73.64	73.46	73.39	73.44	---	---	73.48	73.54	73.58	73.40	73.38	73.22
18	73.59	73.48	73.42	73.45	---	---	73.48	73.51	73.48	73.56	73.43	73.49
19	73.87	73.48	73.45	73.45	---	---	73.48	73.60	73.48	73.60	73.47	73.45
20	73.67	73.47	73.47	73.44	---	---	73.53	73.76	73.61	73.66	73.52	73.18
21	73.50	73.48	73.47	73.43	---	---	73.54	73.67	73.50	73.50	73.69	73.30
22	73.59	73.47	73.47	73.43	---	73.45	73.54	73.51	73.51	73.50	73.54	73.62
23	73.65	73.51	73.47	73.42	---	73.44	73.54	73.54	73.48	73.57	73.33	73.40
24	73.72	73.49	73.46	73.41	---	73.46	73.53	73.54	73.39	73.62	73.56	74.08
25	73.65	73.47	73.45	73.44	---	73.45	73.47	73.52	73.55	73.55	73.44	73.36
26	73.72	73.46	73.45	73.43	---	73.43	73.53	73.56	74.14	73.53	73.54	73.39
27	73.60	73.46	73.46	73.40	---	73.44	73.88	73.68	73.57	73.51	73.32	73.31
28	73.61	73.46	73.45	73.42	---	73.46	73.75	73.54	73.58	73.50	73.48	73.23
29	73.56	73.49	73.43	73.42	---	73.46	73.55	73.59	73.67	73.53	73.58	73.34
30	73.68	73.46	73.47	73.41	---	73.44	73.57	73.17	73.61	73.57	73.56	73.43
31	73.84	---	73.45	73.41	---	73.44	---	73.49	---	73.58	73.67	---
MEAN	73.78	73.52	73.44	73.44	---	---	73.50	73.50	73.55	73.62	73.52	73.39
MAX	74.11	73.90	73.47	73.47	---	---	73.88	73.76	74.14	74.03	73.69	74.08
MIN	73.50	73.44	73.39	73.40	---	---	73.35	73.11	73.35	73.40	73.32	73.18



05073650 LOWER RED LAKE AT BATTLE RIVER MOUTH NEAR SAUM, MN

LOCATION.-- Lat 47°57'35", long 94°44'31", in SE $\frac{1}{4}$ NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 28, T. 152 N., R. 32 W., Beltrami County, Hydrologic Unit 09020302, on east side of Lower Red Lake, 200 feet upstream of mouth of Battle River, 900 feet southwest of highway bridge, and 3.2 mi southwest of Saum.

PERIOD OF RECORD.--June 5, 1996 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,100.00 ft above sea level, adjustment of 1912.

REMARKS.--Records fair. Water level subject to the stage of the Battle River and ice pile up at the mouth; and by lake seiches.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 76.75 ft, Aug. 9, 2001; maximum daily, 76.12 ft, June 19, Aug. 9, 2001; minimum gage height, 73.15 ft, Sept. 11, 2003; minimum daily, 73.23 ft, Sept. 16, 2003.

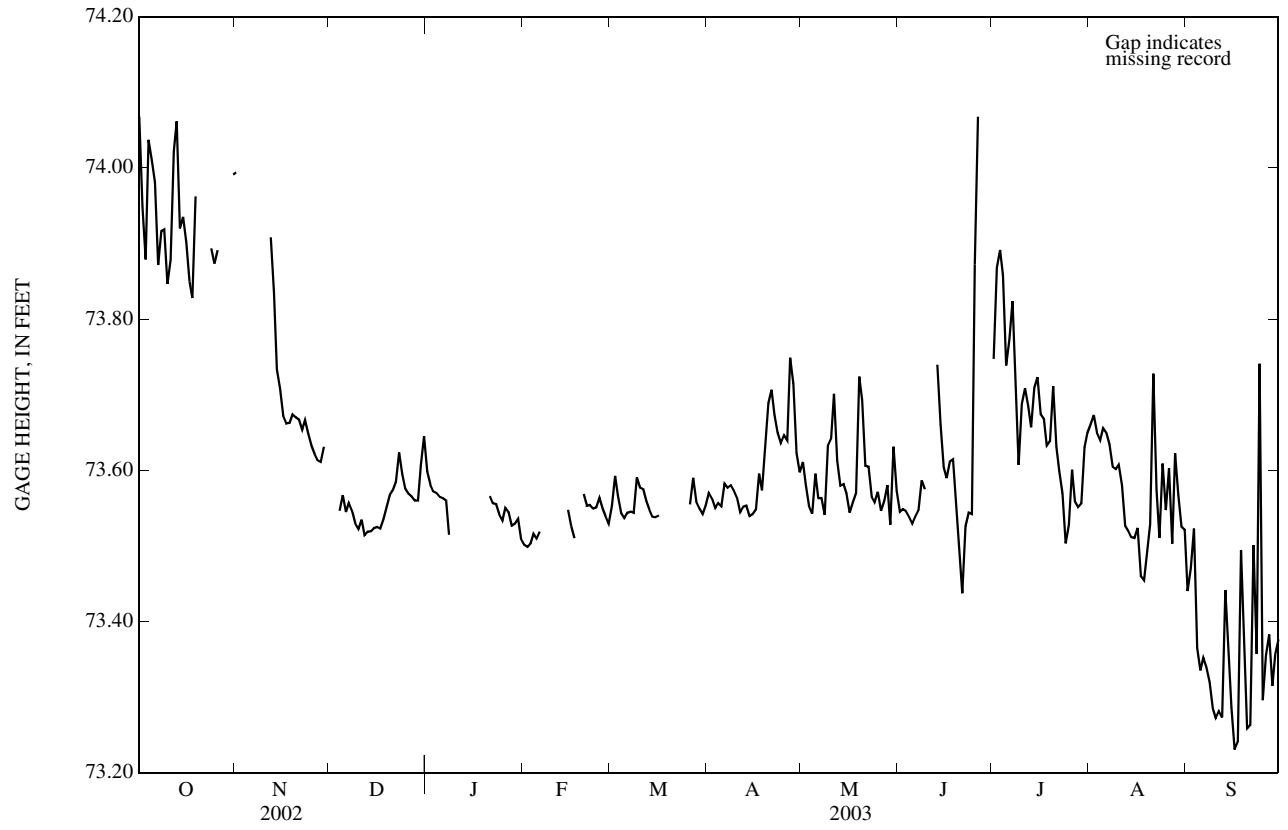
EXTREMES FOR CURRENT YEAR.--Maximum gage height, 74.54 ft, July 2; maximum daily, 74.07 ft, Oct. 1, June 26; minimum gage height, 73.15 ft, Sep. 11; minimum daily, 73.23 ft, Sep. 16.

REVISIONS.--Prior to Oct. 1, 1997, daily-mean, daily-maximum, and daily-minimum gage heights revised upwards by 0.11 ft. Datum of gage had been established 0.11 ft too low.

GAGE HEIGHT, FEET
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	74.07	73.99	---	73.60	73.50	73.55	73.57	73.61	73.55	73.75	73.66	73.44
2	73.95	---	---	73.58	73.50	73.59	73.56	73.58	73.55	73.87	73.67	73.47
3	73.88	---	---	73.57	73.50	73.57	73.55	73.55	73.55	73.89	73.65	73.52
4	74.04	---	73.55	73.57	73.52	73.54	73.56	73.54	73.54	73.86	73.64	73.36
5	74.01	---	73.57	73.56	73.51	73.54	73.55	73.60	73.53	73.74	73.66	73.34
6	73.98	---	73.54	73.56	73.52	73.54	73.58	73.56	73.54	73.77	73.65	73.35
7	73.87	---	73.56	73.56	---	73.55	73.58	73.56	73.55	73.82	73.63	73.34
8	73.92	---	73.55	73.51	---	73.54	73.58	73.54	73.59	73.69	73.60	73.32
9	73.92	---	73.53	---	---	73.59	73.57	73.63	73.58	73.61	73.60	73.28
10	73.85	---	73.52	---	---	73.58	73.56	73.64	---	73.69	73.61	73.27
11	73.88	---	73.53	---	---	73.57	73.54	73.70	---	73.71	73.58	73.28
12	74.02	73.91	73.51	---	---	73.56	73.55	73.61	---	73.69	73.53	73.27
13	74.06	73.83	73.52	---	---	73.55	73.55	73.58	73.74	73.66	73.52	73.44
14	73.92	73.73	73.52	---	---	73.54	73.54	73.58	73.66	73.71	73.51	73.35
15	73.94	73.71	73.52	---	73.55	73.54	73.54	73.57	73.60	73.72	73.51	73.29
16	73.90	73.67	73.52	---	73.53	73.54	73.55	73.54	73.59	73.67	73.52	73.23
17	73.85	73.66	73.52	---	73.51	---	73.60	73.56	73.61	73.67	73.46	73.24
18	73.83	73.66	73.54	---	---	---	73.57	73.57	73.61	73.63	73.45	73.49
19	73.96	73.67	73.55	---	---	---	73.62	73.72	73.54	73.64	73.49	73.40
20	---	73.67	73.57	---	73.57	---	73.69	73.69	73.48	73.71	73.53	73.26
21	---	73.67	73.57	73.57	73.55	---	73.71	73.61	73.44	73.63	73.73	73.26
22	---	73.65	73.58	73.56	73.55	---	73.67	73.60	73.53	73.60	73.57	73.50
23	---	73.67	73.62	73.56	73.55	---	73.65	73.57	73.54	73.57	73.51	73.36
24	73.89	73.65	73.59	73.54	73.55	---	73.64	73.56	73.54	73.50	73.61	73.74
25	73.87	73.63	73.58	73.53	73.56	---	73.65	73.57	73.87	73.53	73.55	73.30
26	73.89	73.62	73.57	73.55	73.55	73.55	73.64	73.55	74.07	73.60	73.60	73.36
27	---	73.61	73.57	73.54	73.54	73.59	73.75	73.56	---	73.56	73.50	73.38
28	---	73.61	73.56	73.53	73.53	73.56	73.71	73.58	---	73.55	73.62	73.31
29	---	73.63	73.56	73.53	---	73.55	73.62	73.53	---	73.56	73.57	73.36
30	---	---	73.61	73.54	---	73.54	73.60	73.63	---	73.63	73.53	73.38
31	73.99	---	73.64	73.51	---	73.55	---	73.57	---	73.65	73.52	---
MEAN	---	---	---	---	---	---	73.60	73.59	---	73.67	73.57	73.36
MAX	---	---	---	---	---	---	73.75	73.72	---	73.89	73.73	73.74
MIN	---	---	---	---	---	---	73.54	73.53	---	73.50	73.45	73.23

05073650 LOWER RED LAKE AT BATTLE RIVER MOUTH NEAR SAUM, MN—Continued



05074000 LOWER RED LAKE NEAR RED LAKE, MN

LOCATION.--Lat 47°57'27", long 95°16'34", in SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 28, T.152 N., R.36 W., Clearwater County, Hydrologic Unit 09020302, on Red Lake Indian Reservation, on left bank just upstream from dam at outlet of Lower Red Lake, and 13 mi northwest of city of Red Lake.

DRAINAGE AREA.--1,950 mi² (approximately).

PERIOD OF RECORD.--June 1930 to November 1932, May 1933 to September 1997, October 1999 to current year. Published as "Red Lake at Redby" prior to May 1933 and as "Red Lake near Red Lake" May 1933 to September 1940. Fragmentary gage-height record, October 1921 to September 1929, for "Red Lake at Redby" in files of Minnesota Department of Natural Resources. Gage height record, October 1997 to September 1999, in files of U.S. Army Corps of Engineers.

GAGE.--Water-stage recorder. Datum of gage is 1,100.00 ft above sea level, adjustment of 1912 (levels by U.S. Army Corps of Engineers). May 1933 to Sept. 6, 1934, nonrecording gage. Sept. 7, 1934 to Sept. 30, 1986, water-stage recorder at present site at datum 69.00 ft higher.

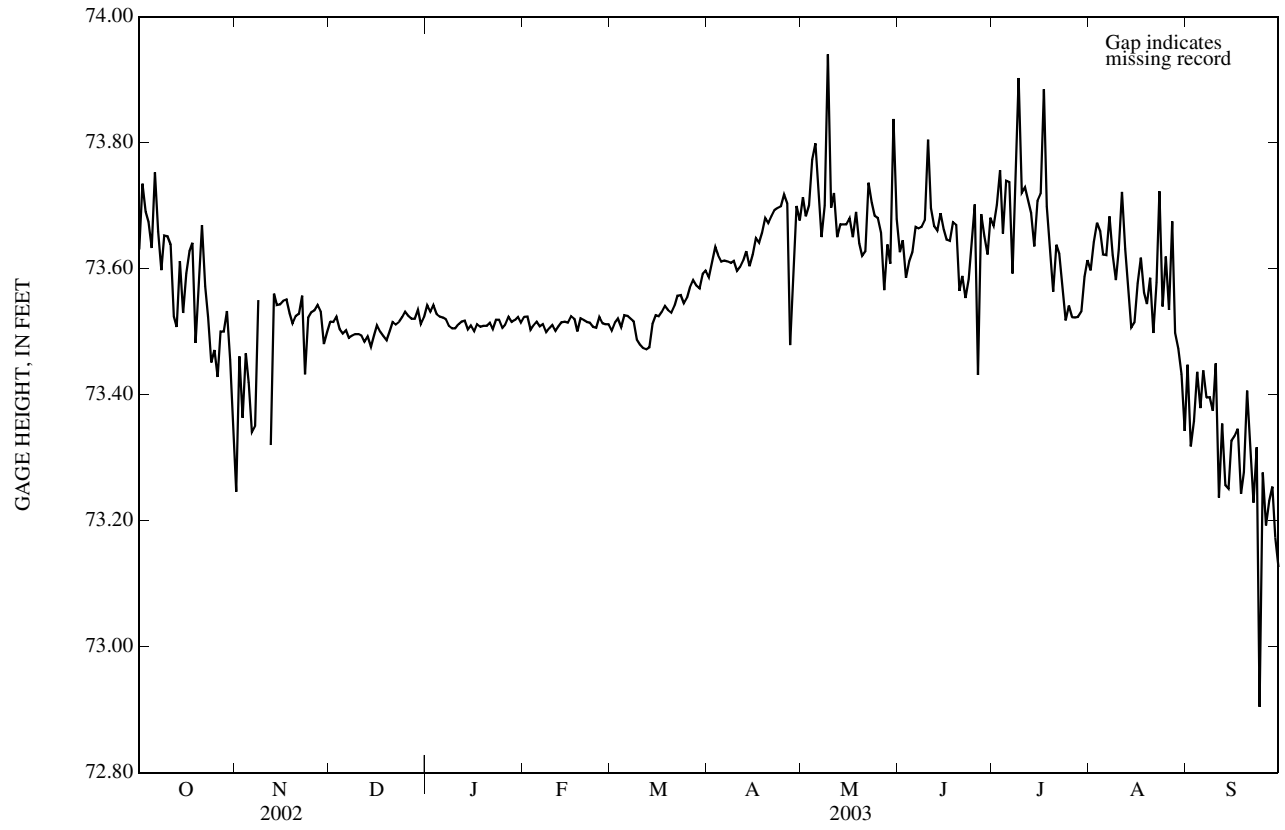
REMARKS.--Records fair. Water level subject to fluctuation caused by seiches, and by drawdown from dam gate changes.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height recorded, 78.53 ft, June 25, 1950; minimum recorded, 69.80 ft, Nov. 20, 1936.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 74.55 ft, July 2; maximum daily, 73.94 ft, May 9; minimum gage height, 72.57 ft, Sept. 24; minimum daily, 72.90 ft, Sept. 24.

GAGE HEIGHT, FEET
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	73.63	73.25	73.52	73.54	73.52	73.50	73.59	73.71	73.63	73.67	73.60	73.45
2	73.73	73.46	73.52	73.53	73.52	73.51	73.61	73.68	73.64	73.70	73.64	73.32
3	73.69	73.36	73.52	73.54	73.50	73.52	73.63	73.70	73.59	73.76	73.67	73.36
4	73.67	73.47	73.50	73.53	73.51	73.51	73.62	73.77	73.61	73.66	73.66	73.44
5	73.63	73.42	73.50	73.52	73.52	73.53	73.61	73.80	73.63	73.74	73.62	73.38
6	73.75	73.34	73.50	73.52	73.51	73.53	73.61	73.73	73.67	73.74	73.62	73.44
7	73.66	73.35	73.49	73.52	73.51	73.52	73.61	73.65	73.66	73.59	73.68	73.40
8	73.60	73.55	73.49	73.51	73.50	73.52	73.61	73.70	73.67	73.76	73.62	73.40
9	73.65	---	73.50	73.51	73.51	73.49	73.61	73.94	73.68	73.90	73.58	73.37
10	73.65	---	73.50	73.50	73.51	73.48	73.60	73.70	73.80	73.72	73.63	73.45
11	73.64	---	73.49	73.51	73.50	73.47	73.60	73.72	73.70	73.73	73.72	73.24
12	73.52	73.32	73.48	73.52	73.51	73.47	73.61	73.65	73.67	73.71	73.63	73.35
13	73.51	73.56	73.49	73.52	73.52	73.47	73.63	73.67	73.66	73.69	73.57	73.26
14	73.61	73.54	73.48	73.50	73.52	73.51	73.60	73.67	73.69	73.64	73.51	73.25
15	73.53	73.54	73.49	73.51	73.51	73.53	73.62	73.67	73.66	73.71	73.51	73.33
16	73.59	73.55	73.51	73.50	73.52	73.52	73.65	73.68	73.65	73.72	73.58	73.33
17	73.63	73.55	73.50	73.51	73.52	73.53	73.64	73.65	73.64	73.88	73.62	73.35
18	73.64	73.53	73.49	73.51	73.50	73.54	73.66	73.69	73.67	73.70	73.56	73.24
19	73.48	73.51	73.49	73.51	73.52	73.53	73.68	73.64	73.67	73.63	73.54	73.28
20	73.58	73.52	73.50	73.51	73.52	73.53	73.67	73.62	73.56	73.56	73.59	73.41
21	73.67	73.53	73.52	73.51	73.52	73.54	73.68	73.63	73.59	73.64	73.50	73.33
22	73.57	73.56	73.51	73.50	73.51	73.56	73.69	73.74	73.55	73.62	73.58	73.23
23	73.52	73.43	73.52	73.52	73.51	73.56	73.70	73.70	73.58	73.57	73.72	73.32
24	73.45	73.52	73.52	73.52	73.51	73.55	73.70	73.68	73.65	73.52	73.54	72.90
25	73.47	73.53	73.53	73.51	73.52	73.55	73.72	73.68	73.70	73.54	73.62	73.28
26	73.43	73.53	73.52	73.51	73.51	73.57	73.70	73.66	73.43	73.52	73.53	73.19
27	73.50	73.54	73.52	73.52	73.51	73.58	73.48	73.57	73.69	73.52	73.67	73.23
28	73.50	73.53	73.52	73.52	73.51	73.57	73.60	73.64	73.65	73.52	73.50	73.25
29	73.53	73.48	73.53	73.52	---	73.57	73.70	73.61	73.62	73.53	73.47	73.17
30	73.46	73.50	73.51	73.52	---	73.59	73.68	73.84	73.68	73.59	73.43	73.13
31	73.35	---	73.52	73.51	---	73.60	---	73.68	---	73.61	73.34	---
MEAN	73.58	---	73.51	73.52	73.51	73.53	73.64	73.69	73.64	73.66	73.58	73.30
MAX	73.75	---	73.53	73.54	73.52	73.60	73.72	73.94	73.80	73.90	73.72	73.45
MIN	73.35	---	73.48	73.50	73.50	73.47	73.48	73.57	73.43	73.52	73.34	72.90



05074500 RED LAKE RIVER NEAR RED LAKE, MN

LOCATION.--Lat 47°57'27", long 95°16'35", in SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 28, T.152 N., R.36 W., Clearwater County, Hydrologic Unit 09020302, on Red Lake Indian Reservation, on left bank 50 ft downstream from dam outlet at outlet of Lower Red Lake, and 13 mi northwest of city of Red Lake.

DRAINAGE AREA.--1,950 mi² (approximately).

PERIOD OF RECORD.--May 1933 to September 1994 (monthly discharge only for May 1933, published in WSP 1308), October 1999 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,100.00 ft above sea level, adjustment of 1912 (levels by U.S. Army Corps of Engineers). Prior to Sept. 7, 1934, nonrecording gage at site 50 ft upstream at datum 69.00 ft higher. Sept. 7, 1934 to Nov. 26, 1951, water-stage recorder at present site at datum 69.00 ft higher. Nov. 27, 1951 to Sept. 30, 1986, water-stage recorder at present site at datum 67.00 ft higher.

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

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	824	765	e405	e215	e145	e120	105	90	75	94	87	96
2	828	776	e405	e180	e144	e120	96	89	71	96	87	94
3	816	788	e405	e165	e144	e120	83	87	71	97	84	91
4	817	808	e405	e165	e143	e120	142	84	69	96	82	95
5	791	820	e405	e165	e143	e120	105	85	68	94	85	94
6	821	810	e405	e165	e143	e120	89	76	67	96	85	98
7	786	767	e405	e160	e143	e120	84	62	63	103	82	99
8	782	545	e405	e160	e142	e120	89	64	67	100	82	98
9	789	e530	e405	e160	e141	e120	93	65	70	100	82	95
10	792	e520	e405	e160	e140	e120	95	68	73	104	83	92
11	783	e505	e406	e160	e139	e120	93	73	69	107	78	78
12	729	495	e405	e160	e128	e120	88	72	66	105	76	83
13	714	e495	e405	e160	e126	e120	94	68	68	104	48	88
14	720	e500	e405	e160	e124	e120	96	68	66	106	37	80
15	722	e495	e405	e160	e123	e120	94	70	64	104	34	85
16	715	e495	e405	e160	e122	e122	81	70	64	99	37	88
17	715	e495	e405	e158	e122	e124	90	72	69	86	39	91
18	732	e495	e400	e155	e121	e126	89	72	72	76	58	96
19	744	e495	e400	e145	e121	e128	90	86	70	79	98	87
20	737	498	e390	e145	e121	e128	101	83	67	87	108	93
21	747	434	e380	e145	e121	e130	100	76	64	87	107	95
22	753	318	e340	e145	e121	e130	92	76	63	85	104	89
23	754	332	e290	e145	e120	e130	90	76	63	87	113	88
24	763	e400	e285	e145	e120	e123	90	76	67	82	108	77
25	768	e400	e280	e145	e120	116	87	79	95	82	110	76
26	781	e400	e280	e145	e120	99	90	81	98	86	112	80
27	783	e405	e285	e145	e120	99	116	84	90	84	113	82
28	794	e405	e285	e145	e120	104	106	86	89	85	109	84
29	810	e400	e280	e145	---	109	92	85	93	85	98	80
30	781	e405	e280	e145	---	102	93	85	94	88	95	74
31	778	---	e260	e145	---	103	---	81	---	87	90	---
TOTAL	23,869	15,996	11,321	4,853	3,637	3,673	2,853	2,389	2,185	2,871	2,611	2,646
MEAN	770	533	365	157	130	118	95.1	77.1	72.8	92.6	84.2	88.2
MAX	828	820	406	215	145	130	142	90	98	107	113	99
MIN	714	318	260	145	120	99	81	62	63	76	34	74
AC-FT	47,340	31,730	22,460	9,630	7,210	7,290	5,660	4,740	4,330	5,690	5,180	5,250
CFSM	0.39	0.27	0.19	0.08	0.07	0.06	0.05	0.04	0.04	0.05	0.04	0.05
IN.	0.46	0.31	0.22	0.09	0.07	0.07	0.05	0.05	0.04	0.05	0.05	0.05

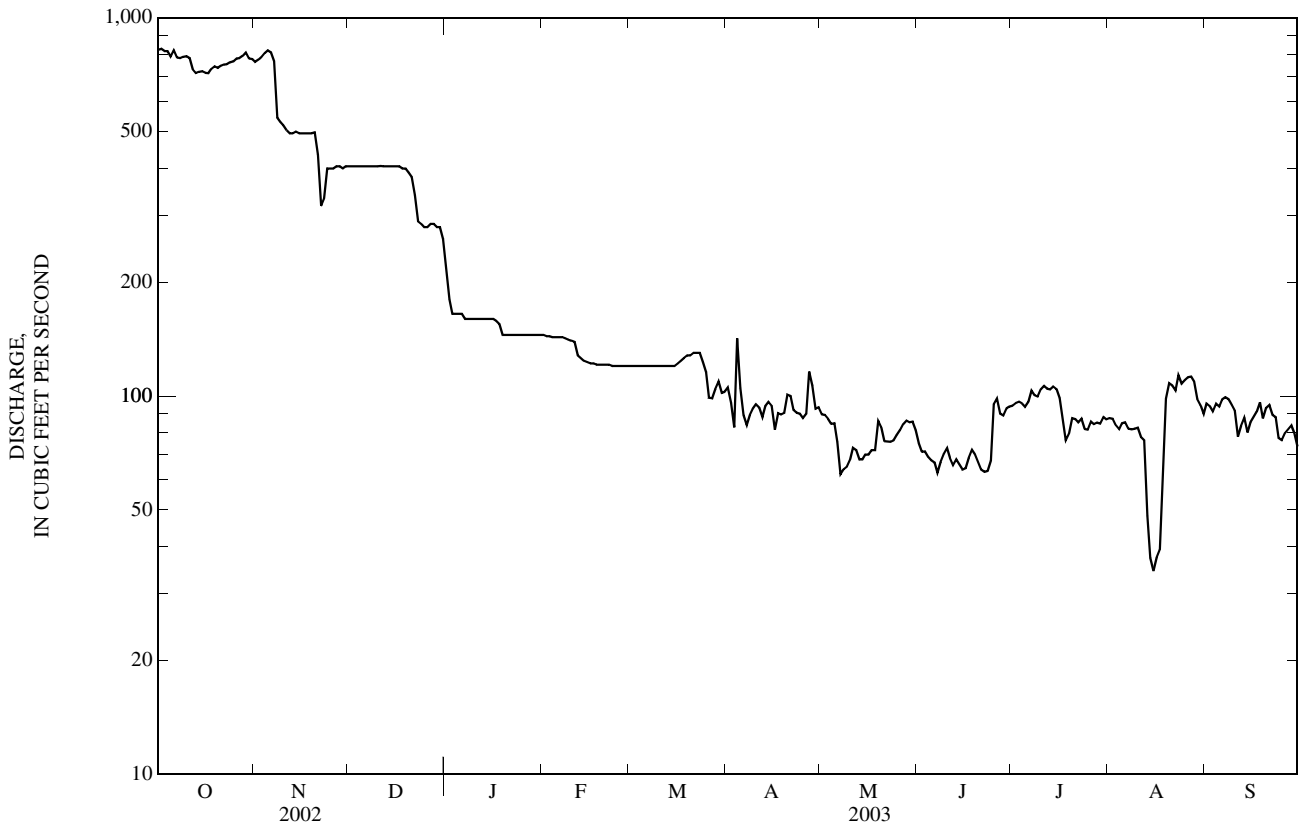
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1933 - 2003, BY WATER YEAR (WY)

MEAN	492	492	475	479	473	442	360	498	569	540	478	472
MAX	2,071	1,765	1,498	1,418	1,342	1,396	1,357	1,624	2,025	1,840	1,464	1,712
(WY)	(1951)	(2000)	(1951)	(1951)	(1951)	(1951)	(2000)	(1950)	(1950)	(1950)	(1975)	(1950)
MIN	5.10	3.57	0.95	0.35	0.40	0.60	4.00	0.60	2.15	4.63	2.73	1.61
(WY)	(1934)	(1934)	(1934)	(1934)	(1934)	(1936)	(1936)	(1933)	(1933)	(1934)	(1936)	(1934)

05074500 RED LAKE RIVER NEAR RED LAKE, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1933 - 2003	
ANNUAL TOTAL	290,853		78,904			
ANNUAL MEAN	797		216		484	
HIGHEST ANNUAL MEAN					1,292	1951
LOWEST ANNUAL MEAN					5.55	1936
HIGHEST DAILY MEAN	1,290	Apr 21	828	Oct 2	2,240	Oct 6, 1950
LOWEST DAILY MEAN	150	Jul 11	34	Aug 15	a0.00	Sep 19, 1933
ANNUAL SEVEN-DAY MINIMUM	279	Dec 25	47	Aug 12	0.00	Sep 1, 1934
MAXIMUM PEAK FLOW			b858	Oct 1	3,600	Jun 25, 1950
MAXIMUM PEAK STAGE			b72.85	Oct 1	78.19	Jun 25, 1950
ANNUAL RUNOFF (AC-FT)	576,900		156,500		350,700	
ANNUAL RUNOFF (CFSM)	0.41		0.11		0.25	
ANNUAL RUNOFF (INCHES)	5.55		1.51		3.37	
10 PERCENT EXCEEDS	1,140		715		1,020	
50 PERCENT EXCEEDS	755		109		420	
90 PERCENT EXCEEDS	405		72		42	

a Many days in 1933, 1934 and 1936.
 b Falling stage.
 c Estimated.



05076000 THIEF RIVER NEAR THIEF RIVER FALLS, MN

LOCATION.--Lat 48°11'08", long 96°10'11", in NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 3, T.154 N., R.43 W., Marshall County, Hydrologic Unit 09020304, on right bank, 0.2 mi upstream from highway bridge, 5 mi north of Thief River Falls, 7 mi upstream from mouth, and 9 mi downstream from Mud Lake National Wildlife Refuge.

DRAINAGE AREA.--985 mi².

PERIOD OF RECORD.--July 1909 to September 1917, April 1920 to September 1921, October 1922 to September 1924, October 1928 to September 1981, March 1982 to current year. Monthly discharge only for some periods, annual maximums for water years 1919, 1922, 1925, 1926, published in WSP 1308. October 1981 to February 1982, operated as a high-flow partial-record station.

REVISED RECORDS.--WSP 925: Drainage area. WSP 1308: 1917(M), 1924(M), 1929(M), 1931-33(M), 1935(M), 1937(M).

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

REMARKS.--Records good except those for estimated daily discharges, which are poor. Some regulation by Thief and Mud Lakes.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	18	e114	2.5	e1.2	e0.41	e0.38	e130	873	13	166	25	0.69
2	17	109	2.3	e1.1	e0.41	e0.38	e96	772	12	144	24	0.56
3	17	112	1.8	e1.0	e0.41	e0.38	e74	186	8.9	133	26	0.54
4	23	106	1.6	e0.98	e0.41	e0.38	e63	118	7.4	100	26	0.36
5	18	108	1.5	e0.93	e0.41	e0.38	e77	114	5.8	84	24	0.22
6	14	109	e1.5	e0.86	e0.41	e0.38	e89	116	5.4	72	18	0.16
7	17	114	e1.6	e0.81	e0.40	e0.38	e83	117	23	61	18	0.12
8	15	140	e1.6	e0.76	e0.40	e0.38	e75	108	29	44	16	0.09
9	14	140	e1.7	e0.74	e0.40	e0.38	66	96	26	38	15	0.04
10	16	140	e1.8	e0.73	e0.40	e0.38	52	101	36	37	14	0.04
11	16	137	e1.8	e0.69	e0.40	e0.38	40	107	69	37	14	0.06
12	15	140	e1.8	e0.62	e0.40	e0.39	62	110	135	35	14	0.04
13	11	e132	e1.8	e0.57	e0.39	e0.41	66	98	173	32	14	0.23
14	12	e120	e1.8	e0.53	e0.39	e0.48	64	85	182	35	18	0.30
15	14	e112	e1.8	e0.50	e0.39	e2.5	80	80	143	42	35	0.33
16	12	e108	e1.8	e0.48	e0.39	e20	72	74	127	44	28	0.33
17	12	e109	e1.7	e0.46	e0.39	e150	56	74	135	47	20	0.49
18	15	112	e1.7	e0.45	e0.39	e225	45	75	162	66	13	1.6
19	16	110	e1.6	e0.44	e0.39	e200	33	85	380	66	11	2.7
20	14	110	e1.6	e0.43	e0.39	e165	45	97	376	62	11	2.4
21	13	108	e1.6	e0.43	e0.39	e145	67	73	362	59	15	2.2
22	52	104	e1.5	e0.42	e0.39	e128	58	55	357	89	11	2.3
23	315	98	e1.5	e0.42	e0.38	e108	44	40	322	91	13	2.4
24	321	e96	e1.4	e0.42	e0.38	e92	36	34	95	90	13	2.6
25	317	e92	e1.4	e0.42	e0.38	e80	22	28	107	90	11	2.7
26	317	e87	e1.3	e0.41	e0.38	e64	13	20	248	90	10	3.6
27	317	e83	e1.3	e0.41	e0.38	e75	9.2	15	289	87	8.0	3.7
28	319	37	e1.3	e0.41	e0.38	e92	157	13	273	87	3.9	3.6
29	244	5.2	e1.2	e0.41	---	e85	884	10	229	49	2.5	3.0
30	124	2.9	e1.2	e0.41	---	e66	895	18	193	32	1.7	3.4
31	116	---	e1.2	e0.41	---	e80	---	17	---	28	1.2	---
TOTAL	2,761	3,095.1	50.2	18.85	11.04	1,782.96	3,553.2	3,809	4,523.5	2,137	474.3	40.80
MEAN	89.1	103	1.62	0.61	0.39	57.5	118	123	151	68.9	15.3	1.36
MAX	321	140	2.5	1.2	0.41	225	895	873	380	166	35	3.7
MIN	11	2.9	1.2	0.41	0.38	0.38	9.2	10	5.4	28	1.2	0.04
AC-FT	5,480	6,140	100	37	22	3,540	7,050	7,560	8,970	4,240	941	81
CFSM	0.09	0.10	0.00	0.00	0.00	0.06	0.12	0.12	0.15	0.07	0.02	0.00
IN.	0.10	0.12	0.00	0.00	0.00	0.07	0.13	0.14	0.17	0.08	0.02	0.00

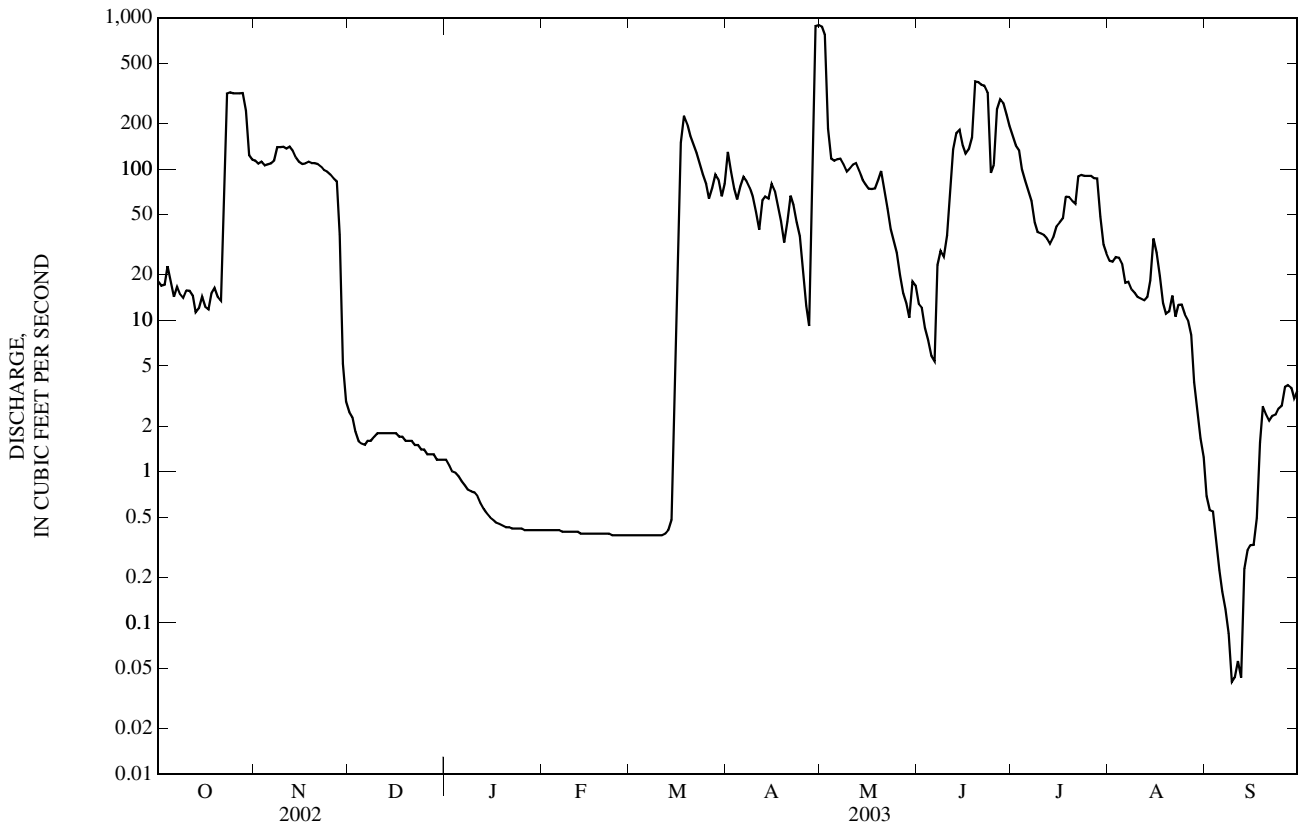
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 2003, BY WATER YEAR (WY)

MEAN	94.8	85.8	24.4	5.67	5.30	77.7	613	501	338	253	118	116
MAX	637	1,019	215	100	101	773	2,827	4,274	2,238	2,103	1,130	1,619
(WY)	(1986)	(2001)	(1999)	(1910)	(1998)	(1995)	(1966)	(1950)	(2002)	(1975)	(2001)	(1999)
MIN	0.000	0.000	0.000	0.000	0.000	0.000	7.75	1.83	0.032	0.000	0.000	0.000
(WY)	(1911)	(1911)	(1911)	(1911)	(1911)	(1930)	(1981)	(1990)	(1980)	(1932)	(1932)	(1929)

05076000 THIEF RIVER NEAR THIEF RIVER FALLS, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1909 - 2003	
ANNUAL TOTAL	165,552.71		22,256.95			
ANNUAL MEAN	454		61.0		a186	
HIGHEST ANNUAL MEAN					791 1999	
LOWEST ANNUAL MEAN					1.28 1939	
HIGHEST DAILY MEAN	3,350	Jun 10	895	Apr 30	5,580	May 13, 1950
LOWEST DAILY MEAN	0.10	Mar 8	0.04	Sep 9	b0.00	Oct 1, 1910
ANNUAL SEVEN-DAY MINIMUM	0.35	Mar 5	0.08	Sep 6	0.00	Oct 1, 1910
MAXIMUM PEAK FLOW			c908	Apr 29	5,610	May 13, 1950
MAXIMUM PEAK STAGE			d8.32	Mar 18	17.38	May 13, 1950
INSTANTANEOUS LOW FLOW			e0.03	Sep 9	b0.00	Oct 1, 1910
ANNUAL RUNOFF (AC-FT)	328,400		44,150		134,700	
ANNUAL RUNOFF (CFSM)	0.46		0.062		0.19	
ANNUAL RUNOFF (INCHES)	6.25		0.84		2.56	
10 PERCENT EXCEEDS	1,980		140		576	
50 PERCENT EXCEEDS	55		16		10	
90 PERCENT EXCEEDS	1.4		0.39		0.00	

- a Median of annual mean discharges is 140 ft³/s.
- b Many days, several years.
- c Gage height, 7.95 ft.
- d Backwater from ice.
- e Estimated.



05078000 CLEARWATER RIVER AT PLUMMER, MN

LOCATION.--Lat 47°55'24", long 96°02'46", in SE¹/₄SW¹/₄ sec. 4, T.151 N., R.42 W., Red Lake County, Hydrologic Unit 09020305, on right bank 200 ft downstream from Soo Line Railroad bridge, 300 ft downstream from bridge on U.S. Highway 59, 0.9 mi northwest of railroad depot in Plummer, and 8 mi upstream from Hill River.

DRAINAGE AREA.--555 mi².

PERIOD OF RECORD.--April 1939 to September 1979, March 1982 to current year. Annual maximums only, October 1979 to February 1982.

GAGE.--Water-stage recorder. Datum of gage is 1,098.57 ft above sea level (NGVD of 1929, levels by U.S. Army Corps of Engineers). Prior to Nov. 10, 1939, nonrecording gage at site 100 ft upstream at same datum.

REMARKS.--Records good except those for estimated daily discharges, which are poor. Since 1968, undetermined amounts of water diverted for the flooding of wild rice paddies upstream.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 630 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jun 27	0700	*616	*5.60	No peak greater than base discharge.			

Minimum discharge, 11 ft³/s, Apr. 3, gage height, 2.10 ft (result of ice jam upstream).

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	49	e45	e40	e41	e39	e36	e57	45	176	343	110	42
2	45	e46	e40	e41	e39	e36	e48	47	163	312	108	39
3	46	e47	e39	e41	e38	e35	e41	48	161	288	109	36
4	45	e48	e38	e40	e38	e35	e56	46	176	317	110	38
5	45	47	e38	e41	e38	e35	e72	47	143	287	117	30
6	54	46	e38	e41	e38	e35	e84	48	123	260	133	28
7	59	e45	e39	e42	e38	e35	e78	42	125	244	115	33
8	53	e46	e40	e42	e38	e35	e72	45	132	222	110	32
9	45	e45	e42	e42	e38	e35	e66	44	124	192	116	33
10	43	e44	e44	e42	e38	e35	58	46	145	181	95	38
11	41	e43	e45	e42	e38	e35	48	56	222	177	79	47
12	58	e42	e46	e41	e37	e35	42	55	238	173	76	39
13	54	e41	e47	e41	e37	e36	37	63	249	191	70	36
14	48	e39	e48	e40	e37	e38	49	61	228	204	59	36
15	44	e38	e47	e40	e37	e45	59	58	198	228	53	40
16	48	e37	e47	e40	e37	e84	44	37	178	231	47	39
17	41	e38	e46	e40	e37	e128	60	57	176	215	45	37
18	41	e39	e45	e40	e37	e155	58	56	164	197	43	40
19	45	e44	e44	e40	e37	e162	40	61	165	183	42	54
20	51	e47	e43	e40	e37	e160	60	110	158	179	39	63
21	49	e48	e42	e40	e37	e126	61	143	125	161	39	38
22	52	e48	e42	e40	e36	e112	52	133	115	145	44	41
23	45	e47	e41	e40	e36	e99	53	141	208	154	45	52
24	44	e46	e40	e40	e36	e96	45	161	182	140	54	45
25	37	e42	e40	e40	e36	e92	44	151	223	133	61	32
26	55	e37	e41	e39	e36	e83	46	139	546	142	58	45
27	89	e34	e41	e39	e36	e77	40	129	605	133	56	42
28	71	e35	e42	e39	e36	e70	35	124	541	106	56	39
29	56	e39	e42	e39	---	e64	40	120	472	103	53	39
30	48	e41	e42	e39	---	e60	40	119	401	106	53	36
31	e47	---	e42	e39	---	e64	---	145	---	109	46	---
TOTAL	1,548	1,284	1,311	1,251	1,042	2,173	1,585	2,577	6,862	6,056	2,241	1,189
MEAN	49.9	42.8	42.3	40.4	37.2	70.1	52.8	83.1	229	195	72.3	39.6
MAX	89	48	48	42	39	162	84	161	605	343	133	63
MIN	37	34	38	39	36	35	35	37	115	103	39	28
AC-FT	3,070	2,550	2,600	2,480	2,070	4,310	3,140	5,110	13,610	12,010	4,450	2,360
CFSM	0.09	0.08	0.08	0.07	0.07	0.13	0.10	0.15	0.41	0.35	0.13	0.07
IN.	0.10	0.09	0.09	0.08	0.07	0.15	0.11	0.17	0.46	0.41	0.15	0.08

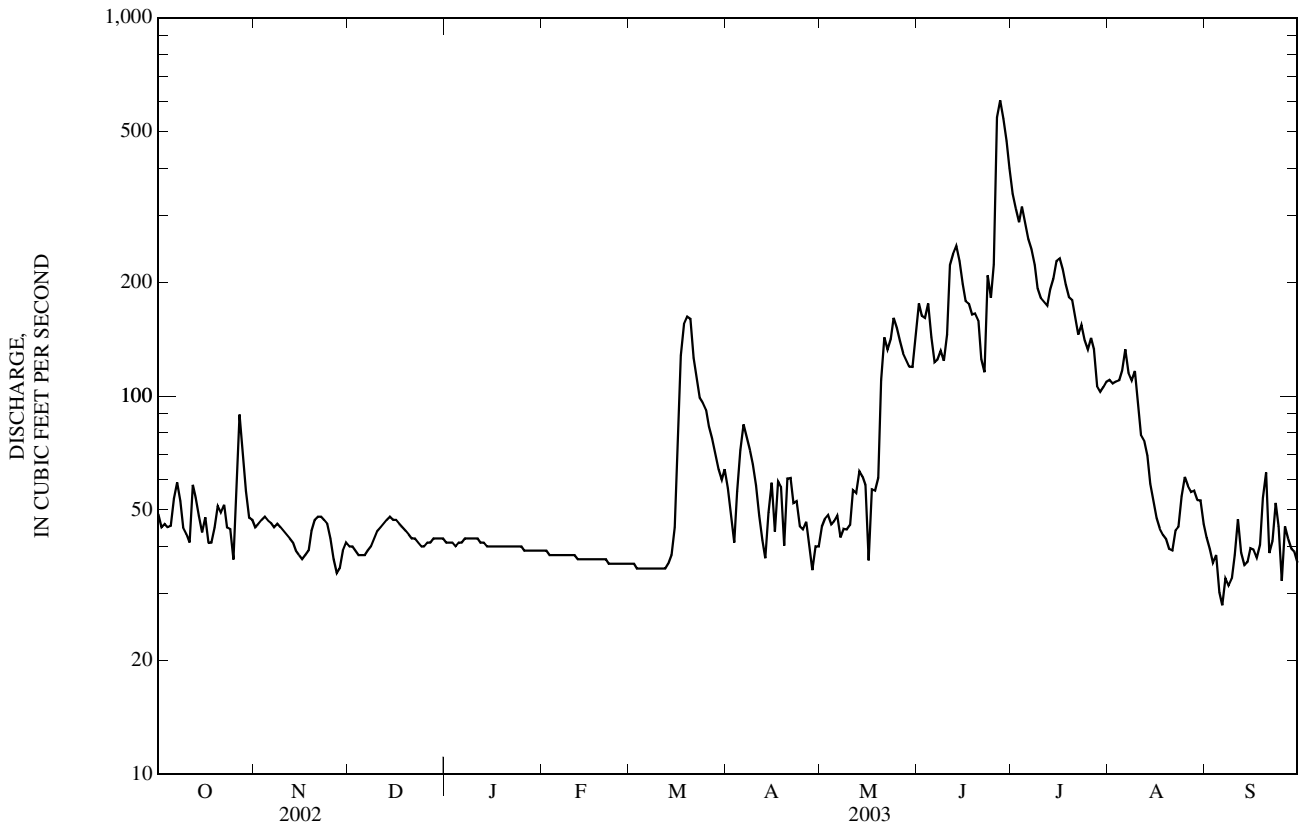
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1939 - 2003, BY WATER YEAR (WY)

MEAN	116	99.2	67.5	54.4	52.3	118	533	359	264	231	127	114
MAX	483	617	211	125	184	445	1,472	1,974	1,140	1,072	507	666
(WY)	(1972)	(2001)	(2001)	(2001)	(1998)	(1995)	(1997)	(1950)	(1962)	(1997)	(1985)	(1973)
MIN	21.5	23.8	24.4	18.4	19.0	22.8	26.8	7.52	30.1	16.0	13.3	14.1
(WY)	(1941)	(1991)	(1990)	(1940)	(1940)	(1940)	(1977)	(1977)	(1991)	(1940)	(1940)	(1940)

05078000 CLEARWATER RIVER AT PLUMMER, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1939 - 2003	
ANNUAL TOTAL	68,744		29,119			
ANNUAL MEAN	188		79.8		a179	
HIGHEST ANNUAL MEAN					354 1950	
LOWEST ANNUAL MEAN					57.0 1990	
HIGHEST DAILY MEAN	1,370	Jun 23	605	Jun 27	3,840	Apr 25, 1979
LOWEST DAILY MEAN	34	Nov 27	28	Sep 6	2.6	May 16, 1977
ANNUAL SEVEN-DAY MINIMUM	38	Nov 26	33	Sep 3	2.9	May 10, 1977
MAXIMUM PEAK FLOW			616	Jun 27	b3,940	Apr 25, 1979
MAXIMUM PEAK STAGE			5.60	Jun 27	c12.74	Apr 16, 1997
INSTANTANEOUS LOW FLOW			d11	Apr 3	2.5	May 16, 1977
ANNUAL RUNOFF (AC-FT)	136,400		57,760		129,600	
ANNUAL RUNOFF (CFSM)	0.34		0.14		0.32	
ANNUAL RUNOFF (INCHES)	4.61		1.95		4.38	
10 PERCENT EXCEEDS	468		174		413	
50 PERCENT EXCEEDS	77		46		79	
90 PERCENT EXCEEDS	42		37		34	

- a Median of annual mean discharges is 180 ft³/s.
- b Gage-height, 12.31 ft.
- c Backwater from ice.
- d Result of ice jam upstream.
- e Estimated.



05078230 LOST RIVER AT OKLEE, MN

LOCATION.--Lat 47°50'35", long 95°51'30", in SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 2, T.150 N., R.41 W., Red Lake County, Hydrologic Unit 09020305, on left bank 30 ft upstream of bridge on State Highway 222 at northwest edge of Oklee, 12 mi upstream from mouth.

DRAINAGE AREA.--254 mi².

PERIOD OF RECORD.--April 1960 to September 1981, February 1982 to current year. Monthly and daily figures for April 1960 to June 1960, published in WSP 2113.

GAGE.--Water-stage recorder. Datum of gage is 1,126.94 ft above sea level, adjustment of 1912 (levels by U.S. Army Corps of Engineers). Prior to Sept. 9, 1960, reference points at same site at datum 8.00 ft higher. Sept. 9, 1960 to Sept. 30, 1964, nonrecording gage at same site at datum 8.00 ft higher. Oct. 1, 1964 to Sept. 30, 1981, and Feb. 24, 1982 to Sept. 6, 1989, nonrecording gage at same site and datum.

REMARKS.--Records fair except those for estimated daily discharges, which are poor.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage known since at least 1897, 18.39 ft, present datum, Apr. 21, 1950, from floodmarks, discharge, 2,790 ft³/s.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	30	e31	e7.3	e5.2	e4.7	e4.5	e36	21	30	144	6.2	2.3
2	26	e30	e7.1	e5.2	e4.7	e4.5	e30	20	28	120	5.8	2.1
3	22	e29	e6.7	e5.1	e4.6	e4.5	e25	20	23	121	5.5	2.0
4	25	e27	e6.6	e5.1	e4.6	e4.5	e15	21	24	113	5.4	1.2
5	28	e27	e6.4	e5.1	e4.6	e4.5	e25	24	22	109	5.2	1.5
6	29	e26	e6.3	e5.1	e4.6	e4.5	e46	24	23	104	4.8	1.5
7	30	e25	e6.2	e5.0	e4.6	e4.5	e43	25	23	100	4.4	1.7
8	30	e26	e6.0	e5.0	e4.6	e4.5	e41	26	24	96	4.3	1.8
9	31	e25	e5.9	e5.0	e4.6	e4.5	e49	31	22	92	4.0	1.6
10	38	e23	e5.9	e5.0	e4.6	e4.5	e52	63	77	86	3.4	1.9
11	37	e21	e5.8	e5.0	e4.6	e4.5	e45	77	129	82	3.1	2.1
12	34	e21	e5.8	e4.9	e4.6	e4.6	37	72	110	78	3.0	2.3
13	30	e17	e6.0	e4.9	e4.6	e4.7	33	65	96	75	2.8	2.3
14	28	e15	e6.3	e4.9	e4.6	e5.4	36	57	80	72	2.5	2.1
15	31	e14	e6.4	e4.9	e4.6	e8.2	30	59	64	70	2.3	2.1
16	35	e11	e6.0	e4.9	e4.6	e65	23	51	59	66	2.0	2.2
17	33	e9.9	e5.7	e4.9	e4.6	e120	16	45	66	64	1.8	2.4
18	34	e9.4	e5.6	e4.9	e4.6	e170	17	47	61	63	1.8	2.8
19	37	e9.7	e5.4	e4.9	e4.6	e215	21	97	49	57	1.6	3.0
20	38	e10	e5.4	e4.9	e4.6	e180	38	109	39	50	1.8	3.0
21	36	e11	e5.4	e4.9	e4.6	e155	44	100	32	40	1.8	3.0
22	36	e12	e5.4	e4.9	e4.6	e135	42	96	38	27	2.0	3.1
23	35	e12	e5.3	e4.8	e4.6	e120	38	87	96	20	2.6	3.2
24	33	e11	e5.3	e4.8	e4.6	e108	37	75	114	17	2.8	3.1
25	30	e11	e5.3	e4.8	e4.6	e82	33	65	914	13	2.7	3.0
26	34	e9.8	e5.3	e4.8	e4.6	e64	35	54	1,000	11	2.6	2.9
27	34	e8.7	e5.2	e4.8	e4.5	e55	35	46	561	11	2.1	2.9
28	36	e8.3	e5.2	e4.8	e4.5	e49	32	44	330	9.8	2.2	2.9
29	39	e8.2	e5.2	e4.8	---	e43	28	40	250	9.0	2.1	2.9
30	e40	e7.8	e5.2	e4.7	---	e39	24	34	193	7.7	2.3	2.9
31	e34	---	e5.2	e4.7	---	e42	---	33	---	6.8	2.2	---
TOTAL	1,013	506.8	180.8	152.7	128.8	1,714.4	1,006	1,628	4,577	1,934.3	97.1	71.8
MEAN	32.7	16.9	5.83	4.93	4.60	55.3	33.5	52.5	153	62.4	3.13	2.39
MAX	40	31	7.3	5.2	4.7	215	52	109	1,000	144	6.2	3.2
MIN	22	7.8	5.2	4.7	4.5	4.5	15	20	22	6.8	1.6	1.2
AC-FT	2,010	1,010	359	303	255	3,400	2,000	3,230	9,080	3,840	193	142
CFSM	0.13	0.07	0.02	0.02	0.02	0.22	0.13	0.21	0.60	0.25	0.01	0.01
IN.	0.15	0.07	0.03	0.02	0.02	0.25	0.15	0.24	0.67	0.28	0.01	0.01

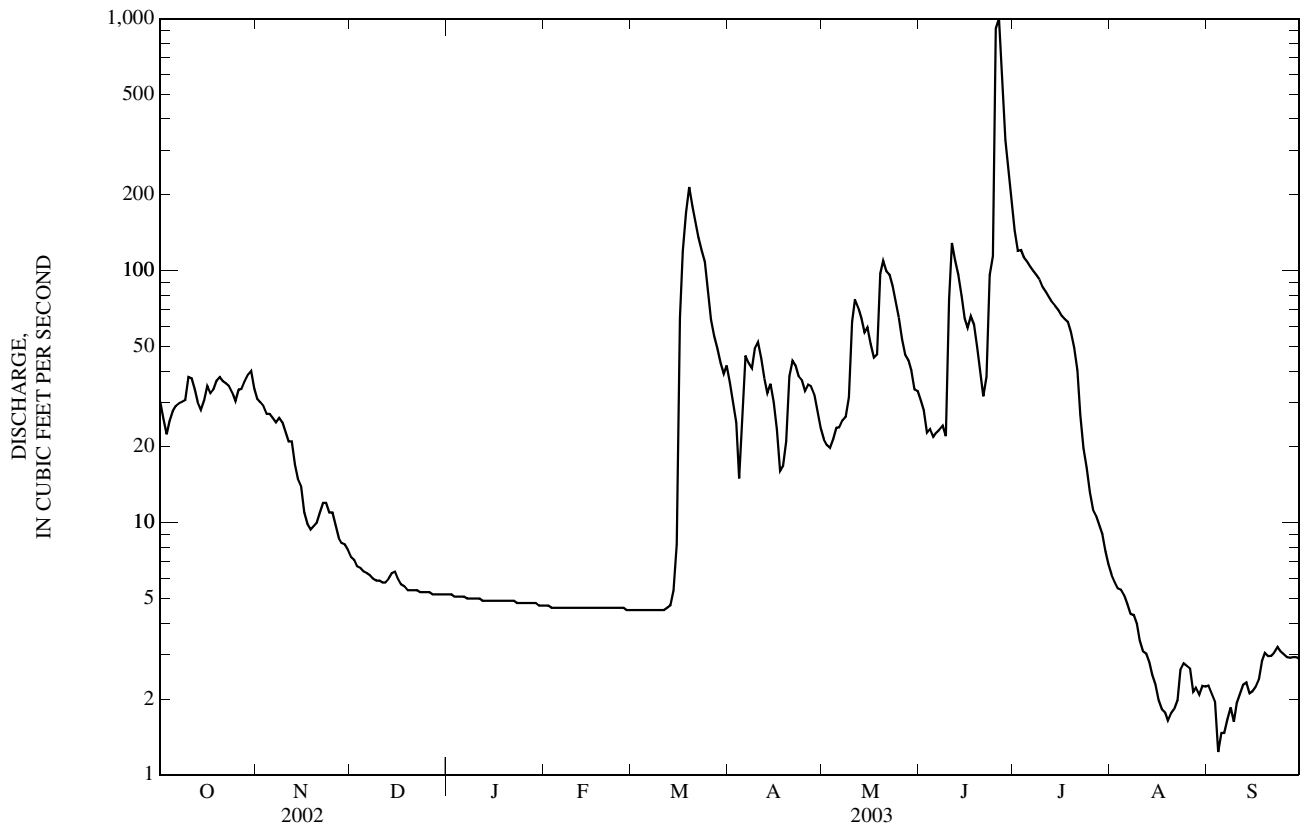
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1960 - 2003, BY WATER YEAR (WY)

MEAN	48.3	36.2	16.1	10.0	10.7	75.6	301	138	97.2	84.0	39.1	41.0
MAX	470	232	56.6	26.7	76.3	264	904	622	657	442	351	330
(WY)	(1972)	(1972)	(1978)	(1998)	(1998)	(1999)	(1996)	(1962)	(1962)	(1962)	(1985)	(1973)
MIN	1.02	1.11	0.050	0.002	0.000	0.19	29.5	10.5	8.20	1.99	1.17	0.000
(WY)	(1991)	(1977)	(1977)	(1977)	(1977)	(1964)	(1991)	(1980)	(1980)	(1961)	(1961)	(1990)

05078230 LOST RIVER AT OKLEE, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1960 - 2003	
ANNUAL TOTAL	22,805.6		13,010.7		74.8	
ANNUAL MEAN	62.5		35.6		18.2	
HIGHEST ANNUAL MEAN					177	1962
LOWEST ANNUAL MEAN					18.2	1990
HIGHEST DAILY MEAN	818	Jun 24	1,000	Jun 26	3,040	Apr 11, 1969
LOWEST DAILY MEAN	5.2	Dec 27	1.2	Sep 4	a0.00	Feb 16, 1963
ANNUAL SEVEN-DAY MINIMUM	5.2	Dec 25	1.6	Sep 4	0.00	Feb 16, 1963
MAXIMUM PEAK FLOW			1,240	Jun 25	b3,210	Apr 11, 1969
MAXIMUM PEAK STAGE			11.98	Jun 25	c16.91	Apr 8, 1997
INSTANTANEOUS LOW FLOW			0.88	Sep 5	a0.00	Feb 16, 1963
ANNUAL RUNOFF (AC-FT)	45,230		25,810		54,170	
ANNUAL RUNOFF (CFSM)	0.25		0.14		0.29	
ANNUAL RUNOFF (INCHES)	3.34		1.91		4.00	
10 PERCENT EXCEEDS	127		81		165	
50 PERCENT EXCEEDS	28		11		20	
90 PERCENT EXCEEDS	9.6		2.8		2.7	

- a Many days, several years.
- b Gage-height, 14.91 ft, from floodmark.
- c Backwater from ice.
- e Estimated.



05078470 JUDICIAL DITCH 64 NEAR MENTOR, MN—Continued

SUMMARY STATISTICS

FOR 2003 WATER YEAR

WATER YEARS 2002 - 2003

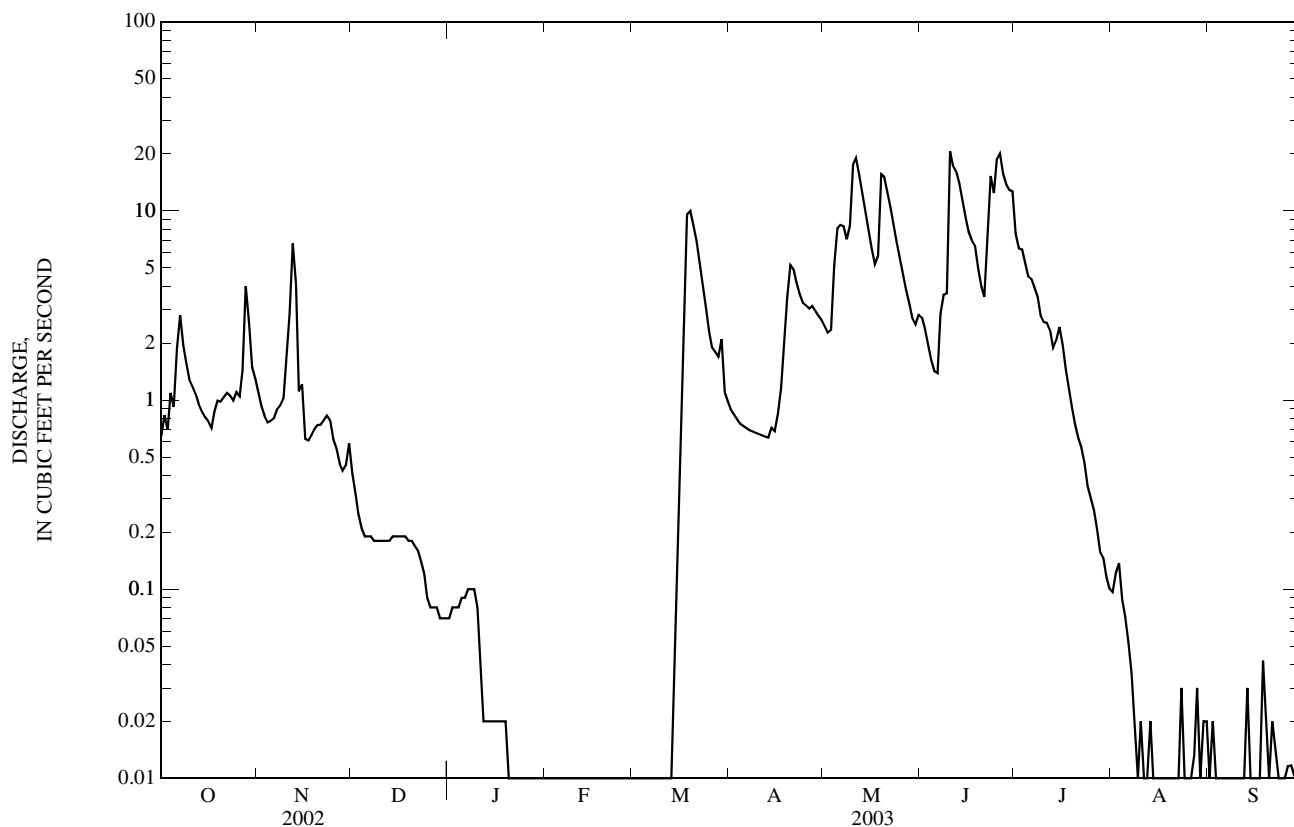
ANNUAL TOTAL	791.74	
ANNUAL MEAN	2.17	2.17
HIGHEST ANNUAL MEAN		2.17 2003
LOWEST ANNUAL MEAN		2.17 2003
HIGHEST DAILY MEAN	21 Jun 10	21 Jun 10, 2003
LOWEST DAILY MEAN	a0.00 Jan 23	a0.00 Jan 23, 2003
ANNUAL SEVEN-DAY MINIMUM	0.00 Jan 23	0.00 Jan 23, 2003
MAXIMUM PEAK FLOW	b30 Jun 10	b30 Jun 10, 2003
MAXIMUM PEAK STAGE	c2.64 Mar 18	c2.64 Mar 18, 2003
INSTANTANEOUS LOW FLOW	a0.00 Jan 23	a0.00 Jan 23, 2003
ANNUAL RUNOFF (AC-FT)	1,570	1,570
10 PERCENT EXCEEDS	7.0	7.0
50 PERCENT EXCEEDS	0.61	0.61
90 PERCENT EXCEEDS	0.00	0.00

a Many days.

b Gage height, 2.63 ft, from floodmark.

c Backwater from ice.

e Estimated.



05078500 CLEARWATER RIVER AT RED LAKE FALLS, MN

LOCATION.--Lat 47°53'15", long 96°16'25", in NW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 22, T.151 N., R.44 W., Red Lake County, Hydrologic Unit 09020305, on left bank 900 ft downstream from U.S. highway 59 bridge in Red Lake Falls, 1.4 mi upstream from mouth, and 3 mi downstream from Badger Creek.

DRAINAGE AREA.--1,380 mi².

PERIOD OF RECORD.--June 1909 to September 1917, October 1934 to September 1981, March 1982 to current year. Monthly-mean discharge only for October, November, 1934, published in WSP 1308.

REVISED RECORDS.--WSP 355: 1911-12. WSP 1438: 1910-11, 1917(M). WDR MN-84-1:1983.

GAGE.--Water-stage recorder. Datum of gage is 948.94 ft above sea level (NGVD of 1929, levels by U.S. Army Corps of Engineers). Prior to Sept. 12, 1911, nonrecording gage at site 0.5 mi upstream, and Sept. 12, 1911 to Sept. 30, 1917, nonrecording gage at site 40 ft upstream at different datum.

REMARKS.--Records good except those for estimated daily discharges, which are poor.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	153	e112	e78	e74	e64	e59	e240	144	271	892	152	63
2	155	e142	e79	e73	e64	e59	e219	144	290	760	152	61
3	153	e138	e77	e72	e64	e59	150	146	262	661	149	54
4	152	e138	e75	e71	e64	e59	100	164	267	615	148	50
5	148	e137	e74	e71	e63	e58	160	169	262	573	150	48
6	148	e136	e73	e70	e63	e58	173	177	236	530	156	44
7	157	e133	e73	e70	e63	e58	199	179	233	478	164	35
8	158	e128	e74	e70	e63	e57	178	167	255	432	144	36
9	151	e125	e76	e70	e63	e57	199	171	269	397	144	39
10	140	e121	e78	e70	e63	e57	212	229	391	366	141	40
11	145	e112	e79	e69	e63	e58	196	319	691	347	125	47
12	144	e90	e81	e69	e63	e58	168	357	730	333	111	56
13	155	e73	e82	e69	e62	e59	149	337	689	328	108	61
14	148	e69	e83	e68	e62	e64	138	297	606	337	101	54
15	142	e68	e82	e68	e62	e85	147	266	496	347	89	54
16	142	e67	e82	e68	e62	e230	153	241	419	362	82	53
17	140	e72	e81	e68	e62	e430	152	205	374	340	76	57
18	134	e78	e80	e68	e62	e490	163	225	354	322	69	58
19	130	e83	e79	e68	e62	e550	169	278	327	294	65	55
20	132	e86	e77	e67	e62	e540	189	417	292	281	63	65
21	142	e88	e76	e67	e62	e520	246	490	264	267	58	86
22	139	e88	e74	e67	e61	e470	240	459	372	243	56	67
23	139	e86	e73	e66	e61	e410	216	413	801	225	68	58
24	130	e82	e72	e66	e61	e370	201	401	699	226	70	76
25	126	e78	e71	e66	e60	e350	177	372	1,090	206	72	73
26	124	e72	e72	e66	e60	e320	169	334	2,390	198	81	59
27	139	e66	e72	e66	e60	e295	174	300	2,420	207	77	68
28	175	e67	e73	e65	e60	e275	164	286	1,750	179	76	67
29	170	e71	e74	e65	---	e260	150	269	1,300	153	74	61
30	157	e76	e74	e65	---	e245	149	256	1,080	154	70	59
31	e108	---	e75	e65	---	e230	---	249	---	153	70	---
TOTAL	4,476	2,882	2,369	2,117	1,741	6,890	5,340	8,461	19,880	11,206	3,161	1,704
MEAN	144	96.1	76.4	68.3	62.2	222	178	273	663	361	102	56.8
MAX	175	142	83	74	64	550	246	490	2,420	892	164	86
MIN	108	66	71	65	60	57	100	144	233	153	56	35
AC-FT	8,880	5,720	4,700	4,200	3,450	13,670	10,590	16,780	39,430	22,230	6,270	3,380
CFSM	0.10	0.07	0.06	0.05	0.05	0.16	0.13	0.20	0.48	0.26	0.07	0.04
IN.	0.12	0.08	0.06	0.06	0.05	0.19	0.14	0.23	0.54	0.30	0.09	0.05

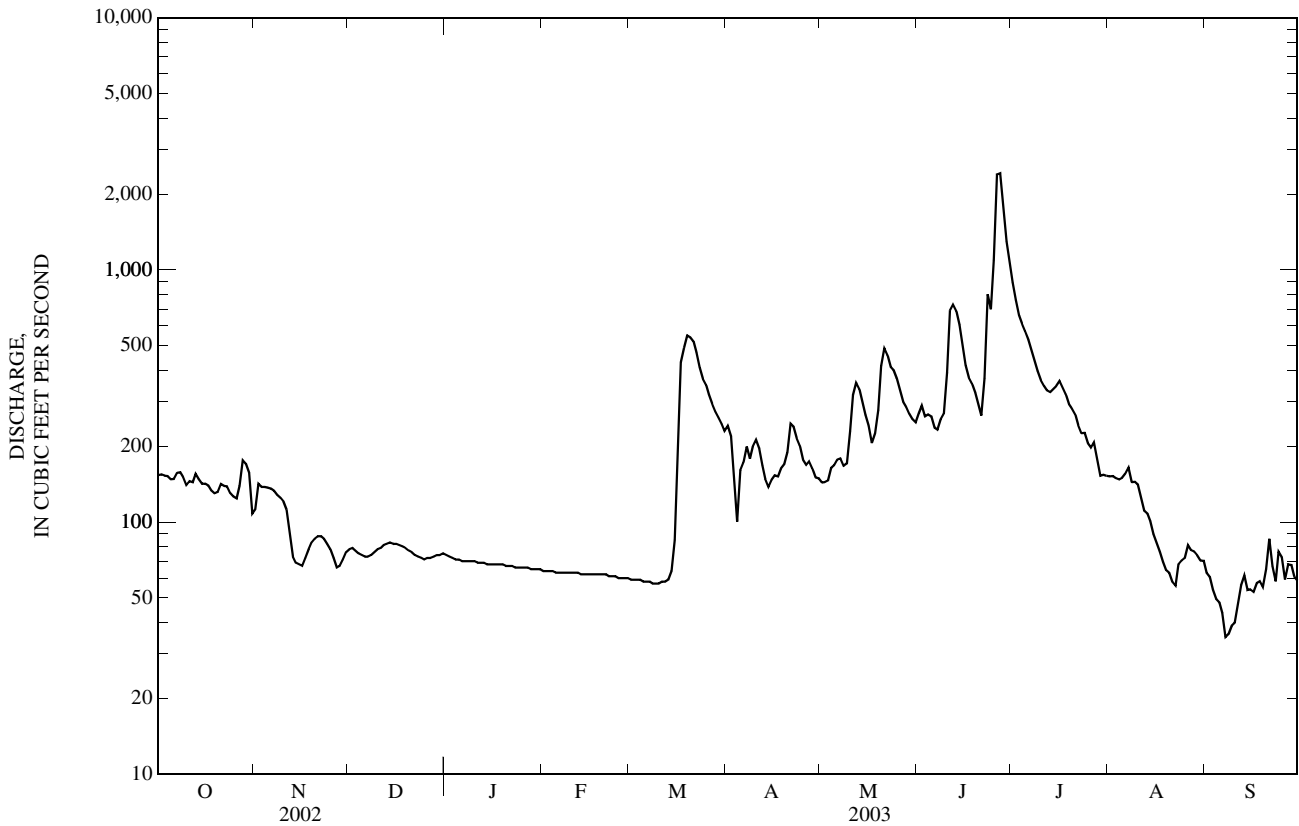
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 2003, BY WATER YEAR (WY)

MEAN	192	156	96.8	77.1	74.0	248	1,171	696	512	413	216	201
MAX	1,350	1,233	321	221	385	1,136	3,507	5,059	3,042	2,389	1,686	1,599
(WY)	(1972)	(1972)	(2001)	(1998)	(1998)	(1995)	(1997)	(1950)	(1962)	(1997)	(1985)	(1999)
MIN	10.0	19.0	21.4	21.4	19.1	13.6	61.0	32.2	26.5	8.34	1.49	2.92
(WY)	(1935)	(1935)	(1937)	(1940)	(1937)	(1937)	(1981)	(1977)	(1980)	(1936)	(1936)	(1936)

05078500 CLEARWATER RIVER AT RED LAKE FALLS, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1909 - 2003	
ANNUAL TOTAL	165,249		70,227		a335	
ANNUAL MEAN	453		192		855	
HIGHEST ANNUAL MEAN					1950	
LOWEST ANNUAL MEAN					1939	
HIGHEST DAILY MEAN	5,510	Sep 1	2,420	Jun 27	9,930	Apr 25, 1979
LOWEST DAILY MEAN	66	Nov 27	35	Sep 7	0.10	Sep 15, 1936
ANNUAL SEVEN-DAY MINIMUM	72	Dec 22	41	Sep 5	0.24	Sep 12, 1936
MAXIMUM PEAK FLOW			2,640	Jun 26	b10,300	Apr 25, 1979
MAXIMUM PEAK STAGE			6.67	Jun 26	c15.85	Mar 6, 1983
INSTANTANEOUS LOW FLOW			30	Sep 7	d0.00	Sep 15, 1936
ANNUAL RUNOFF (AC-FT)	327,800		139,300		242,800	
ANNUAL RUNOFF (CFSM)	0.33		0.14		0.24	
ANNUAL RUNOFF (INCHES)	4.45		1.89		3.30	
10 PERCENT EXCEEDS	1,300		381		795	
50 PERCENT EXCEEDS	164		126		119	
90 PERCENT EXCEEDS	80		60		38	

- a Median of annual mean discharges is 290 ft³/s.
- b Gage-height, 12.38 ft.
- c From highwater mark, backwater from ice.
- d Also occurred Sep. 14, 1939, and Aug. 19-22, 1940.
- e Estimated.



05078520 CYR CREEK NEAR MARCOUX CORNERS, MN—Continued

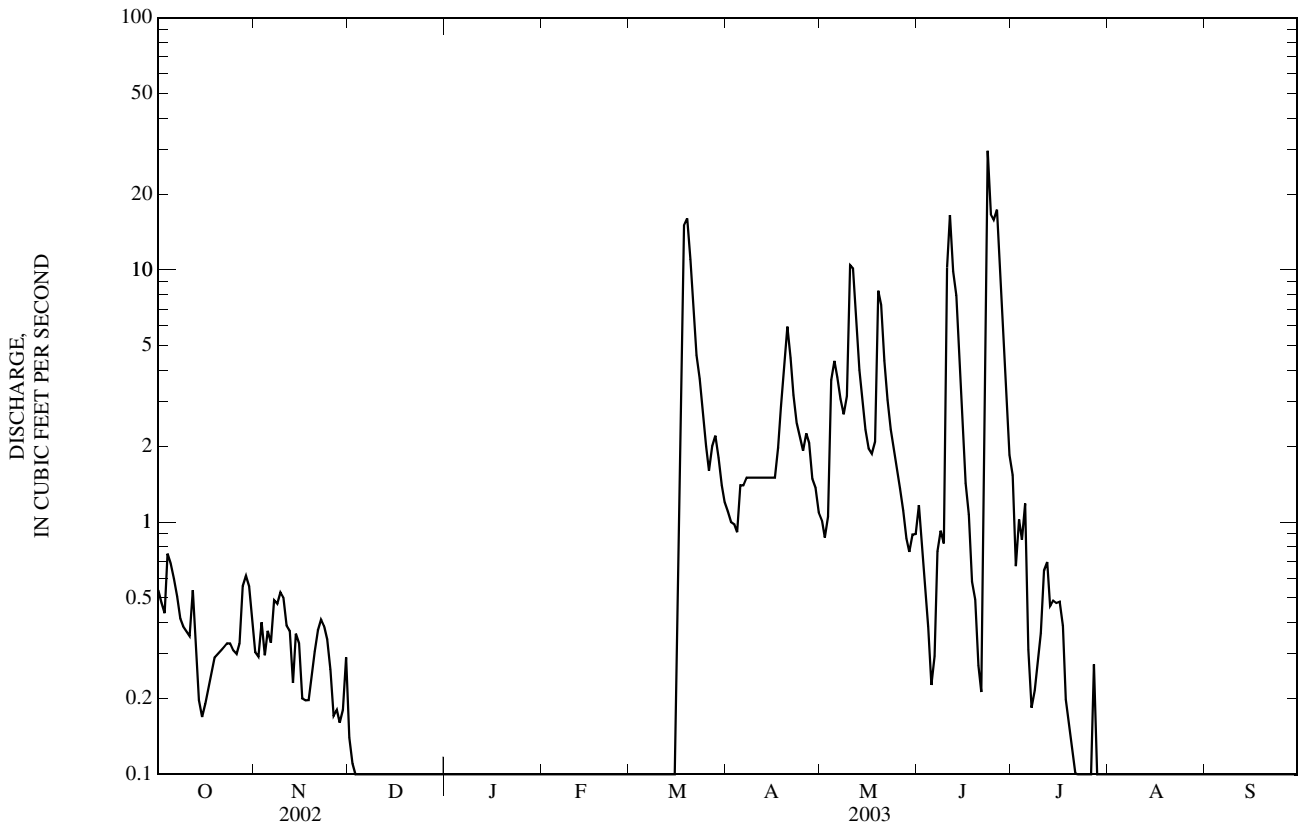
SUMMARY STATISTICS

FOR 2003 WATER YEAR

WATER YEARS 2002 - 2003

ANNUAL TOTAL	438.05	
ANNUAL MEAN	1.20	1.20
HIGHEST ANNUAL MEAN		1.20 2003
LOWEST ANNUAL MEAN		1.20 2003
HIGHEST DAILY MEAN	30 Jun 23	30 Jun 23, 2003
LOWEST DAILY MEAN	a0.00 Jan 23	a0.00 Jan 23, 2003
ANNUAL SEVEN-DAY MINIMUM	0.00 Jan 23	0.00 Jan 23, 2003
MAXIMUM PEAK FLOW	35 Jun 23	35 Jun 23, 2003
MAXIMUM PEAK STAGE	3.07 Jun 23	3.07 Jun 23, 2003
INSTANTANEOUS LOW FLOW	a0.00 Jan 23	a0.00 Jan 23, 2003
ANNUAL RUNOFF (AC-FT)	869	869
ANNUAL RUNOFF (CFSM)	0.000	0.000
ANNUAL RUNOFF (INCHES)	0.00	0.00
10 PERCENT EXCEEDS	3.0	3.0
50 PERCENT EXCEEDS	0.18	0.18
90 PERCENT EXCEEDS	0.00	0.00

a Many days
e Estimated.



05078730 COUNTY DITCH 140 NEAR BENOIT, MN—Continued

SUMMARY STATISTICS

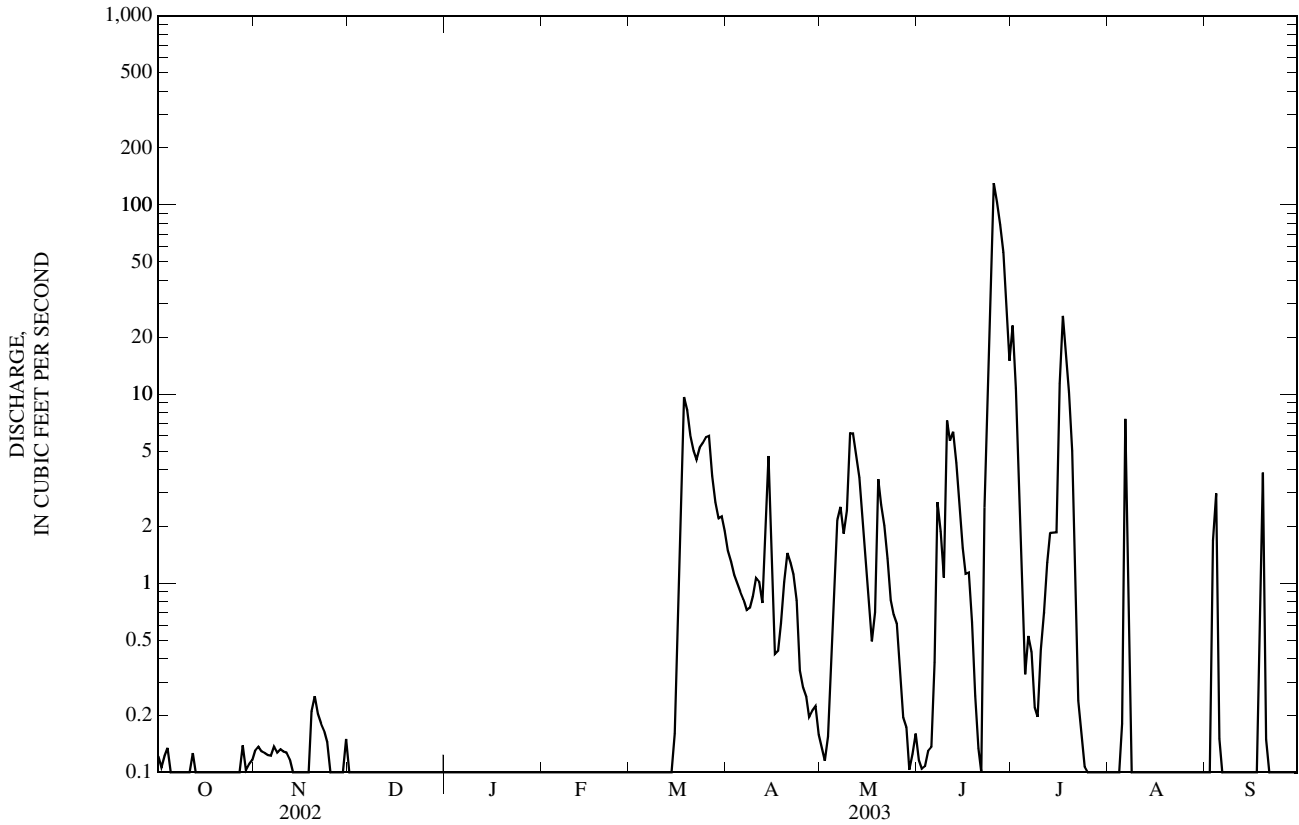
FOR 2003 WATER YEAR

WATER YEARS 2002 - 2003

ANNUAL TOTAL	795.31	
ANNUAL MEAN	2.18	2.18
HIGHEST ANNUAL MEAN		2.18 2003
LOWEST ANNUAL MEAN		2.18 2003
HIGHEST DAILY MEAN	131 Jun 25	131 Jun 25, 2003
LOWEST DAILY MEAN	a0.00 Dec 26	a0.00 Dec 26, 2002
ANNUAL SEVEN-DAY MINIMUM	0.00 Dec 26	0.00 Dec 26, 2002
MAXIMUM PEAK FLOW	140 Jun 25	140 Jun 25, 2003
MAXIMUM PEAK STAGE	4.85 Jun 25	4.85 Jun 25, 2003
INSTANTANEOUS LOW FLOW	a0.00 Dec 26	a0.00 Dec 26, 2002
ANNUAL RUNOFF (AC-FT)	1,580	1,580
ANNUAL RUNOFF (CFSM)	0.000	0.000
ANNUAL RUNOFF (INCHES)	0.00	0.00
10 PERCENT EXCEEDS	3.5	3.5
50 PERCENT EXCEEDS	0.08	0.08
90 PERCENT EXCEEDS	0.00	0.00

a Many days.

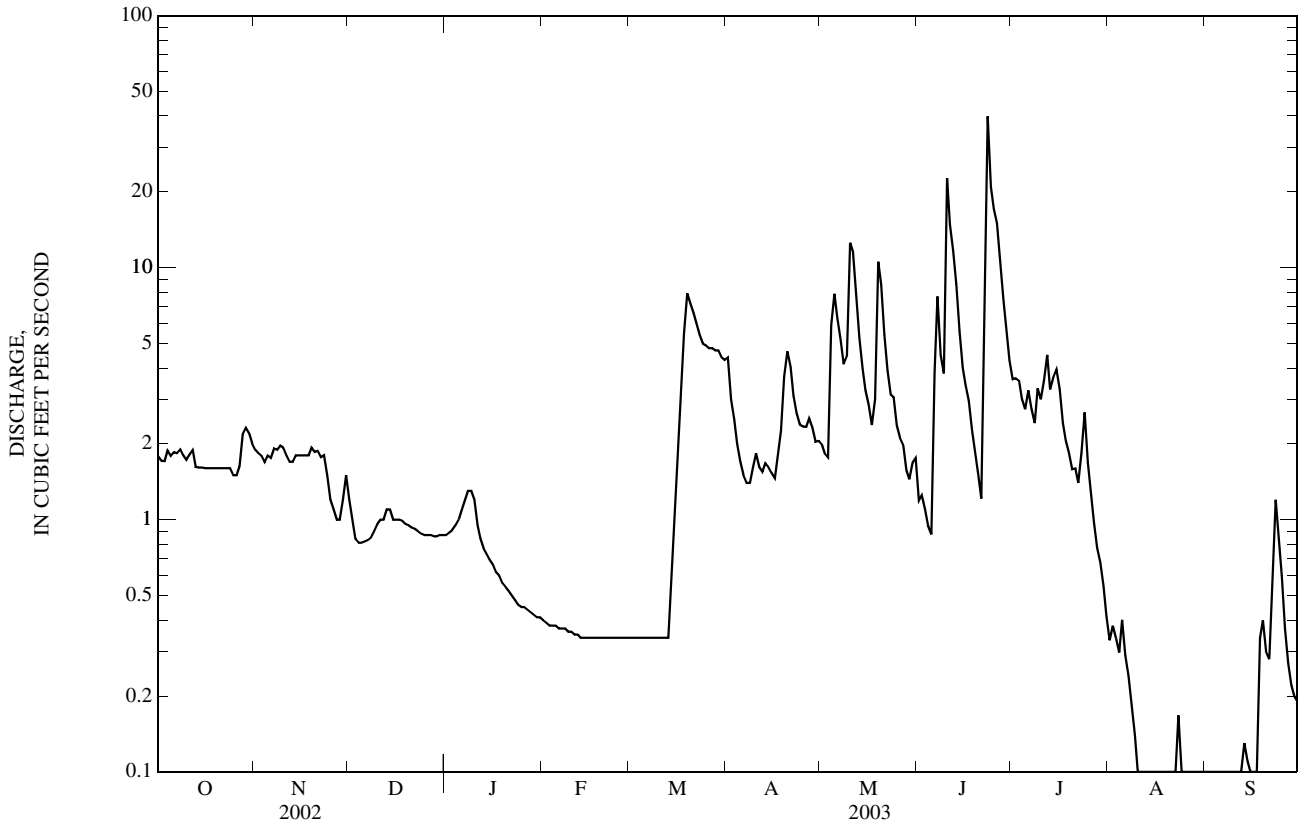
e Estimated.



05078770 JUDICIAL DITCH 66 NEAR MARCOUX CORNERS, MN—Continued

SUMMARY STATISTICS	FOR 2003 WATER YEAR		WATER YEARS 2000 - 2003	
ANNUAL TOTAL	790.33			
ANNUAL MEAN	2.17		2.17	
HIGHEST ANNUAL MEAN			2.17	2003
LOWEST ANNUAL MEAN			2.17	2003
HIGHEST DAILY MEAN	40	Jun 23	40	Jun 23, 2003
LOWEST DAILY MEAN	0.02	Sep 5	0.02	Sep 5, 2003
ANNUAL SEVEN-DAY MINIMUM	0.04	Aug 30	0.04	Aug 30, 2003
MAXIMUM PEAK FLOW	63	Jun 22	63	Jun 22, 2003
MAXIMUM PEAK STAGE	5.96	Jun 22	5.96	Jun 22, 2003
INSTANTANEOUS LOW FLOW	0.00	Sep 3	0.00	Sep 3, 2003
ANNUAL RUNOFF (AC-FT)	1,570		1,570	
ANNUAL RUNOFF (CFSM)	0.000		0.000	
ANNUAL RUNOFF (INCHES)	0.00		0.00	
10 PERCENT EXCEEDS	4.7		4.7	
50 PERCENT EXCEEDS	1.3		1.3	
90 PERCENT EXCEEDS	0.11		0.11	

e Estimated.



05079000 RED LAKE RIVER AT CROOKSTON, MN

LOCATION.--Lat 47°46'32", long 96°36'33", in SW¹/₄SW¹/₄ sec. 30, T.150 N., R.46 W., Polk County, Hydrologic Unit 09020303, on right bank 100 ft upstream from Sargent Street bridge in Crookston, 0.3 mi downstream from Interstate Power Co.'s dam, 0.6 mi downstream from bridge on U.S. Highway 75, and 53 mi upstream from mouth.

DRAINAGE AREA.--5,270 mi².

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.

REVISED RECORDS.--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).

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

REMARKS.--Records good except those for estimated daily discharges, which are poor. Diurnal fluctuation prior to 1975 caused by power plant 1,000 ft upstream. Runoff from 1,950 mi² in the headwaters of Red Lake River is completely controlled by dam at outlet of Lower Red Lake. Flow partially affected by occasional regulation at Thief and Mud Lakes in Thief River basin (see station 05076000).

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1,210	1,100	e570	e360	e234	e222	948	1,290	463	1,730	326	165
2	1,220	1,080	e550	e350	e234	e222	1,010	1,270	468	1,320	298	171
3	1,220	1,180	e517	e340	e234	e221	918	1,240	487	1,130	312	195
4	1,220	1,180	e480	e330	e234	e221	604	896	491	979	303	133
5	1,210	1,240	e491	e320	e234	e220	545	662	483	872	295	119
6	1,200	1,260	e552	e310	e234	e220	592	631	482	802	292	131
7	1,180	1,250	e580	e295	e233	e220	545	623	512	740	291	134
8	1,260	1,240	e580	e285	e233	e220	556	595	561	669	301	89
9	1,130	e1,200	e580	e275	e232	e220	625	563	573	625	285	93
10	1,160	1,160	e578	e270	e230	e220	618	598	625	580	268	122
11	1,170	1,090	e575	e260	e230	e225	614	715	882	552	260	141
12	1,210	e950	e570	e250	e230	e230	590	783	1,190	537	250	154
13	1,240	765	e565	e245	e228	e250	472	730	1,370	506	250	156
14	1,230	598	e562	e242	e227	e270	443	681	1,240	515	229	166
15	1,150	473	e560	e240	e226	e320	459	606	1,130	517	229	165
16	e1,080	e470	e560	e240	e224	e430	470	538	918	524	211	168
17	e1,100	492	e560	e240	e224	e875	479	505	778	516	197	187
18	e1,080	745	e560	e240	e224	e2,000	506	486	680	519	190	209
19	1,070	1,080	e560	e238	e224	e3,000	526	524	644	512	186	172
20	e1,020	1,130	e560	e235	e224	e3,400	543	622	735	473	181	201
21	e1,020	1,150	e555	e235	e224	e3,200	585	786	788	447	168	186
22	e1,030	1,050	e550	e235	e224	e2,900	670	835	841	435	132	194
23	e1,040	992	e530	e235	e224	2,610	634	801	2,960	419	125	186
24	1,290	894	e500	e235	e224	2,050	597	732	3,220	402	144	169
25	1,390	697	e475	e235	e224	1,670	534	678	2,640	402	172	170
26	1,400	562	e460	e235	e222	1,140	498	618	3,570	403	183	175
27	1,400	469	e440	e235	e222	1,130	469	588	4,110	399	197	180
28	1,490	484	e430	e235	e222	1,080	462	540	3,580	392	185	184
29	1,530	e590	e420	e235	---	1,130	434	502	2,760	370	188	182
30	1,470	e600	e400	e235	---	1,110	878	484	2,150	337	190	147
31	1,290	---	e380	e235	---	935	---	475	---	346	173	---
TOTAL	37,710	27,171	16,250	8,150	6,379	32,161	17,824	21,597	41,331	18,970	7,011	4,844
MEAN	1,216	906	524	263	228	1,037	594	697	1,378	612	226	161
MAX	1,530	1,260	580	360	234	3,400	1,010	1,290	4,110	1,730	326	209
MIN	1,020	469	380	235	222	220	434	475	463	337	125	89
AC-FT	74,800	53,890	32,230	16,170	12,650	63,790	35,350	42,840	81,980	37,630	13,910	9,610
CFSM	0.23	0.17	0.10	0.05	0.04	0.20	0.11	0.13	0.26	0.12	0.04	0.03
IN.	0.27	0.19	0.11	0.06	0.05	0.23	0.13	0.15	0.29	0.13	0.05	0.03

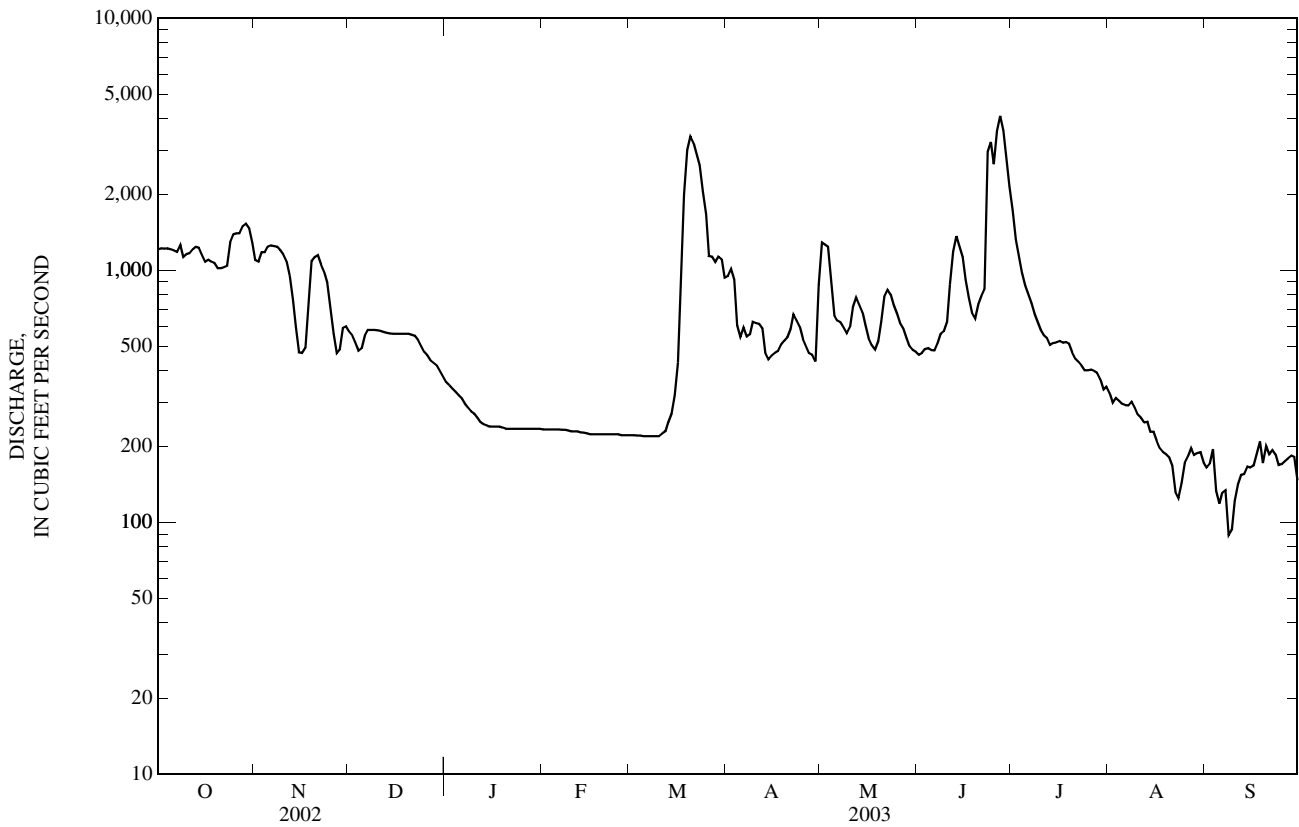
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1901 - 2003, BY WATER YEAR (WY)

MEAN	865	755	604	530	512	1,020	3,103	2,143	1,753	1,399	887	880
MAX	2,836	3,620	1,900	1,663	1,778	4,257	11,870	15,290	7,205	6,851	3,868	5,408
(WY)	(1972)	(2001)	(1904)	(1951)	(1998)	(1995)	(1997)	(1950)	(1962)	(1975)	(1985)	(1999)
MIN	8.02	10.1	5.34	15.6	17.8	24.9	232	154	80.4	26.2	12.3	8.87
(WY)	(1937)	(1937)	(1937)	(1934)	(1937)	(1936)	(1981)	(1934)	(1934)	(1936)	(1934)	(1934)

05079000 RED LAKE RIVER AT CROOKSTON, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1901 - 2003	
ANNUAL TOTAL	740,601		239,398		1,201	
ANNUAL MEAN	2,029		656		83.6	
HIGHEST ANNUAL MEAN					3,129	1950
LOWEST ANNUAL MEAN					83.6	1934
HIGHEST DAILY MEAN	15,400	Jun 11	4,110	Jun 27	27,500	Apr 18, 1997
LOWEST DAILY MEAN	380	Dec 31	89	Sep 8	2.5	Sep 29, 1936
ANNUAL SEVEN-DAY MINIMUM	429	Dec 25	117	Sep 4	3.9	Sep 28, 1936
MAXIMUM PEAK FLOW			4,230	Jun 27	28,400	Apr 12, 1969
MAXIMUM PEAK STAGE			9.76	Jun 27	a28.40	Apr 17, 1997
INSTANTANEOUS LOW FLOW					b0.00	Jul 13, 1960
ANNUAL RUNOFF (AC-FT)	1,469,000		474,800		870,100	
ANNUAL RUNOFF (CFSM)	0.39		0.12		0.23	
ANNUAL RUNOFF (INCHES)	5.23		1.69		3.10	
10 PERCENT EXCEEDS	4,530		1,240		2,620	
50 PERCENT EXCEEDS	1,330		505		740	
90 PERCENT EXCEEDS	580		188		120	

- a From highwater mark, backwater from ice.
- b From regulation by power plant upstream.
- c Estimated.



05079200 COUNTY DITCH 72 NEAR MAPLE BAY, MN—Continued

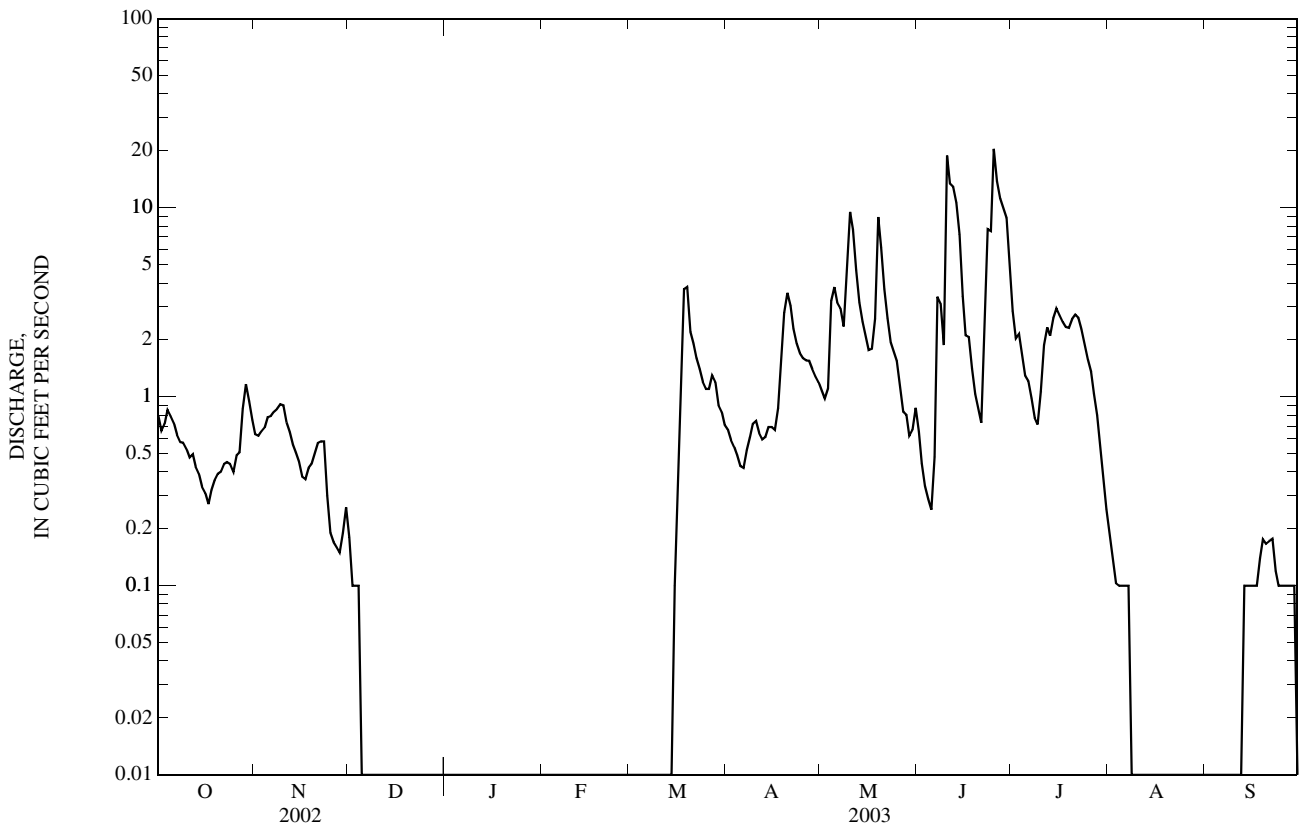
SUMMARY STATISTICS

FOR 2003 WATER YEAR

WATER YEARS 2002 - 2003

ANNUAL TOTAL	414.13	
ANNUAL MEAN	1.13	1.13
HIGHEST ANNUAL MEAN		1.13 2003
LOWEST ANNUAL MEAN		1.13 2003
HIGHEST DAILY MEAN	20 Jun 25	20 Jun 25, 2003
LOWEST DAILY MEAN	a0.00 Dec 26	a0.00 Dec 26, 2002
ANNUAL SEVEN-DAY MINIMUM	0.00 Dec 26	0.00 Dec 26, 2002
MAXIMUM PEAK FLOW	b34 Jun 25	b34 Jun 25, 2003
MAXIMUM PEAK STAGE	c3.53 Mar 22	c3.53 Mar 22, 2003
INSTANTANEOUS LOW FLOW	a0.00 Dec 26	a0.00 Dec 26, 2002
ANNUAL RUNOFF (AC-FT)	821	822
ANNUAL RUNOFF (CFSM)	0.000	0.000
ANNUAL RUNOFF (INCHES)	0.00	0.00
10 PERCENT EXCEEDS	2.7	2.7
50 PERCENT EXCEEDS	0.36	0.36
90 PERCENT EXCEEDS	0.00	0.00

- a Many days.
- b Gage height, 3.36 ft.
- c Backwater from ice.
- e Estimated.

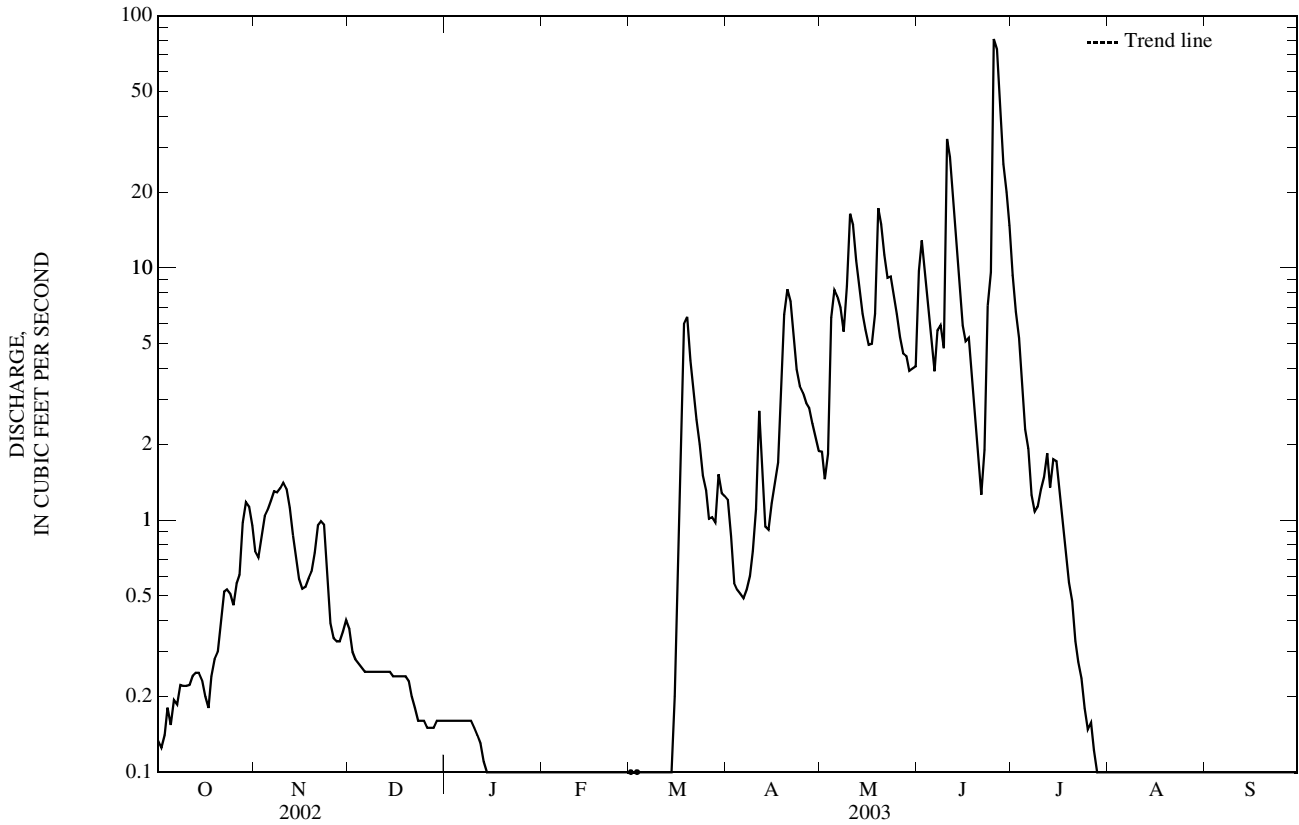


05079250 COUNTY DITCH 65 NEAR MAPLE BAY, MN—Continued

SUMMARY STATISTICS

	FOR 2003 WATER YEAR		WATER YEARS 2002 - 2003	
ANNUAL TOTAL	902.60			
ANNUAL MEAN	2.47		2.47	
HIGHEST ANNUAL MEAN			2.47	2003
LOWEST ANNUAL MEAN			2.47	2003
HIGHEST DAILY MEAN	81	Jun 25	81	Jun 25, 2003
LOWEST DAILY MEAN	a0.00	Aug 22	a0.00	Aug 22, 2003
ANNUAL SEVEN-DAY MINIMUM	0.00	Sep 3	0.00	Sep 3, 2003
MAXIMUM PEAK FLOW	102	Jun 25	102	Jun 25, 2003
MAXIMUM PEAK STAGE	2.37	Jun 25	2.37	Jun 25, 2003
INSTANTANEOUS LOW FLOW	a0.00	Aug 18	a0.00	Aug 18, 2003
ANNUAL RUNOFF (AC-FT)	1,790		1,790	
ANNUAL RUNOFF (CFSM)	0.000		0.000	
ANNUAL RUNOFF (INCHES)	0.00		0.00	
10 PERCENT EXCEEDS	6.6		6.6	
50 PERCENT EXCEEDS	0.25		0.25	
90 PERCENT EXCEEDS	0.02		0.02	

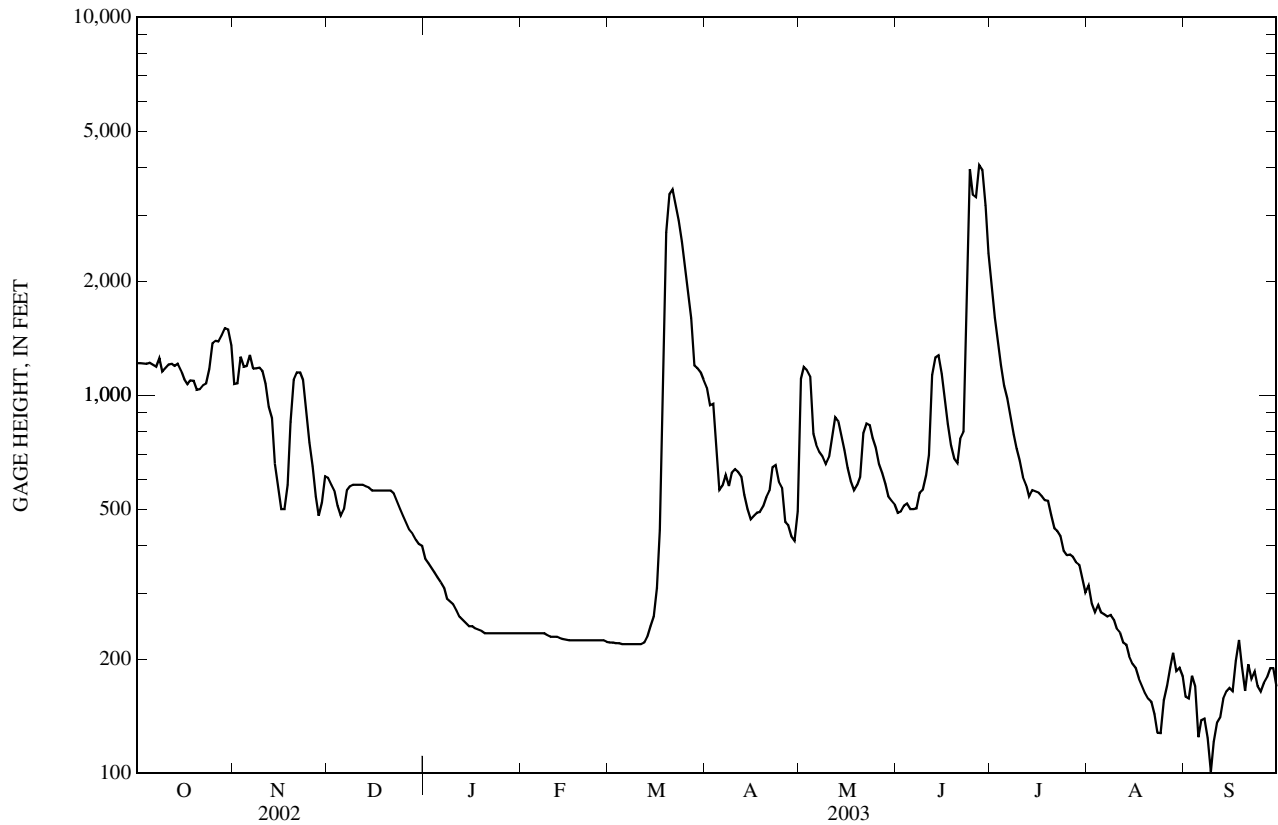
a Many days.
e Estimated.



05080000 RED LAKE RIVER AT FISHER, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 2000 - 2003	
ANNUAL TOTAL	825,907		245,166		1,861	
ANNUAL MEAN	2,263		672		2,591	
HIGHEST ANNUAL MEAN					672	
LOWEST ANNUAL MEAN					2003	
HIGHEST DAILY MEAN	14,200	Jun 12	4,060	Jun 27	22,200	Apr 10, 2001
LOWEST DAILY MEAN	400	Dec 31	101	Sep 9	101	Sep 9, 2003
ANNUAL SEVEN-DAY MINIMUM	433	Dec 25	126	Sep 5	126	Sep 5, 2003
MAXIMUM PEAK FLOW			4,210	Jun 27	24,500	Apr 10, 2001
MAXIMUM PEAK STAGE			19.79	Jun 27	38.00	Apr 10, 2001
ANNUAL RUNOFF (AC-FT)	1,638,000		486,300		1,348,000	
ANNUAL RUNOFF (CFSM)	0.40		0.12		0.33	
ANNUAL RUNOFF (INCHES)	5.41		1.61		4.45	
10 PERCENT EXCEEDS	5,580		1,210		3,610	
50 PERCENT EXCEEDS	1,360		520		1,280	
90 PERCENT EXCEEDS	580		189		406	

e Estimated.



05082500 RED RIVER OF THE NORTH AT GRAND FORKS, ND

LOCATION.--Lat 47°55'38", long 97°01'34", in sec.2, T.151 N., R.50 W., Grand Forks County, Hydrologic Unit 09020301, on right bank 200 ft upstream from the DeMers Avenue bridge, 0.4 mi downstream from Red Lake River, and at mile 297.6.

DRAINAGE AREA.--30,100 mi² (approximately), including 3,800 mi² in closed basins.

PERIOD OF RECORD.--April 1882 to current year. Prior to January 1904 monthly discharge only, published in WSP 1308.

REVISED RECORDS.--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. WRD-ND-81-1: 1882, 1897 (M).

GAGE.--Acoustic-doppler velocity meter and water-stage recorder. Datum of gage is 779.00 ft above sea level, National Geodetic Vertical Datum of 1929. Oct. 1, 1983, to Sept. 30, 1986, datum of gage was 780.00 ft at same site. Apr. 14, 1965, to Sept. 30, 1983, water-stage recorder 1.9 mi downstream at a datum of 778.35 ft. Nov. 3, 1933, to Apr. 13, 1965, water-stage recorder 0.3 mi upstream at 778.35 ft datum. See WSP 1728 or 1913 for history of changes prior to Nov. 3, 1933.

REMARKS.--Records good except those for Nov. 29 to Apr. 3, which are fair, and for estimated discharges, which are poor.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2,190	2,330	1,590	1,280	e880	628	4,890	2,770	3,550	15,200	2,730	485
2	2,150	2,040	e1,500	1,250	858	615	4,230	3,180	3,340	14,700	2,620	447
3	2,100	2,060	e1,350	1,200	843	628	3,620	3,170	3,140	14,100	2,410	414
4	2,130	2,110	e1,280	1,200	806	e640	3,040	3,180	2,980	13,400	2,190	469
5	2,140	2,140	e1,250	1,170	813	e650	2,610	3,040	2,830	12,400	2,240	456
6	2,150	2,200	e1,250	1,140	e810	e660	2,320	2,800	2,650	10,900	2,130	425
7	2,170	2,340	e1,250	1,180	e800	671	2,230	3,110	2,500	9,150	1,960	400
8	2,240	2,250	e1,280	1,070	e780	661	2,160	3,670	2,530	7,420	1,840	400
9	2,330	2,270	1,300	1,110	e780	633	2,200	3,840	2,800	6,210	1,730	339
10	2,240	2,340	1,340	1,170	e770	650	2,390	e4,200	3,070	5,700	1,680	318
11	2,160	e2,290	1,360	1,100	e760	658	2,510	e5,000	3,030	5,370	1,550	339
12	2,340	e2,200	1,400	1,010	e760	663	2,460	5,710	3,540	5,290	1,500	336
13	2,290	1,980	1,460	e1,020	742	665	2,370	5,450	3,880	5,110	1,460	445
14	2,240	1,370	1,480	e1,000	748	682	2,240	5,320	4,080	5,720	1,420	425
15	2,360	1,240	1,500	e980	656	764	2,110	5,060	4,120	5,850	1,390	389
16	2,300	1,340	1,510	e960	628	805	2,040	4,760	3,900	5,680	1,330	432
17	2,210	1,420	1,500	e940	623	874	2,080	4,550	3,590	5,420	1,250	624
18	2,260	1,550	1,490	e930	722	1,150	2,020	4,430	3,150	5,080	1,210	1,060
19	2,180	1,780	1,480	e920	663	2,450	2,160	e4,400	2,860	4,830	1,130	901
20	2,100	2,060	1,480	e910	643	3,990	2,350	e4,800	2,800	4,610	1,010	812
21	2,180	2,180	1,460	e910	665	4,900	2,630	e5,400	2,730	4,340	939	909
22	2,230	2,190	1,440	e910	655	5,330	3,000	5,850	2,690	4,030	852	906
23	2,260	2,250	1,420	e900	689	5,380	3,350	5,850	2,930	3,620	810	777
24	e2,200	2,240	1,420	e890	690	5,850	3,560	5,590	5,200	3,320	761	587
25	e2,400	e2,000	1,390	e860	682	5,840	3,540	5,180	7,940	3,180	616	546
26	e2,500	e1,600	1,350	e860	640	5,620	3,310	4,820	10,100	3,240	551	625
27	e2,600	1,480	1,340	e860	646	5,250	3,110	4,610	13,400	3,200	481	611
28	2,730	1,500	1,280	e830	701	5,120	2,960	4,460	15,800	3,100	541	620
29	2,720	1,590	1,280	e800	---	5,510	2,750	4,210	16,200	2,930	626	549
30	2,640	1,650	e1,270	e720	---	5,830	2,610	4,020	15,700	2,940	605	528
31	2,480	---	1,270	e780	---	5,800	---	3,810	---	2,860	573	---
TOTAL	71,220	57,990	42,970	30,860	20,453	79,567	82,850	136,240	157,030	198,900	42,135	16,574
MEAN	2,297	1,933	1,386	995	730	2,567	2,762	4,395	5,234	6,416	1,359	552
MAX	2,730	2,340	1,590	1,280	880	5,850	4,890	5,850	16,200	15,200	2,730	1,060
MIN	2,100	1,240	1,250	720	623	615	2,020	2,770	2,500	2,860	481	318
AC-FT	141,300	115,000	85,230	61,210	40,570	157,800	164,300	270,200	311,500	394,500	83,570	32,870
CFSM	0.09	0.07	0.05	0.04	0.03	0.10	0.11	0.17	0.20	0.24	0.05	0.02
IN.	0.10	0.08	0.06	0.04	0.03	0.11	0.12	0.19	0.22	0.28	0.06	0.02

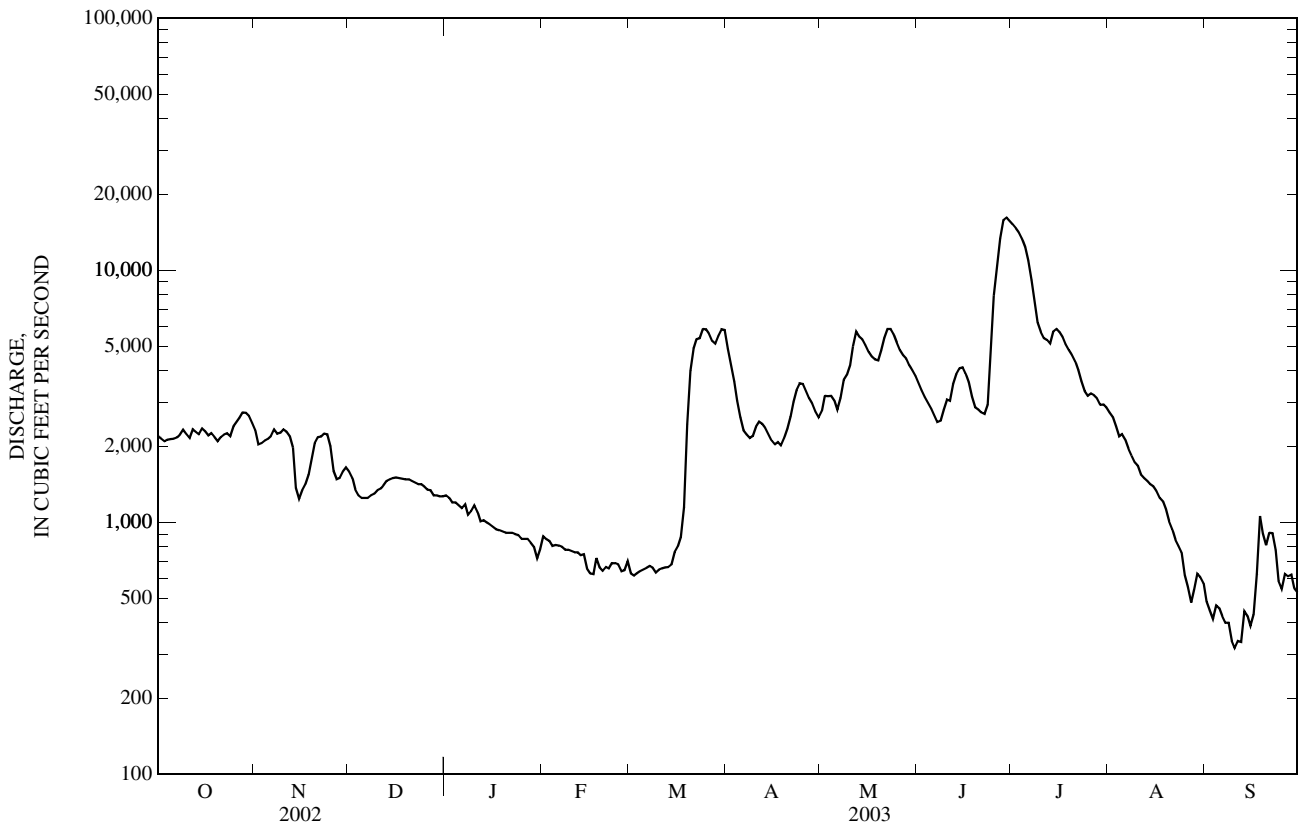
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1904 - 2003, BY WATER YEAR (WY)

MEAN	1,483	1,362	1,055	883	863	2,696	10,060	5,471	4,255	3,745	1,856	1,504
MAX	5,127	9,971	3,832	2,656	3,520	15,370	56,210	36,500	19,250	25,230	17,050	6,251
(WY)	(1995)	(2001)	(2001)	(2001)	(1998)	(1995)	(1997)	(1950)	(1962)	(1975)	(1993)	(1993)
MIN	12.1	30.5	17.8	18.8	2.87	42.1	954	373	151	88.5	30.6	20.3
(WY)	(1937)	(1937)	(1937)	(1937)	(1937)	(1937)	(1938)	(1934)	(1934)	(1936)	(1934)	(1936)

05082500 RED RIVER OF THE NORTH AT GRAND FORKS, ND—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1904 - 2003	
ANNUAL TOTAL	1,988,990		936,789			
ANNUAL MEAN	5,449		2,567		2,921	
HIGHEST ANNUAL MEAN					10,070 1997	
LOWEST ANNUAL MEAN					244 1934	
HIGHEST DAILY MEAN	37,400	Jul 14	16,200	Jun 29	127,000	Apr 18, 1997
LOWEST DAILY MEAN	1,240	Nov 15	318	Sep 10	1.8	Sep 2, 1977
ANNUAL SEVEN-DAY MINIMUM	1,280	Dec 4	365	Sep 6	2.5	Feb 12, 1937
MAXIMUM PEAK FLOW			17,000	Jun 28	a137,000	Apr 18, 1997
MAXIMUM PEAK STAGE			24.35	Jun 29	b54.35	Apr 22, 1997
ANNUAL RUNOFF (AC-FT)	3,945,000		1,858,000		2,116,000	
ANNUAL RUNOFF (CFSM)	0.21		0.098		0.11	
ANNUAL RUNOFF (INCHES)	2.81		1.33		1.51	
10 PERCENT EXCEEDS	14,200		5,300		6,300	
50 PERCENT EXCEEDS	2,720		2,100		1,400	
90 PERCENT EXCEEDS	1,530		631		282	

- a Maximum observed, affected by breakout flow from Red River of the North about 20 miles upstream of gage, that entered Red Lake River about 2 miles from the confluence with Red River of the North.
- b From floodmark.
- c Estimated.



05087500 MIDDLE RIVER AT ARGYLE, MN

LOCATION.--Lat 48°20'25", long 96°48'58", in NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 15, T.156 N., R.48 W., Marshall County, Hydrologic Unit 09020309, on left bank 30 ft upstream of bridge on County Highway 4 in Argyle and 14 mi upstream from mouth.

DRAINAGE AREA.--255 mi².

PERIOD OF RECORD.--March to September 1945, November 1950 to September 1981, February 1982 to current year. Monthly discharge only for some periods, published in WSP 1728.

GAGE.--Water-stage recorder. Datum of gage is 828.53 ft above sea level (NGVD of 1929). Prior to Nov. 8, 1951, nonrecording gage and Nov. 8, 1951 to Sept. 18, 1952, water-stage recorder at site 800 ft downstream at datum 1.0 ft higher. Sept. 19, 1952 to June 28, 1982, recording gage at site 800 feet downstream at present datum. June 29, 1982 to Sept. 20, 1983, nonrecording gage at present site and datum.

REMARKS.--Records good except those for estimated daily discharges, which are poor.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of April 1950 reached a stage of 15.25 ft present datum, site then in use, from floodmarks, discharge, 2,790 ft³/s.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.2	6.5	e2.3	e6.5	e1.1	e0.32	e49	26	30	21	3.4	0.39
2	6.0	6.4	e2.0	e5.7	e1.1	e0.30	e60	24	31	19	2.9	0.45
3	5.8	6.2	e1.9	e5.2	e1.1	e0.28	e75	21	30	16	2.3	0.28
4	5.6	6.3	e1.8	e4.5	e1.0	e0.25	e90	20	26	14	2.2	0.24
5	5.6	6.2	e1.7	e4.0	e0.95	e0.25	e70	19	23	13	2.4	0.20
6	5.7	6.0	e1.7	e4.1	e0.85	e0.25	e55	19	21	11	2.2	0.15
7	5.6	6.1	e1.7	e4.6	e0.82	e0.25	74	19	19	10	1.6	0.28
8	5.6	6.3	e1.7	e4.7	e0.78	e0.25	56	20	22	9.1	1.4	0.15
9	5.9	6.7	e1.7	e4.7	e0.76	e0.25	53	20	24	8.5	1.4	0.05
10	6.8	7.0	e1.7	e4.6	e0.75	e0.25	51	21	30	8.5	1.4	0.13
11	6.5	7.4	e1.7	e4.5	e0.74	e0.22	50	21	34	8.0	1.2	0.13
12	6.4	6.8	e1.7	e4.3	e0.73	e0.20	46	27	62	7.0	1.1	0.12
13	7.2	6.3	e2.0	e4.2	e0.71	e0.20	44	34	126	6.1	1.0	e0.12
14	7.0	6.1	e2.1	e4.0	e0.70	e0.50	40	37	257	6.1	1.3	e0.12
15	6.8	5.5	e2.4	e3.8	e0.68	e2.0	37	34	320	5.3	1.7	e0.12
16	7.2	5.2	e2.4	e3.5	e0.67	e7.5	34	30	279	5.1	1.7	e0.13
17	6.5	5.4	e2.4	e3.1	e0.65	e40	33	28	212	5.1	1.3	e0.35
18	7.2	5.6	e2.4	e2.8	e0.62	e100	31	27	164	4.7	1.3	e0.25
19	8.1	4.9	e2.4	e2.5	e0.57	e250	31	29	134	4.0	1.2	e0.15
20	7.3	3.5	e2.4	e2.1	e0.46	e180	35	72	104	3.7	0.83	e0.13
21	7.2	e3.4	e2.5	e1.9	e0.42	e140	50	125	77	3.1	0.53	e0.11
22	7.3	e3.3	e2.4	e1.7	e0.41	e110	81	130	58	2.7	0.38	e0.10
23	6.8	e3.2	e2.7	e1.5	e0.40	e85	90	115	45	2.4	0.79	e0.09
24	6.7	e3.1	e2.9	e1.4	e0.40	e70	73	94	37	2.0	0.49	e0.09
25	6.4	e3.0	e3.7	e1.3	e0.40	e58	56	75	35	1.9	0.41	e0.09
26	6.2	e2.9	e4.0	e1.3	e0.38	e52	45	61	31	2.0	0.36	e0.09
27	6.0	e2.8	e7.0	e1.2	e0.36	e46	38	50	28	2.2	0.34	e0.10
28	7.1	e2.7	e5.5	e1.2	e0.34	e42	34	41	27	1.9	0.88	e0.10
29	6.9	e2.6	e5.0	e1.1	---	e40	31	35	26	1.5	0.55	e0.11
30	6.2	e2.5	e4.5	e1.1	---	e40	28	32	24	3.0	0.58	e0.13
31	6.1	---	e5.2	e1.1	---	e45	---	29	---	3.8	0.53	---
TOTAL	201.9	149.9	85.5	98.2	18.85	1,311.27	1,540	1,335	2,336	211.7	39.67	4.95
MEAN	6.51	5.00	2.76	3.17	0.67	42.3	51.3	43.1	77.9	6.83	1.28	0.17
MAX	8.1	7.4	7.0	6.5	1.1	250	90	130	320	21	3.4	0.45
MIN	5.6	2.5	1.7	1.1	0.34	0.20	28	19	19	1.5	0.34	0.05
AC-FT	400	297	170	195	37	2,600	3,050	2,650	4,630	420	79	9.8
CFSM	0.03	0.02	0.01	0.01	0.00	0.17	0.20	0.17	0.31	0.03	0.01	0.00
IN.	0.03	0.02	0.01	0.01	0.00	0.19	0.22	0.19	0.34	0.03	0.01	0.00

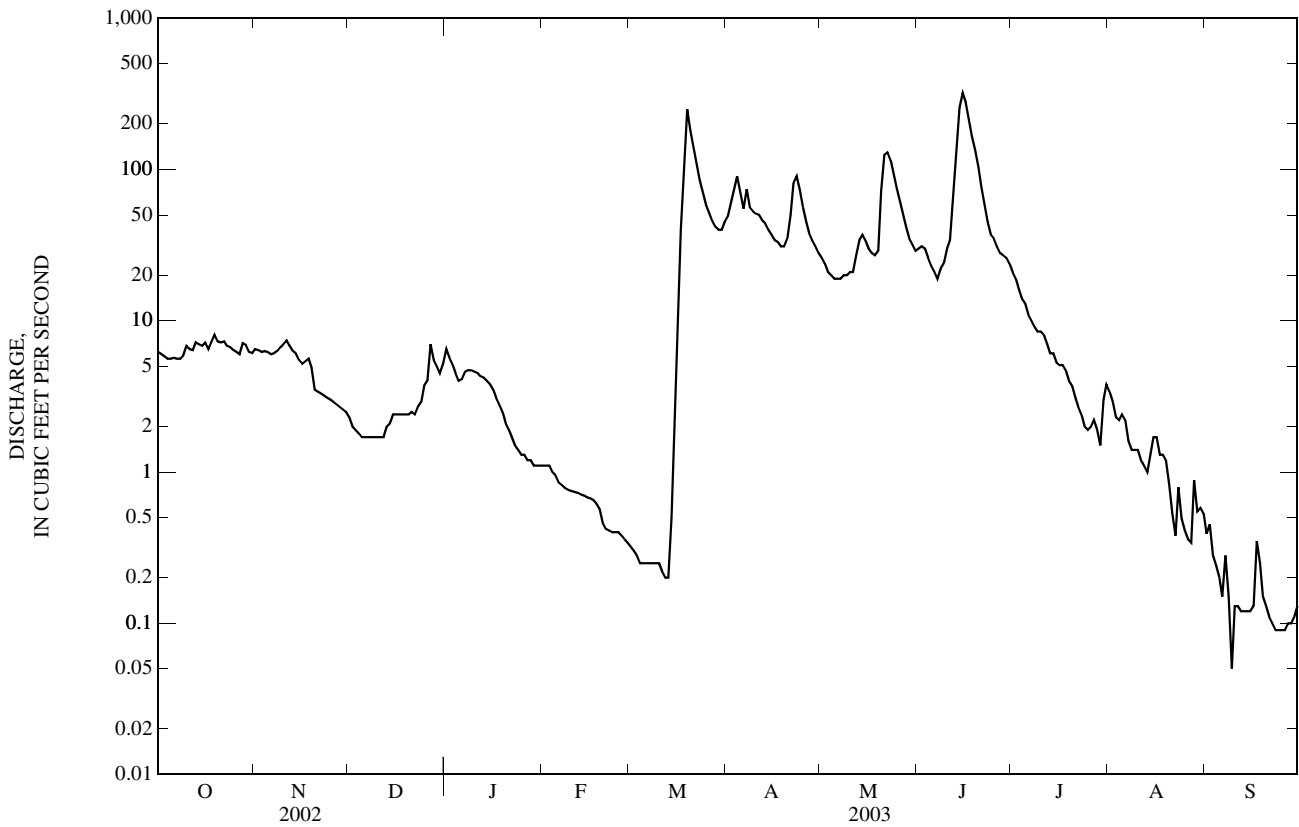
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1945 - 2003, BY WATER YEAR (WY)

MEAN	12.7	18.9	3.81	1.56	2.94	36.7	233	93.4	91.5	61.5	14.8	18.3
MAX	94.1	535	22.2	8.77	69.8	335	966	896	660	688	265	272
(WY)	(1983)	(2001)	(1995)	(1995)	(2000)	(1995)	(1997)	(1996)	(1970)	(1975)	(1993)	(1993)
MIN	0.000	0.000	0.000	0.000	0.000	0.000	0.20	2.12	0.37	0.000	0.000	0.000
(WY)	(1954)	(1954)	(1954)	(1953)	(1953)	(1954)	(1991)	(1981)	(1973)	(1961)	(1961)	(1952)

05087500 MIDDLE RIVER AT ARGYLE, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1945 - 2003	
ANNUAL TOTAL	30,380.8		7,332.94			
ANNUAL MEAN	83.2		20.1		a49.3	
HIGHEST ANNUAL MEAN					198	1999
LOWEST ANNUAL MEAN					1.60	1977
HIGHEST DAILY MEAN	2,550	Jun 13	320	Jun 15	4,800	May 19, 1996
LOWEST DAILY MEAN	1.7	Dec 5	0.05	Sep 9	b0.00	Aug 18, 1952
ANNUAL SEVEN-DAY MINIMUM	1.7	Dec 5	0.09	Sep 22	0.00	Aug 18, 1952
MAXIMUM PEAK FLOW			327	Jun 15	5,020	May 19, 1996
MAXIMUM PEAK STAGE			7.38	Jun 15	c18.27	May 19, 1996
ANNUAL RUNOFF (AC-FT)	60,260		14,540		35,680	
ANNUAL RUNOFF (CFSM)	0.33		0.079		0.19	
ANNUAL RUNOFF (INCHES)	4.43		1.07		2.62	
10 PERCENT EXCEEDS	188		55		100	
50 PERCENT EXCEEDS	6.8		4.7		3.0	
90 PERCENT EXCEEDS	2.4		0.28		0.00	

- a Median of annual mean discharges is 41 ft³/s.
- b Many days, several years.
- c From floodmark.
- e Estimated.



05092000 RED RIVER OF THE NORTH AT DRAYTON, ND

LOCATION.--Lat 48°34'20", long 97°08'50", in SE $\frac{1}{4}$ SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec.24, T.159 N., R.51 W., Pembina County, Hydrologic Unit 09020311, on downstream side of bridge on North Dakota State Highway 66, at the North Dakota-Minnesota border, 1.5 mi northeast of Drayton, and at mile 206.7.

DRAINAGE AREA.--34,800 mi² (approximately) includes 3,800 mi² in closed basins.

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

REVISED RECORDS.--WSP 1388: 1949-50. WSP 1728: Drainage area.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 755.00 ft above sea level, National Geodetic Vertical Datum of 1929 (Minnesota Department of Transportation benchmark). Prior to Nov. 30, 1954, nonrecording gage at site 1.5 mi upstream at datum 1.59 ft higher.

REMARKS.--Records fair except those for estimated daily discharges, which are poor.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of April 1897 reached a stage of about 41 ft at site and datum in use prior to Nov. 30, 1954.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e2,350	e2,620	e1,700	e1,290	e788	e710	e6,910	e2,980	4,510	15,100	e2,880	603
2	2,290	e2,500	e1,600	e1,290	e757	e680	e7,280	e2,900	e4,300	15,300	e2,810	562
3	2,290	e2,300	e1,540	e1,250	e747	e680	e7,510	e3,100	e4,100	15,000	e2,710	539
4	2,320	e2,200	e1,400	e1,220	e816	e690	e7,520	e3,390	e3,810	14,400	e2,580	529
5	2,350	e2,100	e1,350	e1,200	e860	e700	e7,500	e3,390	e3,670	13,500	e2,410	472
6	2,330	e2,100	e1,330	e1,200	e880	e690	e6,980	e3,400	e3,480	12,500	e2,270	485
7	2,320	e2,150	e1,300	e1,160	e850	e690	e6,180	e3,330	e3,340	11,100	e2,200	498
8	2,310	e2,240	e1,300	e1,160	e840	e690	e5,050	e3,250	e3,260	9,770	e2,150	485
9	2,310	e2,250	e1,300	e1,140	e820	e680	e4,420	e3,600	e3,240	8,270	e2,060	466
10	2,310	e2,280	e1,300	e1,160	e810	e685	e4,290	e3,970	e3,240	6,980	e1,950	438
11	2,310	e2,280	e1,300	e1,160	e800	e700	e4,230	4,510	e3,400	6,080	e1,850	406
12	2,310	e2,300	e1,350	e1,130	e790	e710	e4,290	5,110	e3,850	5,530	e1,680	381
13	2,280	e2,200	e1,380	e1,120	e780	e730	e4,250	5,600	4,950	5,140	e1,510	353
14	2,280	e1,800	e1,410	e1,080	e770	e766	e4,090	5,860	5,560	5,000	e1,490	351
15	2,270	e1,400	e1,430	e1,050	e750	e790	e3,850	5,830	5,940	5,140	e1,460	428
16	2,270	e1,500	e1,470	e1,020	e740	e838	e3,410	5,590	6,050	5,390	e1,460	435
17	2,260	e1,700	e1,500	e1,000	e740	e911	e3,140	5,310	5,780	5,470	e1,420	465
18	2,250	e1,800	e1,500	e984	e730	e977	e3,020	5,080	5,340	5,390	e1,380	545
19	2,240	e1,960	e1,500	e962	e710	e1,140	e2,970	4,980	4,760	5,180	e1,320	802
20	2,230	e2,050	e1,480	e936	e690	e1,740	e2,950	5,050	e4,260	4,870	e1,280	1,210
21	2,220	e2,150	e1,470	e933	e700	e2,870	e3,000	5,340	e3,730	e4,290	e1,230	1,190
22	2,200	e2,190	e1,450	e905	e710	e4,080	e3,180	5,930	e3,530	e4,080	e1,130	1,140
23	2,200	e2,200	e1,430	e905	e720	e4,990	e3,310	6,560	e3,440	e3,870	e1,040	1,160
24	2,190	e2,200	e1,410	e900	e720	e5,490	e3,640	6,850	e3,420	e3,600	e989	1,070
25	2,170	e2,220	e1,400	e900	e700	e5,730	e4,040	6,750	e4,310	e3,420	e949	1,090
26	2,160	e2,210	e1,360	e888	e690	e6,020	e4,130	6,340	6,160	e3,310	e873	913
27	2,150	e1,700	e1,330	e873	e720	e6,150	e4,080	5,820	8,400	e3,210	e771	850
28	e2,300	e1,580	e1,320	e861	e720	e6,170	e3,840	5,410	10,800	e3,160	e687	790
29	e2,400	e1,630	e1,310	e847	---	e6,080	e3,600	5,080	13,000	e3,070	550	701
30	e2,600	e1,660	e1,300	e826	---	e6,210	e3,310	4,860	14,400	e2,980	549	666
31	e2,650	---	e1,290	e802	---	e6,600	---	4,700	---	e2,910	581	---
TOTAL	71,120	61,470	43,510	32,152	21,348	76,587	135,970	149,870	158,030	213,010	48,219	20,023
MEAN	2,294	2,049	1,404	1,037	762	2,471	4,532	4,835	5,268	6,871	1,555	667
MAX	2,650	2,620	1,700	1,290	880	6,600	7,520	6,850	14,400	15,300	2,880	1,210
MIN	2,150	1,400	1,290	802	690	680	2,950	2,900	3,240	2,910	549	351
AC-FT	141,100	121,900	86,300	63,770	42,340	151,900	269,700	297,300	313,500	422,500	95,640	39,720
CFSM	0.07	0.07	0.05	0.03	0.02	0.08	0.15	0.16	0.17	0.22	0.05	0.02
IN.	0.09	0.07	0.05	0.04	0.03	0.09	0.16	0.18	0.19	0.26	0.06	0.02

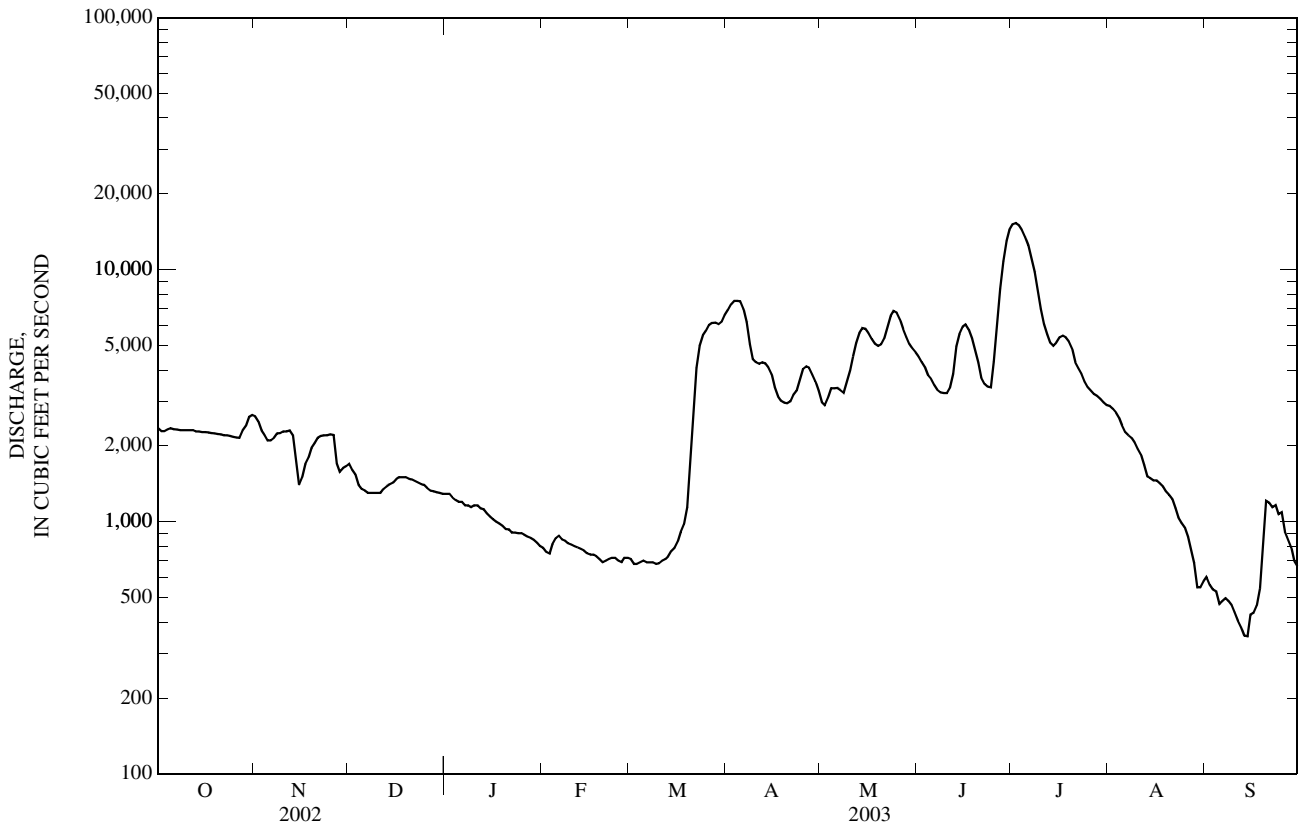
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1936 - 2003, BY WATER YEAR (WY)

MEAN	1,949	1,908	1,458	1,197	1,159	3,372	14,770	9,234	5,827	5,414	2,613	2,120
MAX	5,194	11,840	4,168	2,679	2,598	16,290	54,710	58,890	23,420	28,240	21,580	12,140
(WY)	(1995)	(2001)	(1999)	(2001)	(1998)	(1998)	(1997)	(1950)	(1962)	(1975)	(1993)	(1999)
MIN	13.8	277	149	174	201	280	1,275	938	399	118	50.1	27.4
(WY)	(1937)	(1977)	(1977)	(1990)	(1977)	(1962)	(1981)	(1977)	(1936)	(1936)	(1936)	(1936)

05092000 RED RIVER OF THE NORTH AT DRAYTON, ND—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1936 - 2003	
ANNUAL TOTAL	2,328,230		1,031,309			
ANNUAL MEAN	6,379		2,826		4,388	
HIGHEST ANNUAL MEAN					11,280	1997
LOWEST ANNUAL MEAN					536	1977
HIGHEST DAILY MEAN	34,700	Jun 18	15,300	Jul 2	124,000	Apr 24, 1997
LOWEST DAILY MEAN	1,290	Dec 31	351	Sep 14	7.7	Oct 16, 1936
ANNUAL SEVEN-DAY MINIMUM	1,310	Dec 5	399	Sep 10	9.9	Oct 11, 1936
MAXIMUM PEAK FLOW			15,300	Jul 2	124,000	Apr 24, 1997
MAXIMUM PEAK STAGE			21.12	Jul 2	45.55	Apr 24, 1997
INSTANTANEOUS LOW FLOW					7.7	Oct 16, 1936
ANNUAL RUNOFF (AC-FT)	4,618,000		2,046,000		3,179,000	
ANNUAL RUNOFF (CFSM)	0.21		0.091		0.14	
ANNUAL RUNOFF (INCHES)	2.79		1.24		1.92	
10 PERCENT EXCEEDS	20,500		5,890		10,100	
50 PERCENT EXCEEDS	2,850		2,190		1,930	
90 PERCENT EXCEEDS	1,700		700		499	

e Estimated.



05094000 SOUTH BRANCH TWO RIVERS AT LAKE BRONSON, MN

LOCATION.--Lat 48°43'50", long 96°39'50", in SW¹/₄SW¹/₄ sec. 30, T.161 N., R.46 W., Kittson County, Hydrologic Unit 09020312, on left bank 70 ft upstream from culvert on U.S. Highway 59 at Lake Bronson and 3.4 mi downstream from dam at outlet of Bronson Lake.

DRAINAGE AREA.--422 mi².

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 September 1981, April 1985 to current year. Monthly discharge only for some periods, published in WSP 1308. October 1981 to March 1985, annual maximums only. Published as South Fork Two Rivers at Bronson prior to 1941.

REVISED RECORDS.--WSP 1308: 1929(M), 1931(M), 1936(M), 1944(M), 1947(M).

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

REMARKS.--Records fair except those for estimated daily discharges, which are poor. Flow partly regulated since 1937 at Bronson Lake; usable capacity, 3,700 acre-ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8.5	9.2	e5.6	e6.3	e6.8	e6.5	e265	17	20	23	1.9	3.9
2	8.1	8.7	e5.4	e6.3	e7.2	e4.0	e250	21	20	23	1.9	4.0
3	8.2	8.6	e5.4	e6.3	e7.1	e2.3	e150	22	21	23	1.8	4.0
4	9.7	8.3	e5.4	e6.3	e7.0	e1.6	e100	24	19	23	1.8	3.9
5	9.4	8.2	e5.6	e6.3	e7.0	e1.4	e60	34	19	23	1.9	3.6
6	9.2	7.9	e6.5	e6.2	e7.0	e1.3	e45	43	18	23	2.1	2.8
7	9.6	7.8	e7.5	e6.2	e6.9	e1.2	35	34	21	18	2.0	1.9
8	12	7.9	e8.0	e6.2	e6.8	e1.1	64	27	38	4.9	1.9	1.6
9	13	8.2	e8.5	e5.9	e6.8	e1.0	81	27	169	2.9	1.8	1.4
10	13	8.0	e10	e5.7	e6.8	e0.99	88	27	222	2.7	2.1	1.3
11	13	7.8	e9.6	e5.7	e6.8	e0.98	89	20	357	2.6	2.0	1.5
12	12	8.1	e7.9	e5.7	e6.8	e0.97	82	11	514	2.6	1.9	1.4
13	12	7.8	e7.0	e5.7	e6.9	e0.96	73	15	442	2.2	1.8	1.4
14	14	7.7	e6.4	e5.7	e6.9	e0.95	64	22	337	2.3	1.7	1.4
15	13	7.4	e6.0	e5.7	e7.1	e0.95	60	23	341	2.3	1.6	1.3
16	12	7.1	e5.8	e5.7	e7.5	e0.95	52	25	179	2.1	20	1.2
17	11	6.5	e5.6	e5.8	e7.8	e0.95	37	26	63	2.0	6.7	1.3
18	11	5.9	e5.4	e6.1	e8.0	e10	33	34	103	2.0	5.7	2.4
19	10	5.7	e5.4	e5.8	e8.0	e200	25	48	101	1.9	4.0	2.0
20	10	5.6	e5.4	e5.8	e8.0	e10	25	147	77	2.0	2.6	1.6
21	10	5.8	e5.4	e5.8	e8.0	e50	27	273	52	1.9	2.4	1.5
22	9.7	5.8	e5.2	e5.8	e7.9	e175	47	225	33	1.9	2.3	1.5
23	9.2	e6.0	e5.2	e5.8	e7.8	e200	112	162	20	1.9	3.3	20
24	9.2	e6.2	e5.2	e5.8	e7.7	e220	126	134	12	1.9	4.1	43
25	9.4	e6.5	e5.5	e5.8	e7.6	e240	85	134	6.6	1.9	4.3	40
26	9.0	e7.0	e6.2	e5.8	e7.5	e260	32	111	5.8	2.0	4.3	40
27	8.8	e7.5	e6.6	e5.8	e7.4	e280	33	65	5.2	1.9	4.2	39
28	12	e7.0	e7.0	e6.0	e7.3	e290	32	22	11	1.8	7.1	48
29	12	e6.4	e7.0	e6.2	---	e300	28	18	29	1.8	5.1	54
30	11	e6.0	e6.6	e6.4	---	e290	13	19	33	1.8	4.3	42
31	9.7	---	e6.3	e6.6	---	e280	---	19	---	1.8	3.9	---
TOTAL	328.7	216.6	198.6	185.2	204.4	2,833.10	2,213	1,829	3,288.6	209.1	112.5	372.9
MEAN	10.6	7.22	6.41	5.97	7.30	91.4	73.8	59.0	110	6.75	3.63	12.4
MAX	14	9.2	10	6.6	8.0	300	265	273	514	23	20	54
MIN	8.1	5.6	5.2	5.7	6.8	0.95	13	11	5.2	1.8	1.6	1.2
AC-FT	652	430	394	367	405	5,620	4,390	3,630	6,520	415	223	740
CFSM	0.03	0.02	0.02	0.01	0.02	0.22	0.17	0.14	0.26	0.02	0.01	0.03
IN.	0.03	0.02	0.02	0.02	0.02	0.25	0.20	0.16	0.29	0.02	0.01	0.03

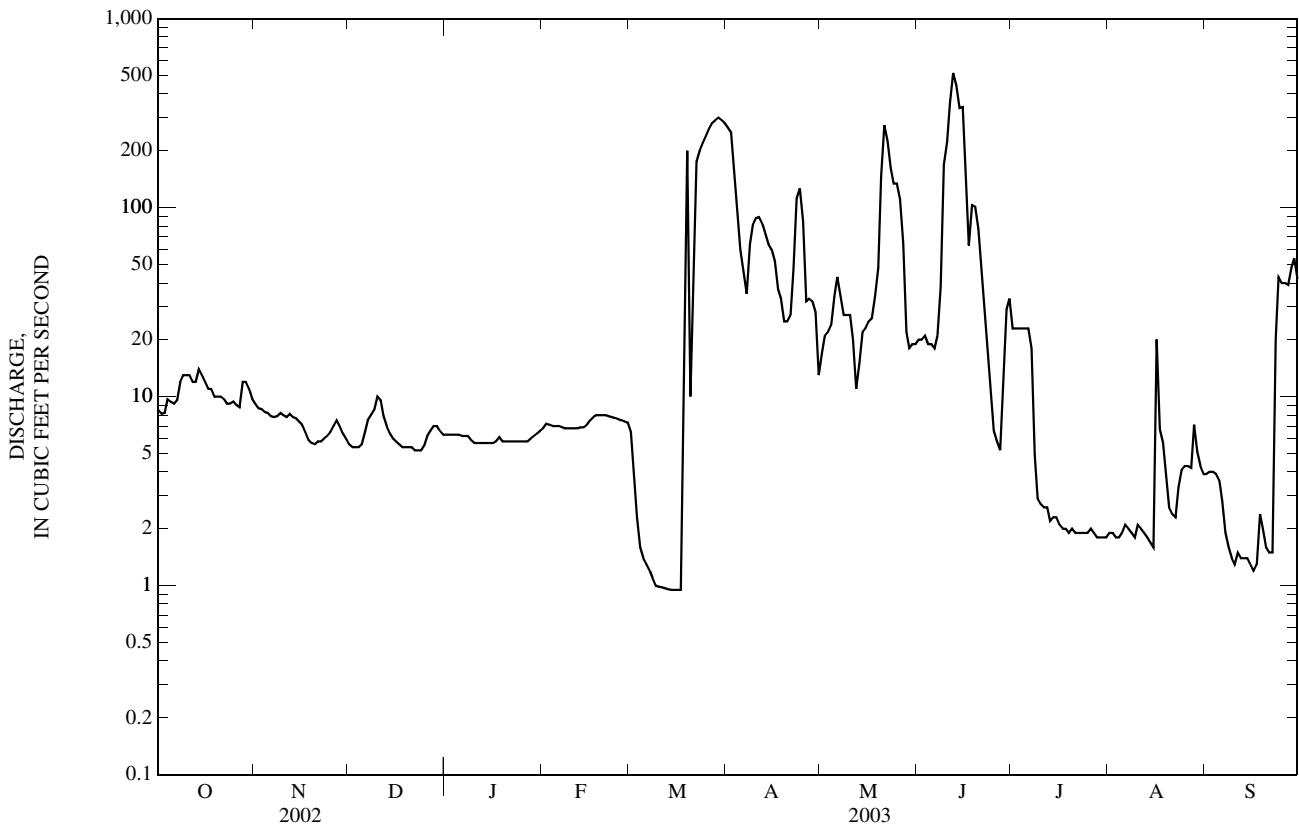
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1929 - 2003, BY WATER YEAR (WY)

MEAN	22.0	32.8	6.04	3.50	6.04	78.1	445	218	188	119	53.3	44.2
MAX	153	1,132	37.9	15.3	93.1	689	1,977	1,500	1,336	1,136	1,349	525
(WY)	(1958)	(2001)	(2001)	(2001)	(1998)	(1995)	(1966)	(1996)	(1970)	(1956)	(1993)	(1957)
MIN	0.40	0.38	0.13	0.12	0.12	0.66	0.54	0.98	1.43	0.44	0.089	0.000
(WY)	(1991)	(1990)	(1987)	(1987)	(1987)	(1934)	(1991)	(1991)	(1980)	(1988)	(1988)	(1937)

05094000 SOUTH BRANCH TWO RIVERS AT LAKE BRONSON, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1929 - 2003	
ANNUAL TOTAL	65,913.5		11,991.70		a102	
ANNUAL MEAN	181		32.9		314	
HIGHEST ANNUAL MEAN					2001	
LOWEST ANNUAL MEAN					1934	
HIGHEST DAILY MEAN	2,680	Jun 14	514	Jun 12	5,290	Apr 5, 1966
LOWEST DAILY MEAN	1.6	Sep 18	0.95	Mar 14-17	b0.00	Jul 25, 1937
ANNUAL SEVEN-DAY MINIMUM	2.1	Sep 14	0.96	Mar 11	0.00	Aug 2, 1937
MAXIMUM PEAK FLOW			547	cJun 12	5,410	Apr 5, 1966
MAXIMUM PEAK STAGE			d11.11	Mar 18	18.23	Apr 5, 1966
ANNUAL RUNOFF (AC-FT)	130,700		23,790		74,080	
ANNUAL RUNOFF (CFSM)	0.43		0.078		0.24	
ANNUAL RUNOFF (INCHES)	5.81		1.06		3.29	
10 PERCENT EXCEEDS	534		86		241	
50 PERCENT EXCEEDS	12		7.4		5.3	
90 PERCENT EXCEEDS	4.4		1.8		0.90	

- a Median of annual mean discharges is 65 ft³/s.
- b Many days, several years.
- c Gage height, 5.83 ft.
- d Backwater from ice, from highwater mark.
- e Estimated.



05104500 ROSEAU RIVER BELOW SOUTH FORK NEAR MALUNG, MN

LOCATION.--Lat 48°47'30", long 95°44'40", in NW¹/₄SW¹/₄ sec. 6, T.161 N., R.39 W., Roseau County, Hydrologic Unit 09020314, on left bank 0.3 mi downstream from South Fork and 1.5 mi northwest of Malung.

DRAINAGE AREA.--430 mi².

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

REVISED RECORDS.--WSP 2113: 1948, 1950, 1951, 1956(M), 1957(M), 1962(M). WRIR 97-4249: Drainage area.

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

REMARKS.--Records good except those for estimated daily discharges, which are poor. Some flow bypasses the gaging station through a natural overflow channel 0.8 mi. upstream and returns to river 0.5 mi downstream. Overflow begins at stage of about 13.0 ft, discharge, 1,800 ft³/s. These records include any flow in the overflow channel.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	20	17	e12	e10	e8.0	e6.8	e140	88	77	69	10	2.9
2	21	17	e11	e10	e8.0	e6.8	e194	79	73	65	10	2.1
3	14	17	e10	e11	e8.0	e6.8	e120	72	67	60	11	1.9
4	14	16	e9.8	e11	e8.2	e6.8	e84	68	61	54	9.6	1.5
5	14	16	e9.5	e10	e8.2	e6.8	e80	67	55	49	7.8	1.1
6	15	16	e9.2	e10	e8.2	e6.8	e65	69	58	44	6.5	0.86
7	13	16	e9.2	e10	e8.2	e6.5	e60	78	54	32	5.6	0.72
8	11	16	e9.2	e10	e8.0	e6.5	e54	86	73	24	4.8	0.89
9	11	e16	e9.2	e10	e8.0	e6.5	60	78	85	22	3.9	0.66
10	12	e15	e9.2	e10	e8.0	e6.5	62	77	97	20	2.6	1.2
11	e12	e14	e9.5	e9.8	e8.0	e6.2	69	84	124	15	2.4	1.3
12	11	e14	e9.5	e9.5	e7.8	e6.2	74	98	199	12	2.2	1.4
13	12	e14	e10	e9.2	e7.5	e6.0	76	110	242	15	1.7	2.5
14	e12	e13	e10	e9.0	e7.5	e5.8	77	104	297	17	1.7	3.9
15	12	e13	e10	e8.8	e7.2	e6.0	76	93	325	21	1.1	4.8
16	11	e12	e10	e8.8	e7.2	e7.0	72	83	289	17	0.50	5.4
17	12	e12	e10	e8.5	e7.2	e30	72	75	224	14	0.35	6.5
18	14	e13	e11	e8.5	e7.0	e140	69	74	178	12	0.21	96
19	16	e13	e11	e8.5	e7.0	e220	70	93	145	11	0.09	130
20	16	e13	e11	e8.5	e7.0	e235	102	152	119	9.0	0.03	153
21	15	e13	e11	e8.2	e7.0	e220	159	235	100	8.1	0.02	135
22	16	e13	e11	e8.0	e7.2	e200	194	254	91	8.1	0.01	109
23	16	e13	e11	e8.0	e7.0	e175	180	217	60	7.6	0.00	92
24	16	e13	e10	e7.8	e7.0	e160	156	189	50	7.1	0.00	78
25	16	e12	e11	e7.8	e7.2	e136	137	161	62	7.2	0.00	68
26	17	e12	e10	e7.5	e7.0	e60	132	136	83	7.7	0.07	58
27	17	e12	e10	e7.8	e7.0	e34	117	116	89	8.2	0.14	50
28	18	e12	e10	e7.8	e7.0	e44	107	100	82	8.7	1.2	42
29	19	e12	e10	e7.8	---	e39	99	87	77	8.0	0.99	35
30	18	e12	e10	e7.8	---	e45	95	80	72	5.3	1.2	31
31	17	---	e10	e7.8	---	e70	---	81	---	8.2	2.7	---
TOTAL	458	417	314.3	277.4	210.6	1,912.0	3,052	3,384	3,608	666.2	88.41	1,116.63
MEAN	14.8	13.9	10.1	8.95	7.52	61.7	102	109	120	21.5	2.85	37.2
MAX	21	17	12	11	8.2	235	194	254	325	69	11	153
MIN	11	12	9.2	7.5	7.0	5.8	54	67	50	5.3	0.00	0.66
AC-FT	908	827	623	550	418	3,790	6,050	6,710	7,160	1,320	175	2,210
CFSM	0.03	0.03	0.02	0.02	0.02	0.14	0.24	0.25	0.28	0.05	0.01	0.09
IN.	0.04	0.04	0.03	0.02	0.02	0.17	0.26	0.29	0.31	0.06	0.01	0.10

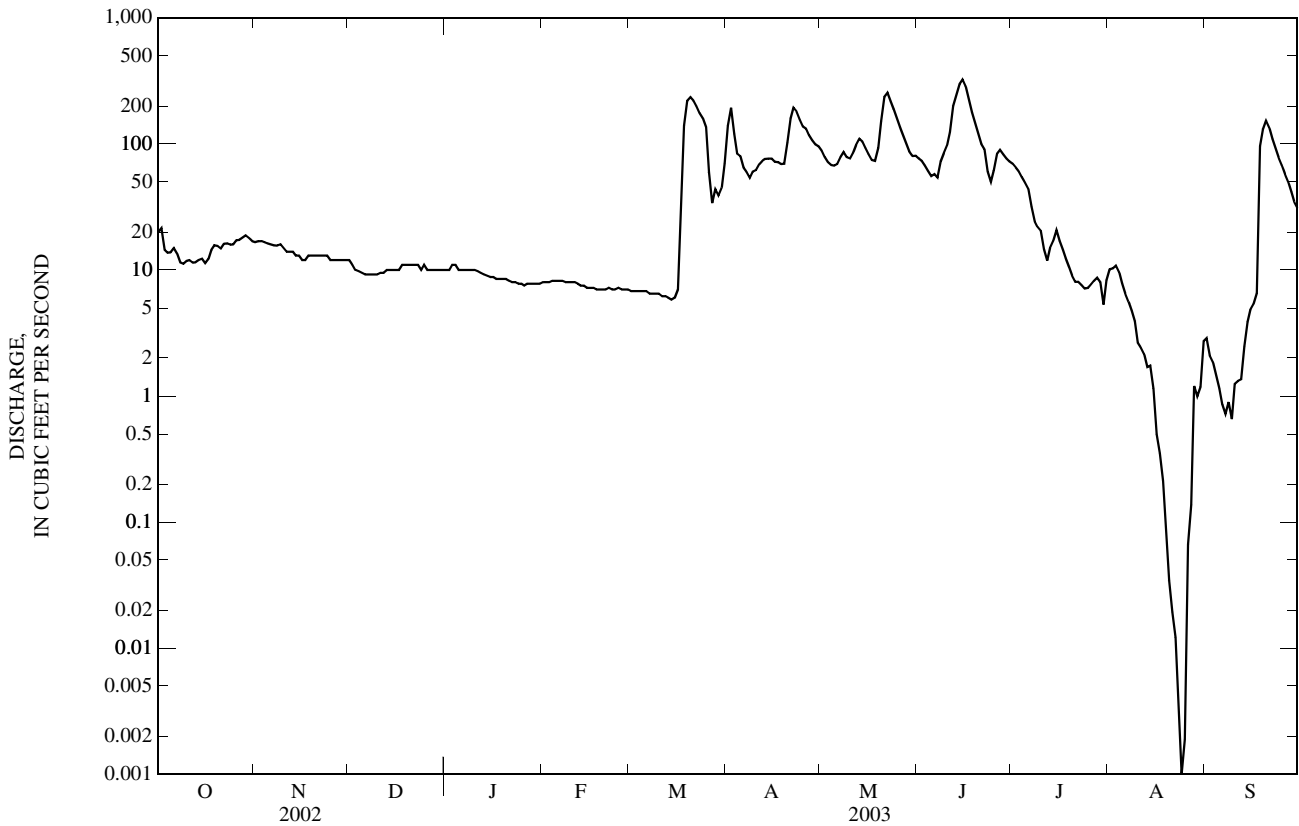
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1947 - 2003, BY WATER YEAR (WY)

MEAN	65.2	64.1	17.3	7.95	8.67	66.5	601	327	275	158	73.4	80.0
MAX	351	848	65.6	22.2	102	524	2,035	1,589	2,787	1,152	896	710
(WY)	(1983)	(2001)	(1995)	(1997)	(1998)	(1995)	(1966)	(1950)	(2002)	(1968)	(2001)	(1957)
MIN	0.029	0.16	0.013	0.000	0.000	0.83	5.60	8.77	4.17	0.092	0.000	0.025
(WY)	(1991)	(1991)	(1977)	(1977)	(1977)	(1977)	(1991)	(1990)	(1980)	(1980)	(1961)	(1988)

05104500 ROSEAU RIVER BELOW SOUTH FORK NEAR MALUNG, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1947 - 2003	
ANNUAL TOTAL	107,099.4		15,504.54			
ANNUAL MEAN	293		42.5		a145	
HIGHEST ANNUAL MEAN					355 2001	
LOWEST ANNUAL MEAN					7.28 1990	
HIGHEST DAILY MEAN	15,800	Jun 12	325	Jun 15	15,800	Jun 12, 2002
LOWEST DAILY MEAN	3.9	Mar 13	0.00	Aug 23-25	b0.00	Jul 23, 1961
ANNUAL SEVEN-DAY MINIMUM	4.0	Mar 9	0.02	Aug 20	0.00	Jul 23, 1961
MAXIMUM PEAK FLOW			c329	Jun 15	16,000	Jun 12, 2002
MAXIMUM PEAK STAGE			d8.79	Mar 19	26.96	Jun 12, 2002
INSTANTANEOUS LOW FLOW			0.00	Aug 23	b0.00	Jul 23, 1961
ANNUAL RUNOFF (AC-FT)	212,400		30,750		105,200	
ANNUAL RUNOFF (CFSM)	0.68		0.099		0.34	
ANNUAL RUNOFF (INCHES)	9.27		1.34		4.59	
10 PERCENT EXCEEDS	416		119		332	
50 PERCENT EXCEEDS	18		12		20	
90 PERCENT EXCEEDS	6.9		3.9		1.9	

- a Median of annual mean discharges is 120 ft³/s.
- b Many days, several years.
- c Gage height, 6.57 ft.
- d Backwater from ice.
- e Estimated.



05106000 SPRAGUE CREEK NEAR SPRAGUE, MANITOBA

LOCATION.--Lat 48°59'33", long 95°39'43", in NE $\frac{1}{4}$ sec. 34, T.164 N., R.39 W., Roseau County, Hydrologic Unit 09020314, on left bank 0.5 mi south of international boundary, 3.5 mi south of Sprague, Manitoba, 8 mi upstream from mouth, and 10.5 mi northeast of Roseau, MN.

DRAINAGE AREA.--176 mi².

PERIOD OF RECORD.--September 1928 to December 1981, October, 1999 to current year.

REVISED RECORDS.--WSP 1055: 1944. WSP 1308: 1931(M). WDR MN-81-1: Drainage area.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 1,038.40 ft above sea level, 1928 datum, (levels by Geodetic Survey of Canada). Prior to Mar. 15, 1929, nonrecording gage at same site and datum.

REMARKS.--Records good except those for estimated daily discharges, which are poor.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	29	22	e6.1	e3.2	e2.8	e2.0	e50	53	104	60	20	27
2	28	20	e5.6	3.2	e2.8	e2.0	e48	51	96	55	21	24
3	28	19	e5.1	3.0	e2.7	e2.0	e46	49	83	77	18	19
4	35	19	e4.7	3.1	e2.7	e2.0	e44	49	70	73	16	18
5	35	18	e4.3	3.1	e2.6	e2.0	e45	49	65	61	15	17
6	33	18	e4.0	3.0	e2.5	e2.0	e49	48	68	55	15	14
7	29	18	e3.7	3.1	e2.4	e2.0	e58	54	80	49	13	12
8	29	18	e3.5	3.2	e2.4	e2.0	e71	55	86	45	12	10
9	30	18	e3.4	3.3	e2.4	e2.0	e61	51	91	39	10	8.7
10	31	18	e3.4	3.1	e2.4	e1.9	58	53	148	37	41	15
11	31	18	e3.5	e3.2	e2.4	e1.9	55	69	167	36	40	20
12	34	17	e3.8	e3.2	e2.3	e1.9	41	67	169	38	22	20
13	36	16	e4.3	e3.1	e2.3	e1.9	40	57	176	40	15	33
14	31	14	e4.9	e3.0	e2.3	e2.0	45	51	160	41	11	52
15	27	13	e4.0	e2.9	e2.2	e2.2	41	47	136	41	8.3	52
16	28	13	e3.7	e2.8	e2.2	e2.6	39	44	133	35	6.9	45
17	28	12	e3.6	e2.6	e2.2	e6.0	36	44	144	30	5.8	64
18	29	12	e3.6	e2.4	e2.1	e60	37	71	127	26	5.4	312
19	30	12	e3.6	e2.2	e2.1	e110	45	366	106	30	5.1	343
20	29	12	e3.7	e2.0	e2.1	e118	68	339	91	35	5.1	265
21	27	12	e3.7	e1.9	e2.1	e117	65	286	72	37	4.7	233
22	25	13	e3.6	e1.8	e2.0	e110	57	265	61	35	4.4	242
23	27	12	e3.6	e1.8	e2.1	e95	59	247	65	30	3.7	225
24	25	11	e3.7	e1.9	e2.0	e64	55	215	62	25	2.9	196
25	22	8.8	e3.8	e2.0	e2.1	e57	60	183	58	23	3.2	179
26	21	7.5	e3.4	e2.1	e2.0	e52	56	156	57	21	3.2	159
27	21	7.4	e3.2	e2.3	e2.0	e48	59	134	55	21	3.0	142
28	22	7.0	e3.2	e2.5	e2.0	e46	64	120	57	19	9.6	128
29	25	7.5	e3.3	e2.7	---	e45	63	107	78	16	17	119
30	27	6.8	e3.3	e2.8	---	e47	57	112	73	18	30	110
31	26	---	e3.3	e2.8	---	e52	---	117	---	20	36	---
TOTAL	878	420.0	120.6	83.3	64.2	1,059.4	1,572	3,609	2,938	1,168	423.3	3,103.7
MEAN	28.3	14.0	3.89	2.69	2.29	34.2	52.4	116	97.9	37.7	13.7	103
MAX	36	22	6.1	3.3	2.8	118	71	366	176	77	41	343
MIN	21	6.8	3.2	1.8	2.0	1.9	36	44	55	16	2.9	8.7
AC-FT	1,740	833	239	165	127	2,100	3,120	7,160	5,830	2,320	840	6,160
CFSM	0.16	0.08	0.02	0.02	0.01	0.19	0.30	0.66	0.56	0.21	0.08	0.59
IN.	0.19	0.09	0.03	0.02	0.01	0.22	0.33	0.76	0.62	0.25	0.09	0.66

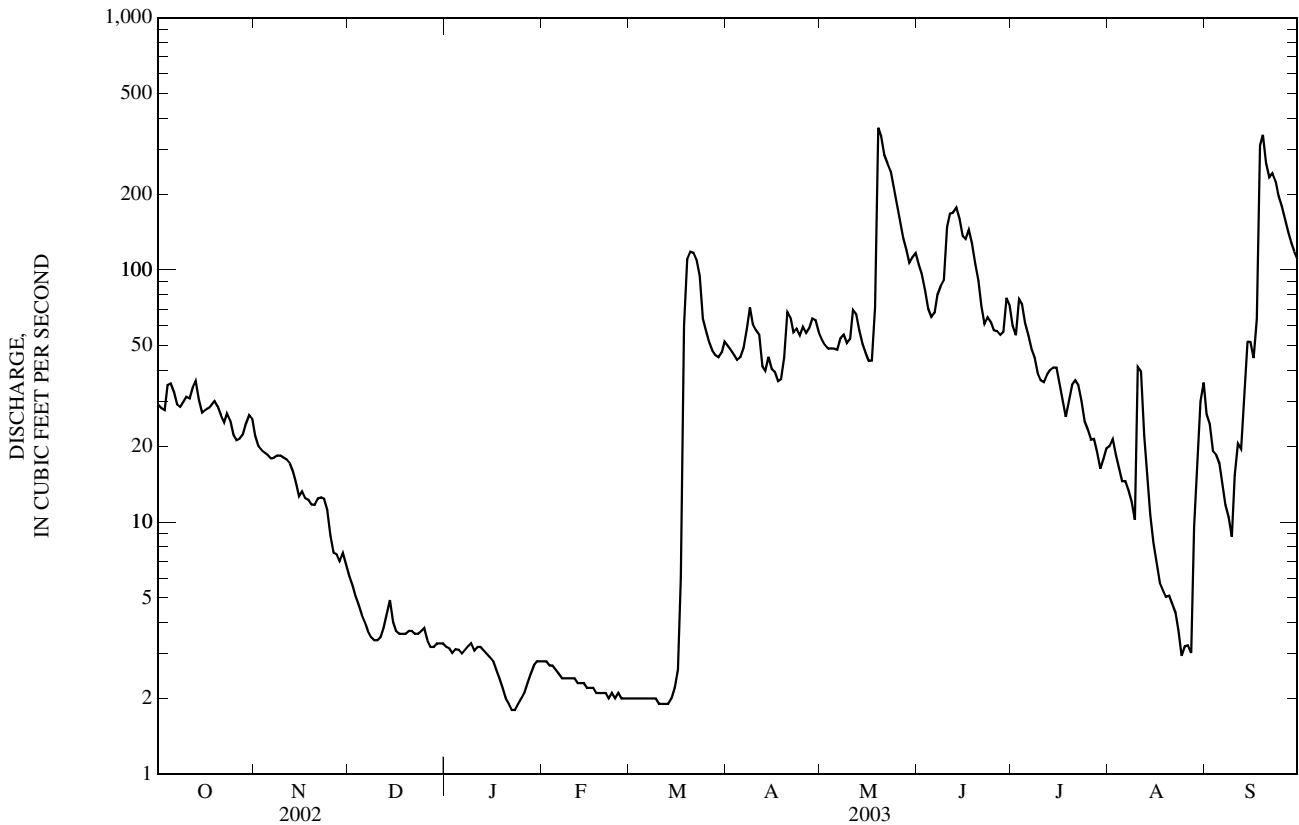
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1929 - 2003, BY WATER YEAR (WY)

MEAN	34.1	30.2	5.64	2.21	1.84	16.9	173	161	127	51.2	26.4	42.4
MAX	259	460	30.1	10.3	7.32	193	633	709	1,238	315	160	419
(WY)	(1942)	(2001)	(2001)	(1966)	(2000)	(1945)	(1966)	(1950)	(2002)	(1937)	(1968)	(1941)
MIN	0.95	1.10	0.20	0.23	0.13	0.53	7.16	2.21	0.11	0.032	0.094	0.39
(WY)	(1953)	(1977)	(1977)	(1977)	(1977)	(1964)	(1981)	(1980)	(1980)	(1980)	(1961)	(1934)

05106000 SPRAGUE CREEK NEAR SPRAGUE, MANITOBA—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1929 - 2003	
ANNUAL TOTAL	54,404.7		15,439.5		60.2	
ANNUAL MEAN	149		42.3		4.07	
HIGHEST ANNUAL MEAN					150	2002
LOWEST ANNUAL MEAN					4.07	1980
HIGHEST DAILY MEAN	8,070	Jun 11	366	May 19	8,070	Jun 11, 2002
LOWEST DAILY MEAN	1.4	Mar 4	1.8	Jan 22,23	a0.00	Apr 1, 1930
ANNUAL SEVEN-DAY MINIMUM	1.4	Mar 4	1.9	Jan 20	0.00	Aug 7, 1936
MAXIMUM PEAK FLOW			405	May 19	b8,440	Jun 11, 2002
MAXIMUM PEAK STAGE			8.31	Apr 19	17.08	Jun 11, 2002
ANNUAL RUNOFF (AC-FT)	107,900		30,620		43,620	
ANNUAL RUNOFF (CFSM)	0.85		0.24		0.34	
ANNUAL RUNOFF (INCHES)	11.50		3.26		4.65	
10 PERCENT EXCEEDS	218		110		168	
50 PERCENT EXCEEDS	27		22		9.1	
90 PERCENT EXCEEDS	2.0		2.2		1.1	

a Many days, several years.
 b From rating curve extended above 2,560 ft³/s.
 c Estimated.



05107500 ROSEAU RIVER AT ROSS, MN

LOCATION.--Lat 48°54'37", long 95°55'18", in NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 27, T. 163 N., R. 41 W., Roseau County, Hydrologic Unit 09020314, on left bank 300 ft downstream from State Highway 89 bridge, 0.2 mi. north of Ross, and 2.3 mi downstream from Pine Creek.

DRAINAGE AREA.--1,090 mi².

PERIOD OF RECORD.--July 1928 to September 1991, April 1995 to current year.

REVISED RECORDS.--WSP 1055: 1945. WSP 1175: Drainage area. WSP 1308: 1936(m). WSP 1508: 1848-49(P).

GAGE.--Water-stage recorder. Datum of gage is 1,018.61 ft above sea level (NGVD of 1929, levels by Geodetic Survey of Canada). Prior to Mar. 13, 1929, nonrecording gage at same site and datum.

REMARKS.--Records good except those for estimated daily discharges, which are poor. High flow affected by natural storage in Roseau Lake.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage known, about 19 ft in 1896. Other floods reached the following stages, from information by local residents: flood of July 1919, 17.5 ft; flood of 1927, about 16 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	68	74	e35	e21	e9.6	e9.7	e520	233	318	212	45	51
2	65	68	e30	e20	e9.6	e9.9	e570	215	286	188	51	45
3	62	62	e26	e20	e9.6	e10	491	200	261	185	54	45
4	69	61	e23	e20	e9.6	e10	502	192	237	189	49	41
5	75	59	e22	e20	e9.6	e10	e480	192	215	174	44	36
6	75	56	e21	e20	e9.5	e11	e400	188	218	152	39	31
7	78	59	e20	e19	e9.5	e11	e350	189	228	134	35	26
8	68	59	e20	e19	e9.6	e11	e300	204	273	116	31	21
9	65	57	e21	e19	e9.6	e11	e270	213	297	100	29	18
10	67	57	e21	e18	e9.6	e11	232	212	371	90	29	20
11	68	e59	e22	e18	e9.5	e11	226	232	466	84	75	28
12	70	e58	e23	e18	e9.5	e11	223	252	505	82	70	35
13	75	e53	e24	e17	e9.4	e11	211	263	541	80	53	44
14	72	e49	e25	e17	e9.3	e11	202	256	549	83	42	72
15	68	e48	e26	e16	e9.2	e11	198	237	551	112	32	87
16	68	e47	e26	e16	e9.1	e12	187	217	551	113	25	83
17	72	e46	e27	e15	e9.1	e15	172	200	545	96	20	82
18	72	e47	e27	e14	e9.1	e40	171	205	515	79	16	295
19	74	e48	e26	e13	e9.1	e130	177	463	457	67	16	664
20	75	e48	e26	e12	e9.1	e400	245	641	371	64	14	706
21	73	e49	e25	e11	e9.1	e500	326	644	299	65	12	662
22	70	e48	e25	e11	e9.1	e490	354	643	248	68	11	634
23	62	e47	e24	e10	e9.2	e475	356	631	226	63	11	619
24	60	e46	e24	e10	e9.2	e455	336	617	205	55	9.2	593
25	62	e45	e23	e9.7	e9.2	e439	310	597	185	48	9.0	576
26	62	e43	e23	e9.5	e9.3	e420	288	560	193	44	11	544
27	59	e41	e22	e9.4	e9.3	e410	275	516	211	39	9.6	507
28	61	e40	e22	e9.4	e9.5	e400	280	475	220	37	12	466
29	65	e39	e22	e9.4	---	e385	269	428	234	36	27	424
30	67	e37	e21	e9.4	---	e380	248	366	233	34	42	377
31	67	---	e21	e9.5	---	e400	---	343	---	37	51	---
TOTAL	2,114	1,550	743	460.3	262.1	5,510.6	9,169	10,824	10,009	2,926	973.8	7,832
MEAN	68.2	51.7	24.0	14.8	9.36	178	306	349	334	94.4	31.4	261
MAX	78	74	35	21	9.6	500	570	644	551	212	75	706
MIN	59	37	20	9.4	9.1	9.7	171	188	185	34	9.0	18
AC-FT	4,190	3,070	1,470	913	520	10,930	18,190	21,470	19,850	5,800	1,930	15,530
CFSM	0.06	0.05	0.02	0.01	0.01	0.16	0.28	0.32	0.31	0.09	0.03	0.24
IN.	0.07	0.05	0.03	0.02	0.01	0.19	0.31	0.37	0.34	0.10	0.03	0.27

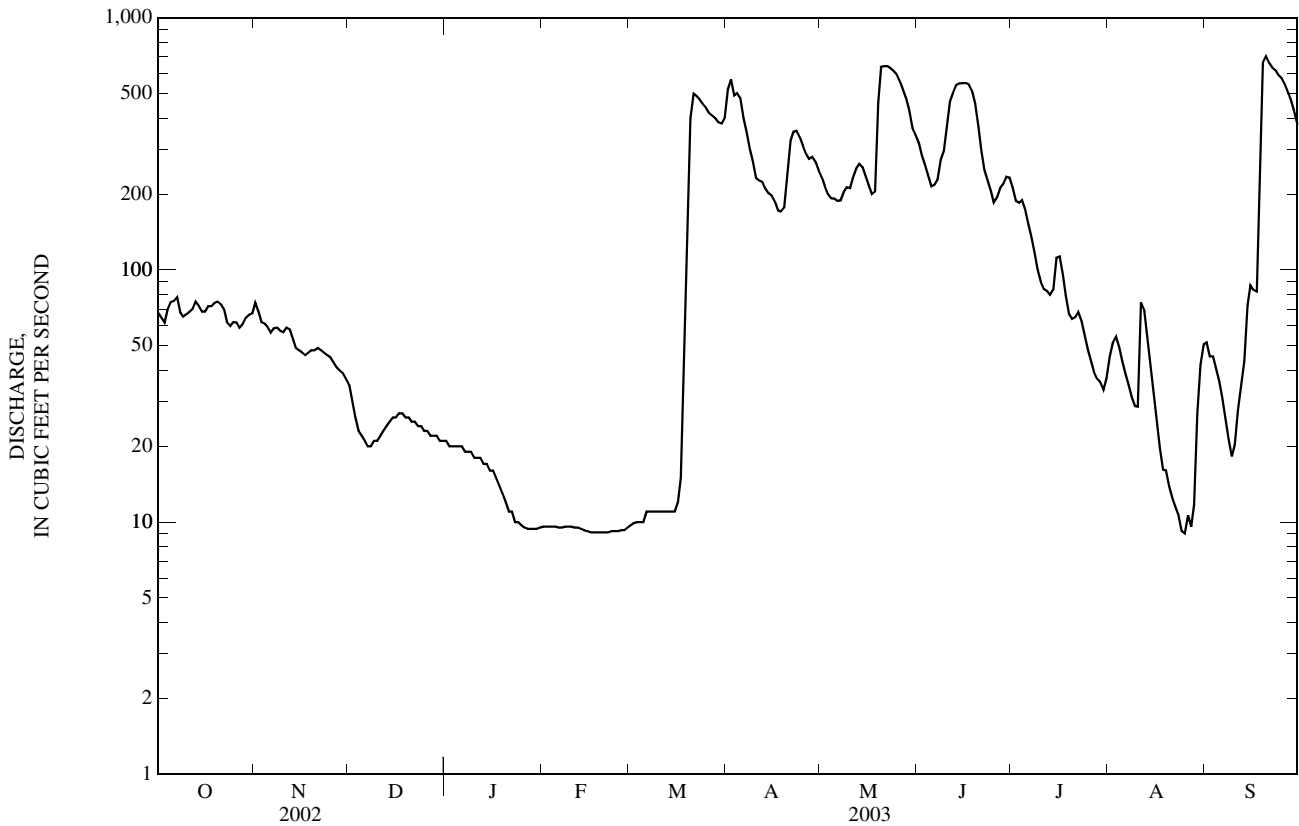
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1928 - 2003, BY WATER YEAR (WY)

MEAN	133	119	37.4	16.4	14.5	86.4	875	914	571	333	137	134
MAX	974	1,926	395	66.5	99.2	551	3,234	4,583	4,553	2,300	1,352	1,041
(WY)	(1942)	(2001)	(2001)	(1997)	(1998)	(1946)	(1966)	(1950)	(2002)	(2002)	(1968)	(1968)
MIN	1.91	1.63	0.27	0.001	0.000	2.76	32.1	29.5	6.83	1.39	0.84	0.38
(WY)	(1991)	(1977)	(1977)	(1977)	(1977)	(1989)	(1991)	(1988)	(1980)	(1980)	(1961)	(1990)

05107500 ROSEAU RIVER AT ROSS, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1928 - 2003	
ANNUAL TOTAL	254,465.7		52,373.8		a282	
ANNUAL MEAN	697		143		753	
HIGHEST ANNUAL MEAN					28.9	
LOWEST ANNUAL MEAN					10,100	
HIGHEST DAILY MEAN	10,100	Jun 16	706	Sep 20	10,100	Jun 16, 2002
LOWEST DAILY MEAN	8.0	Mar 8	9.0	Aug 25	b0.00	Aug 29, 1961
ANNUAL SEVEN-DAY MINIMUM	8.0	Mar 7	9.1	Feb 16	0.00	Jan 3, 1977
MAXIMUM PEAK FLOW			c714	Sep 20	10,500	Jun 16, 2002
MAXIMUM PEAK STAGE			d9.19	Mar 20	18.89	Jun 16, 2002
INSTANTANEOUS LOW FLOW			8.2	Aug 25	b0.00	Aug 29, 1961
ANNUAL RUNOFF (AC-FT)	504,700		103,900		204,100	
ANNUAL RUNOFF (CFSM)	0.64		0.13		0.26	
ANNUAL RUNOFF (INCHES)	8.68		1.79		3.51	
10 PERCENT EXCEEDS	2,040		459		900	
50 PERCENT EXCEEDS	74		59		42	
90 PERCENT EXCEEDS	14		9.6		6.0	

- a Median of annual mean discharges is 240 ft³/s.
- b Many days, several years.
- c Gage height, 7.95 ft.
- d Backwater from ice.
- e Estimated.



05112000 ROSEAU RIVER BELOW STATE DITCH 51, NEAR CARIBOU, MN

LOCATION.--Lat 48°58'54", long 96°27'46", in SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 34, T.164 N., R.45 W., Kittson County, Hydrologic Unit 09020314, on left bank 400 ft downstream from State ditch 51 (known locally as Caribou cutoff ditch) and 0.6 mi west of Caribou.

DRAINAGE AREA.--1,420 mi².

PERIOD OF RECORD.--April to October 1917, April 1920 to current year (no winter records in water years 1931, 1932, 1934-36, 1938-40, 1944-72).

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.

REVISED RECORDS.--WSP 1308: 1938(M). WSP 1508: 1917(M), 1920, 1932(M), 1934-35(M). WSP 1913: 1954(M).

GAGE.--Water-stage recorder. Datum of gage is 1,002.31 ft above sea level (NGVD of 1929, levels by Geodetic Survey of Canada). Prior to Apr. 1, 1929, nonrecording gage at site at Caribou 0.6 mi upstream at datum 0.95 ft lower.

REMARKS.--Records good except those for estimated daily discharges, which are poor. Some regulation from wildlife management impoundments several miles upstream of gage. Occasionally, at high stages, there is some natural diversion of flow above station to headwaters of Two Rivers.

COOPERATION.--Red Lake Watershed Management Board.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of 1916 is reported to have reached a stage of about 15.5 ft at former site.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	96	e155	e52	e26	e12	e12	e660	291	370	241	27	53
2	90	e155	e49	e25	e12	e12	e670	274	340	235	32	64
3	85	153	e45	e24	e12	e12	e650	259	308	223	38	62
4	86	144	e40	e24	e12	e12	e600	252	284	210	43	54
5	89	134	e35	e23	e12	e12	e540	242	261	212	44	54
6	93	122	e33	e23	e12	e12	e470	235	273	201	39	49
7	93	118	e31	e22	e12	e13	e410	231	309	181	33	46
8	99	e115	e29	e22	e12	e13	e350	231	285	166	30	41
9	93	111	e28	e21	e12	e13	e320	245	315	148	26	34
10	83	100	e27	e21	e12	e13	288	258	410	128	29	33
11	84	86	e27	e20	e11	e13	302	261	519	113	24	33
12	88	e90	e28	e20	e11	e13	292	274	608	108	40	30
13	88	e86	e30	e19	e11	e13	279	288	647	100	65	42
14	92	e80	e31	e19	e11	e13	267	300	643	98	52	52
15	90	e80	e32	e19	e11	e13	257	296	627	101	39	74
16	87	e85	e33	e18	e11	e13	241	281	629	131	31	103
17	83	e87	e34	e17	e12	e13	216	272	630	156	25	111
18	87	e88	e34	e16	e12	e13	211	288	620	140	21	119
19	89	e87	e35	e16	e12	e14	267	363	594	115	16	263
20	89	e85	e35	e15	e12	e15	308	545	532	78	14	506
21	91	e82	e35	e14	e12	e30	358	709	449	58	14	628
22	84	e75	e34	e14	e12	e100	425	763	373	56	12	653
23	79	e72	e33	e13	e12	e400	445	778	313	55	12	643
24	69	e68	e32	e13	e12	e560	441	780	278	53	14	622
25	48	e67	e31	e13	e12	e564	422	764	255	47	14	613
26	99	e66	e30	e12	e12	e555	392	735	227	41	17	593
27	144	e65	e29	e12	e12	e540	368	693	211	33	17	561
28	138	e63	e29	e12	e12	e520	354	646	218	30	22	523
29	127	e60	e28	e12	---	e510	353	585	227	28	19	479
30	137	e56	e27	e12	---	e500	321	512	237	27	19	431
31	e150	---	e26	e12	---	e560	---	418	---	26	36	---
TOTAL	2,950	2,835	1,022	549	330	5,096	11,477	13,069	11,992	3,539	864	7,569
MEAN	95.2	94.5	33.0	17.7	11.8	164	383	422	400	114	27.9	252
MAX	150	155	52	26	12	564	670	780	647	241	65	653
MIN	48	56	26	12	11	12	211	231	211	26	12	30
AC-FT	5,850	5,620	2,030	1,090	655	10,110	22,760	25,920	23,790	7,020	1,710	15,010
CFSM	0.07	0.07	0.02	0.01	0.01	0.12	0.27	0.30	0.28	0.08	0.02	0.18
IN.	0.08	0.07	0.03	0.01	0.01	0.13	0.30	0.34	0.31	0.09	0.02	0.20

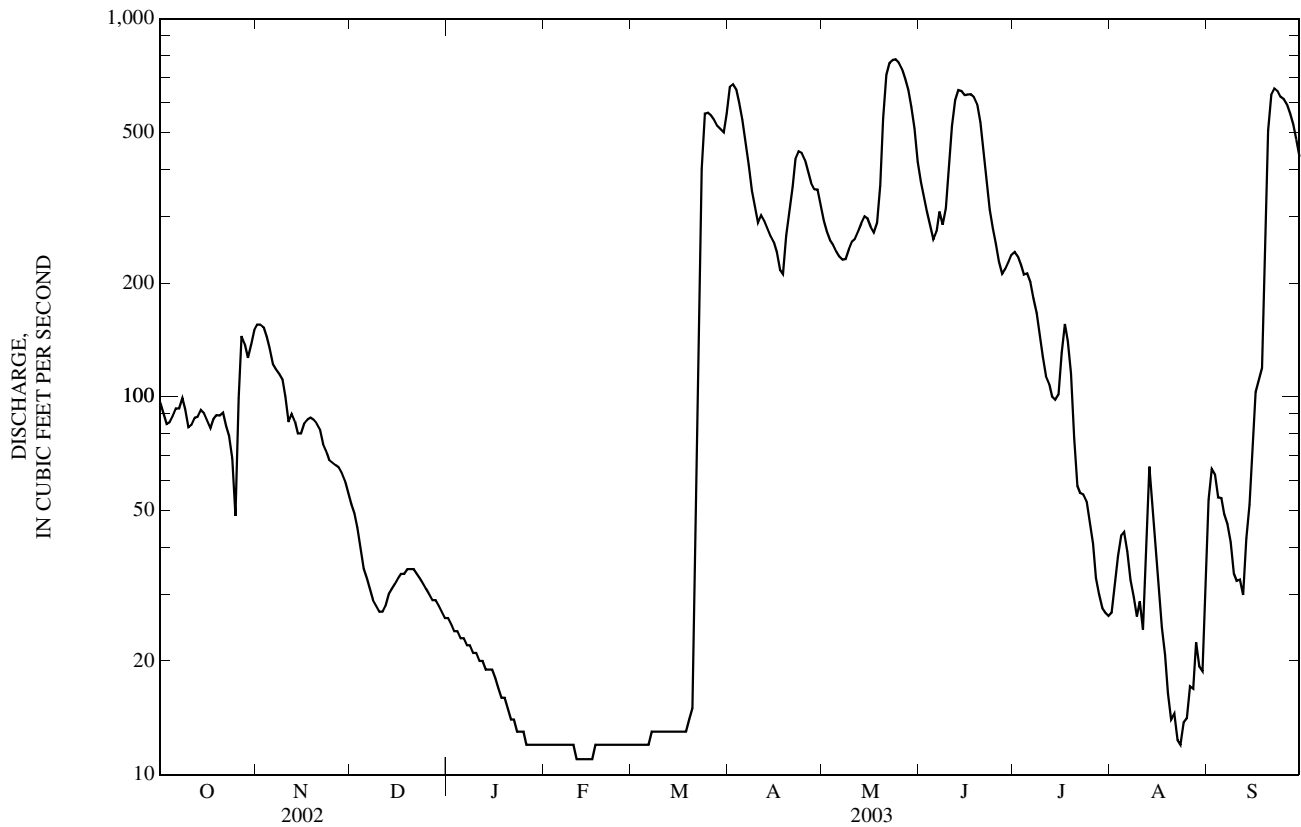
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1917 - 2003, BY WATER YEAR (WY)

MEAN	172	171	70.4	27.4	23.1	132	829	967	646	456	177	182
MAX	1,302	2,022	813	134	75.4	793	2,168	3,029	2,588	3,080	1,582	1,451
(WY)	(1942)	(2001)	(2001)	(1927)	(1997)	(1995)	(1966)	(1950)	(1970)	(2002)	(1993)	(1968)
MIN	0.12	0.26	0.53	0.090	0.060	1.57	38.2	26.9	6.70	0.65	2.09	0.30
(WY)	(1991)	(1991)	(1991)	(1991)	(1991)	(1989)	(1981)	(1988)	(1980)	(1980)	(1936)	(1990)

05112000 ROSEAU RIVER BELOW STATE DITCH 51, NEAR CARIBOU, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1917 - 2003	
ANNUAL TOTAL	235,642		61,292		337	
ANNUAL MEAN	646		168		35.9	
HIGHEST ANNUAL MEAN					933	2001
LOWEST ANNUAL MEAN					35.9	1977
HIGHEST DAILY MEAN	4,320	Jun 25	780	May 24	4,320	Jun 25, 2002
LOWEST DAILY MEAN	10	Mar 12	11	Feb 11	0.00	Sep 15, 1990
ANNUAL SEVEN-DAY MINIMUM	11	Mar 7	11	Feb 10	0.04	Sep 12, 1990
MAXIMUM PEAK FLOW			a781	May 23	4,320	Jun 24, 2002
MAXIMUM PEAK STAGE			b7.33	Mar 27	11.91	Jun 24, 2002
INSTANTANEOUS LOW FLOW			10	Aug 23	c0.00	Aug 13, 1936
ANNUAL RUNOFF (AC-FT)	467,400		121,600		244,500	
ANNUAL RUNOFF (CFSM)	0.45		0.12		0.24	
ANNUAL RUNOFF (INCHES)	6.17		1.61		3.23	
10 PERCENT EXCEEDS	2,640		527		1,160	
50 PERCENT EXCEEDS	116		80		67	
90 PERCENT EXCEEDS	18		12		8.8	

- a Gage height, 5.51 ft.
- b Backwater from ice.
- c Many days, several years.
- e Estimated.



RAINY RIVER BASIN

05124480 KAWISHIWI RIVER NEAR ELY, MN

LOCATION.--Lat 47°55'22", long 91°32'06", in SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 24, T.63 N., R.10 W., Lake County, Hydrologic Unit 09030001, in Superior National Forest, on left bank 100 ft upstream from rapids, 2 mi upstream from South Kawishiwi River, 2.2 mi southwest of Fernberg Lookout Tower and 14 mi east of Ely.

DRAINAGE AREA.--254 mi².

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

GAGE.--Water-stage recorder. Elevation of gage is 1,450 ft above sea level, from topographic map.

REMARKS.--Records good.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	43	55	69	60	44	35	38	122	206	173	263	109
2	42	55	68	59	44	35	38	124	204	185	259	107
3	41	56	68	59	44	35	38	127	200	197	256	103
4	46	55	68	58	44	35	39	131	195	196	246	99
5	50	56	68	58	44	35	39	134	190	191	238	95
6	50	56	68	57	43	35	39	137	186	190	235	92
7	49	56	68	56	43	35	39	142	180	200	233	90
8	48	56	68	56	42	34	38	147	179	192	223	88
9	48	57	68	56	41	33	38	153	197	187	212	86
10	47	58	67	56	41	33	39	162	194	200	204	83
11	47	58	67	55	41	33	40	168	189	207	195	81
12	51	59	66	54	40	33	40	170	183	207	187	94
13	52	60	66	53	40	32	40	174	176	207	180	95
14	51	62	66	52	39	32	41	181	170	210	174	89
15	51	63	65	52	39	32	43	183	165	231	169	85
16	50	63	65	51	39	32	46	183	160	236	165	81
17	50	63	64	50	39	33	50	183	166	236	160	78
18	50	64	65	50	38	33	53	183	186	234	153	78
19	53	64	66	50	38	33	60	197	180	240	149	106
20	53	65	67	50	38	34	70	217	171	267	147	115
21	53	66	66	49	38	35	88	219	164	266	159	112
22	53	67	66	48	38	36	96	221	157	263	150	111
23	52	68	65	47	38	36	101	221	159	262	144	106
24	52	69	65	47	37	37	104	219	166	264	139	102
25	52	69	64	47	37	37	108	215	172	262	136	101
26	53	68	64	46	36	36	111	210	189	260	131	100
27	53	68	63	46	36	37	114	203	189	256	124	101
28	54	68	63	46	35	38	116	203	187	251	124	100
29	55	69	62	45	---	38	118	197	183	246	122	96
30	56	68	62	45	---	38	120	202	180	252	116	95
31	55	---	61	44	---	38	---	208	---	257	112	---
TOTAL	1,560	1,861	2,038	1,602	1,116	1,078	1,944	5,536	5,423	7,025	5,505	2,878
MEAN	50.3	62.0	65.7	51.7	39.9	34.8	64.8	179	181	227	178	95.9
MAX	56	69	69	60	44	38	120	221	206	267	263	115
MIN	41	55	61	44	35	32	38	122	157	173	112	78
AC-FT	3,090	3,690	4,040	3,180	2,210	2,140	3,860	10,980	10,760	13,930	10,920	5,710
CFSM	0.20	0.24	0.26	0.20	0.16	0.14	0.26	0.70	0.71	0.89	0.70	0.38
IN.	0.23	0.27	0.30	0.23	0.16	0.16	0.28	0.81	0.79	1.03	0.81	0.42

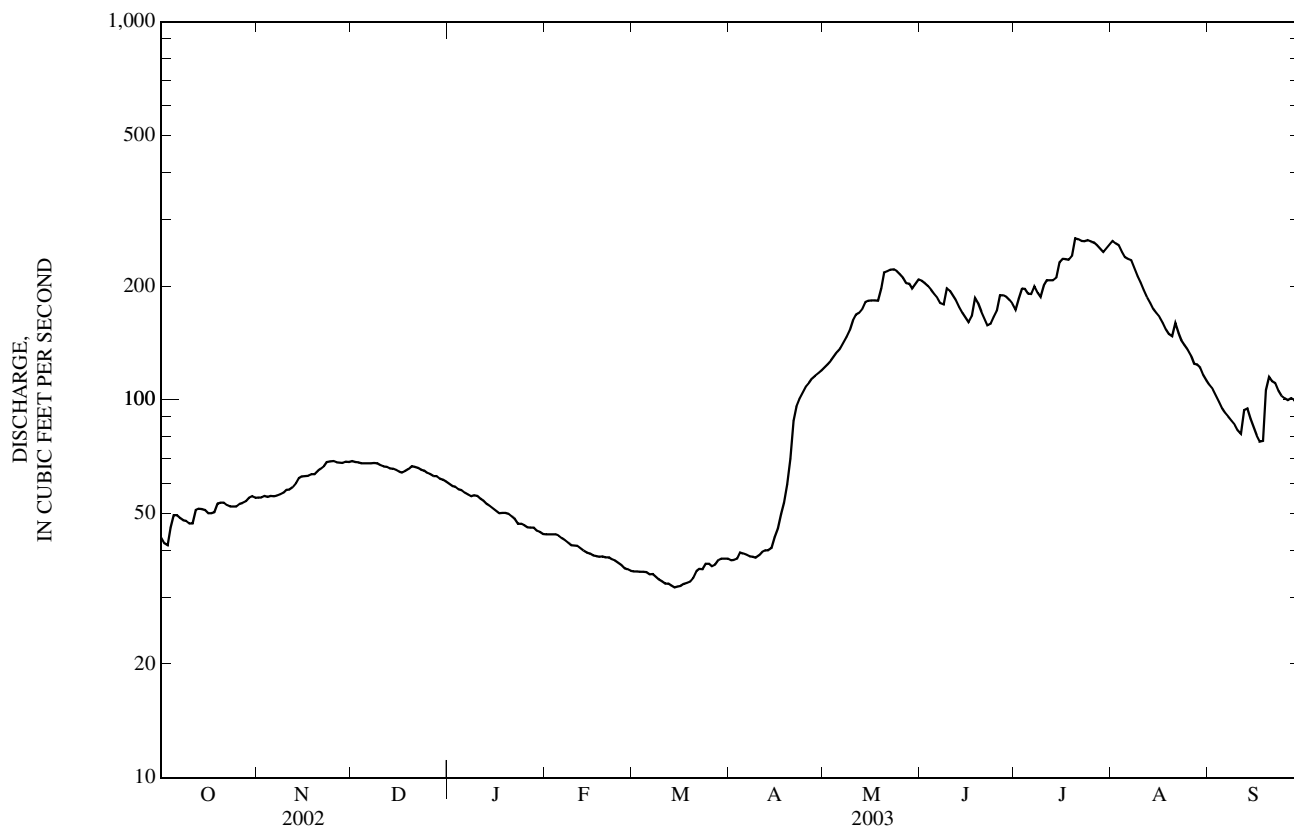
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1966 - 2003, BY WATER YEAR (WY)

MEAN	147	158	134	93.0	67.5	56.3	237	633	364	209	147	134
MAX	881	684	345	163	107	85.2	785	1,133	1,070	523	758	698
(WY)	(1978)	(1971)	(1983)	(1984)	(1971)	(1969)	(1976)	(1979)	(1970)	(1999)	(1988)	(1988)
MIN	12.1	9.43	7.25	5.32	4.77	5.87	8.95	13.3	115	65.1	36.0	18.5
(WY)	(1977)	(1977)	(1977)	(1977)	(1977)	(1977)	(1977)	(1977)	(1977)	(1998)	(1998)	(1976)

05124480 KAWISHIWI RIVER NEAR ELY, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1966 - 2003	
ANNUAL TOTAL	38,919		37,566		199	
ANNUAL MEAN	107		103		313	
HIGHEST ANNUAL MEAN					81.3	1971
LOWEST ANNUAL MEAN					1,850	1998
HIGHEST DAILY MEAN	277	May 12	267	Jul 20	1,870	May 3, 2001
LOWEST DAILY MEAN	41	Oct 3	32	Mar 13-16	a4.5	Jan 31, 1977
ANNUAL SEVEN-DAY MINIMUM	43	Sep 27	32	Mar 10	4.6	Jan 29, 1977
MAXIMUM PEAK FLOW			270	Jul 20	1,870	May 4, 2001
MAXIMUM PEAK STAGE			3.99	Jul 20	6.07	May 4, 2001
INSTANTANEOUS LOW FLOW			32	Mar 11	4.5	Jan 30, 1977
ANNUAL RUNOFF (AC-FT)	77,200		74,510		144,400	
ANNUAL RUNOFF (CFSM)	0.42		0.41		0.78	
ANNUAL RUNOFF (INCHES)	5.70		5.50		10.66	
10 PERCENT EXCEEDS	194		207		486	
50 PERCENT EXCEEDS	80		67		108	
90 PERCENT EXCEEDS	53		38		37	

a Occurred Jan. 31 to Feb. 2, 1977.



05125000 SOUTH KAWISHIWI RIVER NEAR ELY, MN

LOCATION.--Lat 47°50'24", long 91°41'43", in NE $\frac{1}{4}$ WW $\frac{1}{4}$ sec. 23, T.62 N., R.11 W., Lake County, Hydrologic Unit 09030001, on left bank 5 mi upstream from Birch Lake and 9 mi southeast of Ely.

DRAINAGE AREA.--

PERIOD OF RECORD.--October 1951 to September 1961, April 1976 to September 1978, May 2003 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 1430 ft above mean sea level (from topographic map).

REMARKS.--Records good.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

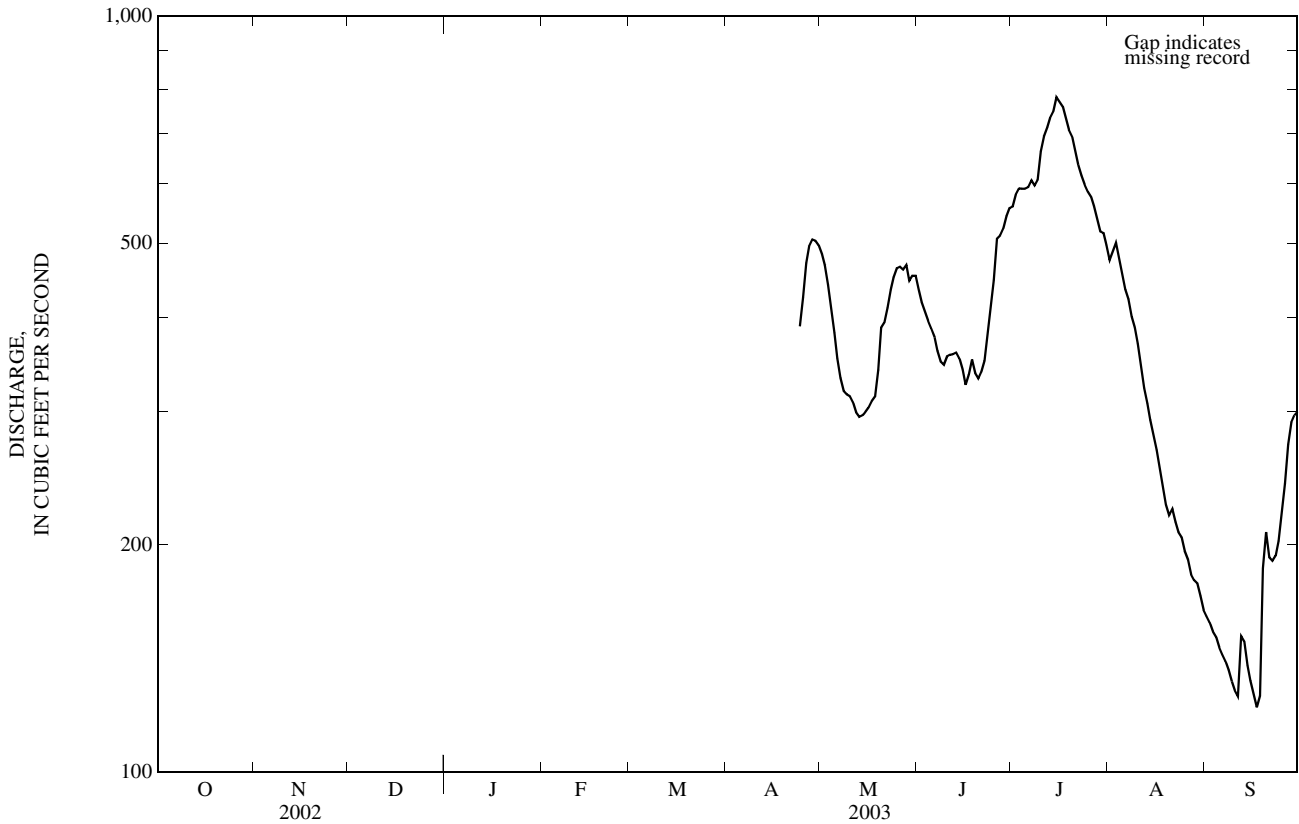
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	---	---	---	485	434	560	476	161
2	---	---	---	---	---	---	---	468	418	581	489	158
3	---	---	---	---	---	---	---	442	407	592	501	154
4	---	---	---	---	---	---	---	409	396	592	478	151
5	---	---	---	---	---	---	---	381	386	591	457	146
6	---	---	---	---	---	---	---	353	376	594	435	143
7	---	---	---	---	---	---	---	332	361	606	422	140
8	---	---	---	---	---	---	---	319	350	597	400	137
9	---	---	---	---	---	---	---	316	346	607	387	132
10	---	---	---	---	---	---	---	314	355	663	369	129
11	---	---	---	---	---	---	---	309	357	694	345	126
12	---	---	---	---	---	---	---	299	357	712	322	152
13	---	---	---	---	---	---	---	295	359	733	308	149
14	---	---	---	---	---	---	---	297	353	748	292	139
15	---	---	---	---	---	---	---	300	341	782	280	132
16	---	---	---	---	---	---	---	304	325	770	267	127
17	---	---	---	---	---	---	---	310	336	759	253	122
18	---	---	---	---	---	---	---	314	352	734	238	126
19	---	---	---	---	---	---	---	341	338	708	226	186
20	---	---	---	---	---	---	---	387	332	693	219	208
21	---	---	---	---	---	---	---	393	339	661	223	192
22	---	---	---	---	---	---	---	412	350	635	214	191
23	---	---	---	---	---	---	---	435	384	616	208	193
24	---	---	---	---	---	---	389	452	418	599	205	202
25	---	---	---	---	---	---	425	464	448	586	196	220
26	---	---	---	---	---	---	472	466	508	577	191	241
27	---	---	---	---	---	---	496	462	513	561	183	272
28	---	---	---	---	---	---	506	468	524	540	180	290
29	---	---	---	---	---	---	505	447	545	519	178	296
30	---	---	---	---	---	---	498	454	557	516	171	300
31	---	---	---	---	---	---	---	454	---	498	164	---
TOTAL	---	---	---	---	---	---	---	11,882	11,865	19,624	9,277	5,315
MEAN	---	---	---	---	---	---	---	383	396	633	299	177
MAX	---	---	---	---	---	---	---	485	557	782	501	300
MIN	---	---	---	---	---	---	---	295	325	498	164	122
AC-FT	---	---	---	---	---	---	---	23,570	23,530	38,920	18,400	10,540

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1952 - 2003, BY WATER YEAR (WY)

MEAN	402	299	237	175	132	115	693	1,247	756	454	291	384
MAX	1,733	757	456	295	179	150	2,278	3,141	1,440	885	1,125	1,099
(WY)	(1978)	(1978)	(1952)	(1978)	(1957)	(1953)	(1976)	(1954)	(1978)	(1952)	(1952)	(1977)
MIN	36.0	49.0	45.8	37.1	33.5	57.4	130	179	290	152	80.7	45.0
(WY)	(1961)	(1977)	(1977)	(1977)	(1977)	(1977)	(1977)	(1977)	(1958)	(1958)	(1961)	(1976)

05125000 SOUTH KAWISHIWI RIVER NEAR ELY, MN—Continued

SUMMARY STATISTICS	FOR 2003 WATER YEAR		WATER YEARS 1905-2003	
ANNUAL MEAN			440	
HIGHEST ANNUAL MEAN			673	1978
LOWEST ANNUAL MEAN			233	1958
HIGHEST DAILY MEAN			5110	May 5 1954
LOWEST DAILY MEAN	122	Sep 17	27	Oct 10 1960
ANNUAL SEVEN-DAY MINIMUM			29	Oct 6 1960
MAXIMUM PEAK FLOW	788	Jul 14	5130	May 4 1954
MAXIMUM PEAK STAGE	3.79	Jul 14	7.25	May 4 1954
INSTANTANEOUS LOW FLOW	16	Sep 18	25	Oct 12 1960
ANNUAL RUNOFF (AC-FT)			318,700	
10 PERCENT EXCEEDS			1,080	
50 PERCENT EXCEEDS			228	
90 PERCENT EXCEEDS			99	



05126210 SOUTH KAWISHIWI RIVER ABOVE WHITE IRON LAKE NEAR ELY, MN

LOCATION.--Lat 47°50'31", long 91°45'56", in SW¹/₄NW¹/₄ sec. 19, T.62 N., R.11 W., Lake County, Hydrologic Unit 09030001, on right bank 0.5 mi above inlet to White Iron Lake and 5 mi southeast of Ely.

DRAINAGE AREA.--

PERIOD OF RECORD.--August 1975 to September 1978, May 2003 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 1,420 ft above mean sea level (from topographic map).

REMARKS.--Records good. Flow regulated by Minnesota Power Co. dam located 2.1 mi above gage at outlet of Birch Lake.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

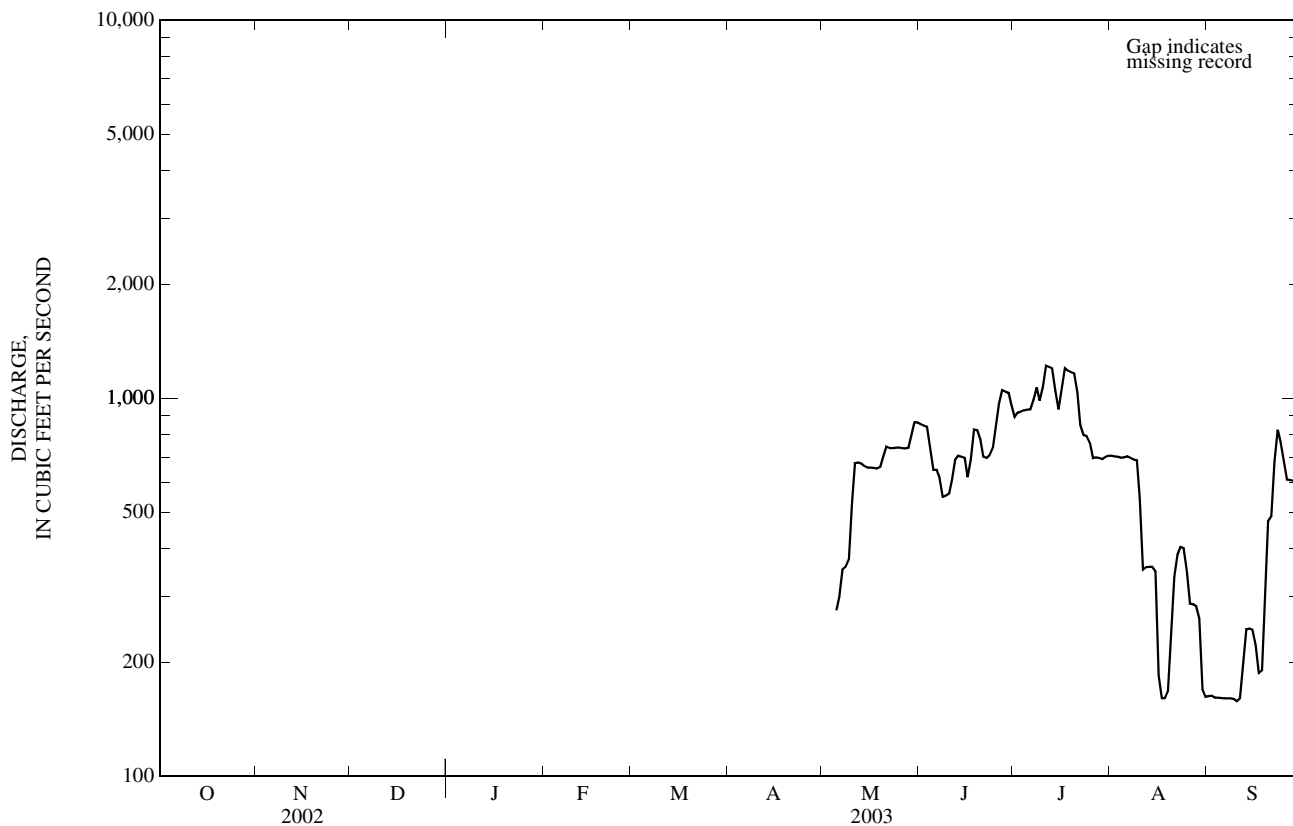
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---	---	---	---	---	---	---	854	893	705	163
2	---	---	---	---	---	---	---	---	846	918	703	163
3	---	---	---	---	---	---	---	---	841	923	701	162
4	---	---	---	---	---	---	---	---	744	930	696	162
5	---	---	---	---	---	---	---	275	647	934	699	161
6	---	---	---	---	---	---	---	299	647	935	702	161
7	---	---	---	---	---	---	---	353	617	991	695	161
8	---	---	---	---	---	---	---	359	549	1,070	689	161
9	---	---	---	---	---	---	---	375	552	985	686	160
10	---	---	---	---	---	---	---	533	559	1,070	542	158
11	---	---	---	---	---	---	---	674	608	1,220	353	161
12	---	---	---	---	---	---	---	677	687	1,210	358	200
13	---	---	---	---	---	---	---	673	705	1,200	358	245
14	---	---	---	---	---	---	---	661	701	1,050	358	246
15	---	---	---	---	---	---	---	656	695	935	349	244
16	---	---	---	---	---	---	---	655	619	1,050	185	223
17	---	---	---	---	---	---	---	655	690	1,200	161	188
18	---	---	---	---	---	---	---	653	828	1,180	161	191
19	---	---	---	---	---	---	---	658	825	1,170	168	294
20	---	---	---	---	---	---	---	700	777	1,160	232	473
21	---	---	---	---	---	---	---	745	701	1,040	338	487
22	---	---	---	---	---	---	---	739	696	849	387	682
23	---	---	---	---	---	---	---	739	708	800	404	825
24	---	---	---	---	---	---	---	740	741	796	402	767
25	---	---	---	---	---	---	---	741	843	763	350	681
26	---	---	---	---	---	---	---	738	968	695	287	610
27	---	---	---	---	---	---	---	738	1,050	698	285	608
28	---	---	---	---	---	---	---	741	1,040	695	282	606
29	---	---	---	---	---	---	---	799	1,040	691	262	605
30	---	---	---	---	---	---	---	866	959	700	170	602
31	---	---	---	---	---	---	---	863	---	705	163	---
TOTAL	---	---	---	---	---	---	---	---	22,737	29,456	12,831	10,550
MEAN	---	---	---	---	---	---	---	---	758	950	414	352
MAX	---	---	---	---	---	---	---	---	1,050	1,220	705	825
MIN	---	---	---	---	---	---	---	---	549	691	161	158
AC-FT	---	---	---	---	---	---	---	---	45,100	58,430	25,450	20,930

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1975 - 2003, BY WATER YEAR (WY)

MEAN	1,120	626	560	405	247	231	1,598	1,230	1,266	958	384	727
MAX	2,831	1,325	871	666	356	310	3,730	2,125	2,394	1,253	842	1,934
(WY)	(1978)	(1978)	(1978)	(1978)	(1978)	(1976)	(1976)	(1978)	(1978)	(1978)	(1978)	(1977)
MIN	84.4	78.3	84.4	80.4	70.2	97.7	138	187	758	672	94.3	104
(WY)	(1977)	(1977)	(1977)	(1977)	(1977)	(1977)	(1977)	(1977)	(2003)	(1976)	(1976)	(1976)

05126210 SOUTH KAWISHIWI RIVER ABOVE WHITE IRON LAKE NEAR ELY, MN—Continued

SUMMARY STATISTICS	WATER YEAR 2003		WATER YEARS 1975 - 2003	
ANNUAL MEAN			819	
HIGHEST ANNUAL MEAN			1,241	1978
LOWEST ANNUAL MEAN			408	1977
HIGHEST DAILY MEAN	1,220	Jul 11	8,040	Apr 22 1976
LOWEST DAILY MEAN	158	Sep 10	27	Mar 22 1977
ANNUAL SEVEN-DAY MINIMUM	160	Sep 5	34	Aug 13 1976
MAXIMUM PEAK FLOW	1,240	Jul 10	8,080	Apr 22 1976
MAXIMUM PEAK STAGE	5.70	Jul 10	11.42	Apr 22 1976
INSTANTANEOUS LOW FLOW	156	Sep 9	19	Mar 22 1977
ANNUAL RUNOFF (AC-FT)			593,100	
10 PERCENT EXCEEDS			1,900	
50 PERCENT EXCEEDS			480	
90 PERCENT EXCEEDS			80	



05127000 KAWISHIWI RIVER NEAR WINTON, MN

LOCATION.--Lat 47°56'05", long 91°45'50", in NE¼NW¼ sec. 20, T.63 N., R.11 W., Lake County, Hydrologic Unit 09030001, Superior National Forest, at power plant of Minnesota Power Co., just upstream from Fall Lake, and 1.8 mi east of Winton.

DRAINAGE AREA.--1,230 mi².

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.

REVISED RECORDS.--WDR MN-77-1: Drainage area.

REMARKS.--No estimated daily discharges. Records fair. Daily discharge computed from power plant records. Flow regulated by power plant and by Camp Six, Bald Eagle, Gabbro, Little Gabbro, Birch, White Iron, South Farm, and Garden Lakes.

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

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	221	139	308	308	105	121	122	308	761	1,230	893	253
2	225	131	308	308	149	121	163	349	772	1,120	893	64
3	185	210	308	308	168	165	261	402	895	1,120	894	0.00
4	226	375	308	308	246	183	261	402	897	1,120	875	0.00
5	384	405	308	308	259	200	261	407	843	1,120	893	0.00
6	209	405	308	287	259	153	261	448	775	1,120	846	0.00
7	208	405	308	270	259	123	261	448	775	1,380	894	0.00
8	246	393	308	247	259	153	261	448	626	1,220	894	264
9	257	381	308	261	259	220	261	451	556	1,230	894	404
10	298	380	308	261	259	223	261	461	580	1,390	881	403
11	305	380	308	260	259	187	252	665	606	1,490	563	129
12	362	378	309	260	259	122	161	872	623	1,490	405	254
13	399	355	309	260	259	122	122	870	655	1,490	405	451
14	399	355	309	260	259	122	122	871	837	1,270	406	450
15	393	355	309	260	259	122	224	871	877	1,120	406	416
16	399	350	308	260	259	123	261	843	892	1,120	406	353
17	399	291	308	260	259	123	260	836	892	1,140	381	269
18	432	334	308	260	140	224	260	808	891	1,230	94	257
19	447	335	309	260	106	230	326	748	892	1,280	0.00	484
20	452	335	309	260	121	157	385	748	892	1,340	0.00	670
21	452	335	309	260	121	122	447	825	892	1,410	279	669
22	452	332	308	260	121	122	447	898	854	1,230	446	748
23	667	308	308	261	237	122	432	898	841	1,120	446	890
24	799	308	308	257	258	198	406	898	862	1,120	446	890
25	787	308	308	257	277	258	345	898	903	957	445	890
26	666	311	308	257	185	258	260	877	1,030	794	445	886
27	604	308	308	254	122	176	260	849	1,120	787	424	807
28	552	308	309	259	121	120	258	882	1,240	765	401	755
29	571	308	309	259	---	119	258	897	1,320	796	394	660
30	576	308	309	166	---	120	266	829	1,320	821	377	554
31	441	---	308	97	---	122	---	791	---	893	377	---
TOTAL	13,013	9,826	9,558	8,053	5,844	4,931	8,125	21,798	25,919	35,713	16,403.00	12,870.00
MEAN	420	328	308	260	209	159	271	703	864	1,152	529	429
MAX	799	405	309	308	277	258	447	898	1,320	1,490	894	890
MIN	185	131	308	97	105	119	122	308	556	765	0.00	0.00
AC-FT	25,810	19,490	18,960	15,970	11,590	9,780	16,120	43,240	51,410	70,840	32,540	25,530
CFSM	0.34	0.27	0.25	0.21	0.17	0.13	0.22	0.57	0.70	0.94	0.43	0.35
IN.	0.39	0.30	0.29	0.24	0.18	0.15	0.25	0.66	0.78	1.08	0.50	0.39
+	4.27	-30.6	-78.0	-118	-127	-6.04	286	89.7	-33.8	4.16	-14.0	7.31
MEAN ‡	4.24	297	230	142	81.7	153	557	793	830	1156	515	436
CFSM ‡	0.34	0.24	0.19	0.12	0.07	0.12	0.45	0.64	0.67	0.94	0.42	0.35
IN ‡	0.39	0.27	0.22	0.14	0.07	0.14	0.50	0.74	0.75	1.08	0.48	0.39

CAL. YR. 02 TOTAL 201,405 MEAN 552 MAX 1,830 MIN 116 MEAN ‡ 548 CFSM ‡ 0.45 IN ‡ 6.05
WTR. YR. 03 TOTAL 172,053 MEAN 471 MAX 1,490 MIN 0.00 MEAN ‡ 470 CFSM ‡ 0.38 IN ‡ 5.19

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1905 - 2003, BY WATER YEAR (WY)

	MEAN	882	760	597	454	348	376	1,211	3,081	1,886	1,164	692	729
MAX	4,277	3,572	1,422	862	770	844	5,020	9,278	5,661	3,382	3,775	3,149	
(WY)	(1947)	(1971)	(1983)	(1978)	(1927)	(1945)	(1945)	(1950)	(1968)	(1999)	(1988)	(1928)	
MIN	66.5	8.97	76.1	80.3	74.5	103	19.3	111	519	217	51.7	38.1	
(WY)	(1924)	(1924)	(1977)	(1977)	(1977)	(1924)	(1924)	(1924)	(1980)	(1961)	(1919)	(1919)	

05127000 KAWISHIWI RIVER NEAR WINTON, MN—Continued

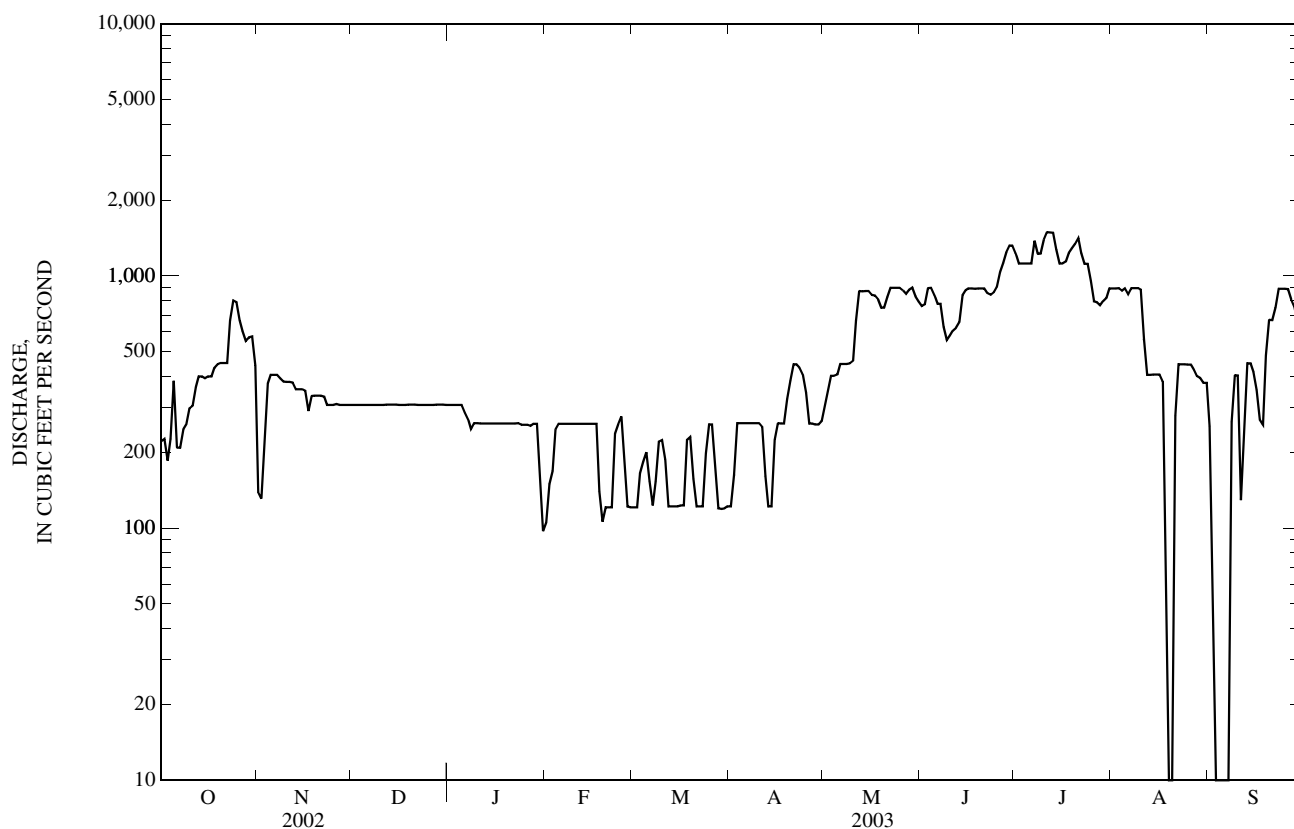
SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1905 - 2003	
ANNUAL TOTAL	201,405		172,053.00			
ANNUAL MEAN	552		471		1,025	
HIGHEST ANNUAL MEAN					1,967	1950
LOWEST ANNUAL MEAN					240	1924
HIGHEST DAILY MEAN	1,830	May 2	1,490	Jul 11-13	16,000	May 18, 1950
LOWEST DAILY MEAN	116	Jul 19	a0.00	Aug 19	b0.00	Aug 24, 1905
ANNUAL SEVEN-DAY MINIMUM	139	Sep 24	45	Sep 1	0.00	Oct 13, 1923
ANNUAL RUNOFF (AC-FT)	399,500		341,300		742,400	
ANNUAL RUNOFF (CFSM)	0.45		0.38		0.83	
ANNUAL RUNOFF (INCHES)	6.09		5.20		11.32	
10 PERCENT EXCEEDS	1,150		897		2,420	
50 PERCENT EXCEEDS	434		311		600	
90 PERCENT EXCEEDS	245		127		200	

+ Change in contents, equivalent in cubic feet per second, in Camp Six, Bald Eagle, Gabbro, Little Gabbro, Birch, White Iron, Farm, South Farm, and Garden Lakes.

‡ Adjusted for change in reservoir contents.

a Also occurred Aug. 20, and Sept. 3-7.

b Many days, several years.



05127500 BASSWOOD RIVER NEAR WINTON, MN
(International Gaging Station)

LOCATION.--Lat 48°04'57", long 91°39'09", in SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 30, T.65 N., R.10 W., Lake County, Hydrologic Unit 09030001, in Superior National Forest, on island in Jackfish Bay of Basswood Lake, used to determine discharge at outlet (lat 48°06'21", long 91°38'51", in sec. 19, T.65 N., R.10 W., on international boundary 14 mi northeast of Winton).

DRAINAGE AREA.--1,740 mi², 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.

REVISED RECORDS.--WSP 955: Drainage area. WSP 1145: 1935, 1937.

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

REMARKS.--Records good. Some regulation by power plant on Kawishiwi River at Winton, and by many lakes located upstream from station.

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

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	355	471	423	402	356	307	300	485	927	1,130	1,530	644
2	343	465	421	400	354	305	300	482	942	1,220	1,530	626
3	339	456	418	400	348	305	298	482	949	1,270	1,510	590
4	355	448	417	400	345	305	305	478	948	1,280	1,470	571
5	361	441	414	400	341	305	305	483	945	1,290	1,440	544
6	355	432	415	400	341	304	305	475	957	1,320	1,410	515
7	348	433	410	397	340	299	305	476	944	1,360	1,400	498
8	342	433	409	394	337	295	305	480	934	1,360	1,370	470
9	341	434	409	391	339	292	305	492	913	1,370	1,340	451
10	339	429	406	390	336	292	309	499	897	1,480	1,310	435
11	340	429	406	388	336	292	310	502	878	1,530	1,280	432
12	359	430	403	387	336	292	315	505	861	1,570	1,230	511
13	358	433	401	382	336	288	319	522	840	1,630	1,170	511
14	359	435	402	380	336	288	319	544	831	1,680	1,120	503
15	351	436	400	379	336	288	323	567	814	1,800	1,060	491
16	351	435	400	379	336	284	322	590	806	1,820	1,010	489
17	351	435	400	378	336	280	331	610	840	1,820	970	490
18	358	431	403	369	336	278	340	629	852	1,800	910	494
19	365	426	406	369	336	276	356	660	851	1,800	868	614
20	368	429	412	369	336	278	381	691	847	1,810	831	660
21	373	429	412	369	336	286	420	706	836	1,830	845	677
22	368	430	412	369	336	288	434	715	818	1,820	793	693
23	368	433	413	369	332	289	449	726	848	1,810	767	703
24	373	432	415	369	328	290	458	736	899	1,800	738	715
25	386	432	412	369	325	289	474	745	938	1,760	720	737
26	401	429	412	369	319	292	481	753	1,000	1,720	703	753
27	417	429	412	369	314	298	489	756	1,030	1,680	689	768
28	434	427	410	369	312	303	490	786	1,050	1,630	697	791
29	447	423	410	369	---	305	490	809	1,070	1,570	692	804
30	454	423	406	369	---	305	489	871	1,100	1,560	678	808
31	461	---	403	362	---	305	---	898	---	1,530	659	---
TOTAL	11,520	13,048	12,692	11,806	9,399	9,103	11,027	19,153	27,365	49,050	32,740	17,988
MEAN	372	435	409	381	336	294	368	618	912	1,582	1,056	600
MAX	461	471	423	402	356	307	490	898	1,100	1,830	1,530	808
MIN	339	423	400	362	312	276	298	475	806	1,130	659	432
AC-FT	22,850	25,880	25,170	23,420	18,640	18,060	21,870	37,990	54,280	97,290	64,940	35,680
CFSM	0.21	0.25	0.24	0.22	0.19	0.17	0.21	0.36	0.52	0.91	0.61	0.34
IN.	0.25	0.28	0.27	0.25	0.20	0.19	0.24	0.41	0.59	1.05	0.70	0.38

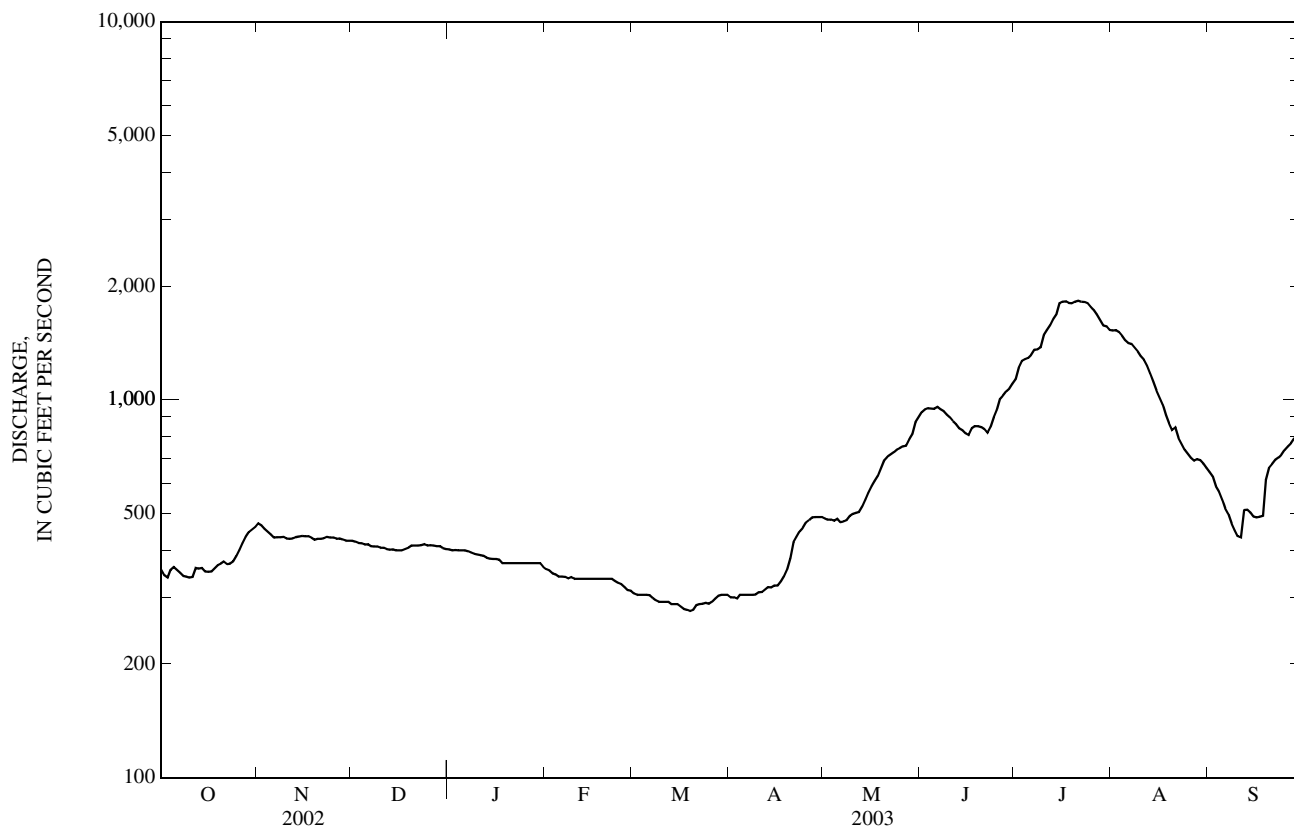
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 2003, BY WATER YEAR (WY)

MEAN	1,070	1,011	883	731	598	569	1,223	3,678	2,800	1,824	1,133	979
MAX	5,320	3,879	2,510	1,475	1,229	1,143	5,069	9,114	7,332	4,453	3,487	5,034
(WY)	(1978)	(1971)	(1983)	(1966)	(1966)	(1966)	(1945)	(1950)	(1950)	(1944)	(1944)	(1988)
MIN	65.1	60.2	76.2	86.2	95.0	135	269	225	696	512	278	120
(WY)	(1977)	(1977)	(1977)	(1977)	(1977)	(1977)	(1977)	(1977)	(1980)	(1980)	(1998)	(1976)

05127500 BASSWOOD RIVER NEAR WINTON, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1931 - 2003	
ANNUAL TOTAL	289,796		224,891		1,387	
ANNUAL MEAN	794		616		2,643	
HIGHEST ANNUAL MEAN					1950	
LOWEST ANNUAL MEAN					1958	
HIGHEST DAILY MEAN	1,720	May 15	1,830	Jul 21	15,200	May 24, 1950
LOWEST DAILY MEAN	339	Oct 3	276	Mar 19	58	Nov 3, 1976
ANNUAL SEVEN-DAY MINIMUM	346	Oct 6	281	Mar 15	58	Nov 7, 1976
MAXIMUM PEAK FLOW			1,850	Jul 17	15,600	May 24, 1950
MAXIMUM PEAK STAGE			4.10	Jul 17	9.94	May 24, 1950
INSTANTANEOUS LOW FLOW			276	Mar 18	55	Nov 18, 1976
ANNUAL RUNOFF (AC-FT)	574,800		446,100		1,005,000	
ANNUAL RUNOFF (CFSM)	0.46		0.35		0.80	
ANNUAL RUNOFF (INCHES)	6.20		4.81		10.83	
10 PERCENT EXCEEDS	1,480		1,300		3,210	
50 PERCENT EXCEEDS	665		432		870	
90 PERCENT EXCEEDS	403		305		371	

a Present datum.



05128000 NAMAkan RIVER AT OUTLET OF LAC LA CROIX, ONTARIO
(International Gaging Station)

LOCATION.--Lat 48°21'14", long 92°13'01", at Campbell's Camp, on Lac La Croix Lake, used to determine discharge at outlet [Lat 48°23'00", long 92°10'40", 2.5 mi east of Campbell's Camp].

DRAINAGE AREA.--5,170 mi².

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

GAGE.--Water-stage recorder. Datum of gage is sea level (United States and Canadian Boundary Survey). Prior to October 1933, nonrecording gages at various sites on Lac la Croix. October 1933 to Mar. 13, 1963, nonrecording gage at present site and datum.

REMARKS.--Records furnished by Water Survey of Canada.

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

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1,350	1,220	1,200	1,160	1,010	936	918	1,130	1,490	1,890	3,600	2,500
2	1,340	1,230	1,200	1,160	1,010	936	918	1,140	1,510	1,940	3,640	2,440
3	1,340	1,220	1,200	1,150	1,010	936	918	1,160	1,520	1,990	3,670	2,360
4	1,370	1,220	1,200	1,150	1,010	936	925	1,160	1,530	1,990	3,640	2,330
5	1,380	1,220	1,200	1,140	1,010	932	925	1,180	1,530	2,030	3,640	2,280
6	1,370	1,200	1,200	1,140	999	929	922	1,160	1,580	2,080	3,600	2,230
7	1,360	1,210	1,190	1,140	999	925	922	1,170	1,600	2,080	3,640	2,200
8	1,340	1,220	1,190	1,130	996	922	918	1,190	1,620	2,110	3,600	2,150
9	1,340	1,220	1,190	1,130	992	922	922	1,220	1,640	2,160	3,530	2,120
10	1,330	1,200	1,190	1,120	992	918	918	1,200	1,680	2,240	3,520	2,070
11	1,320	1,200	1,180	1,110	989	918	918	1,200	1,700	2,290	3,490	2,040
12	1,340	1,200	1,180	e1,100	985	911	922	1,210	1,720	2,350	3,420	2,240
13	1,330	1,210	1,180	e1,100	982	911	922	1,220	1,710	2,400	3,370	2,240
14	1,340	1,210	1,170	e1,090	975	907	922	1,240	1,730	2,450	3,310	2,190
15	1,300	1,210	1,170	e1,080	978	907	925	1,240	1,750	2,510	3,250	2,150
16	1,290	1,210	1,160	e1,070	975	904	925	1,250	1,750	2,600	3,220	2,130
17	1,280	1,210	1,160	e1,070	968	904	936	1,250	1,780	2,680	3,170	2,150
18	1,280	1,200	1,170	e1,070	964	904	939	1,260	1,790	2,740	3,090	2,140
19	1,270	1,200	1,180	e1,060	957	904	960	1,290	1,800	2,820	3,040	2,380
20	1,280	1,200	1,190	e1,060	957	904	982	1,310	1,790	2,890	3,020	2,550
21	1,270	1,200	1,190	e1,050	960	907	1,010	1,340	1,800	2,990	3,060	2,640
22	1,250	1,210	1,180	e1,050	957	911	1,030	1,350	1,780	3,060	3,020	2,700
23	1,240	1,220	1,190	e1,040	953	915	1,040	1,360	1,780	3,140	3,000	2,810
24	1,230	1,210	1,180	e1,040	950	918	1,060	1,360	1,820	3,200	2,880	2,820
25	1,230	1,220	1,180	e1,040	950	922	1,070	1,360	1,860	3,260	2,830	2,980
26	1,220	1,220	1,180	e1,030	946	922	1,080	1,370	1,840	3,300	2,720	3,040
27	1,220	1,220	1,180	e1,020	943	925	1,090	1,370	1,880	3,360	2,680	3,080
28	1,240	1,220	1,170	e1,020	939	922	1,090	1,380	1,900	3,400	2,680	3,150
29	1,240	1,210	1,170	e1,010	---	922	1,110	1,400	1,880	3,430	2,650	3,170
30	1,230	1,210	1,170	e1,010	---	918	1,120	1,460	1,880	3,520	2,600	3,210
31	1,220	---	1,160	1,010	---	922	---	1,470	---	3,570	2,540	---
TOTAL	40,140	36,350	36,650	33,550	27,356	28,470	29,257	39,400	51,640	82,470	99,120	74,490
MEAN	1,295	1,212	1,182	1,082	977	918	975	1,271	1,721	2,660	3,197	2,483
MAX	1,380	1,230	1,200	1,160	1,010	936	1,120	1,470	1,900	3,570	3,670	3,210
MIN	1,220	1,200	1,160	1,010	939	904	918	1,130	1,490	1,890	2,540	2,040
AC-FT	79,620	72,100	72,700	66,550	54,260	56,470	58,030	78,150	102,400	163,600	196,600	147,800
CFSM	0.25	0.23	0.23	0.21	0.19	0.18	0.19	0.25	0.33	0.51	0.62	0.48
IN.	0.29	0.26	0.26	0.24	0.20	0.20	0.21	0.28	0.37	0.59	0.71	0.54

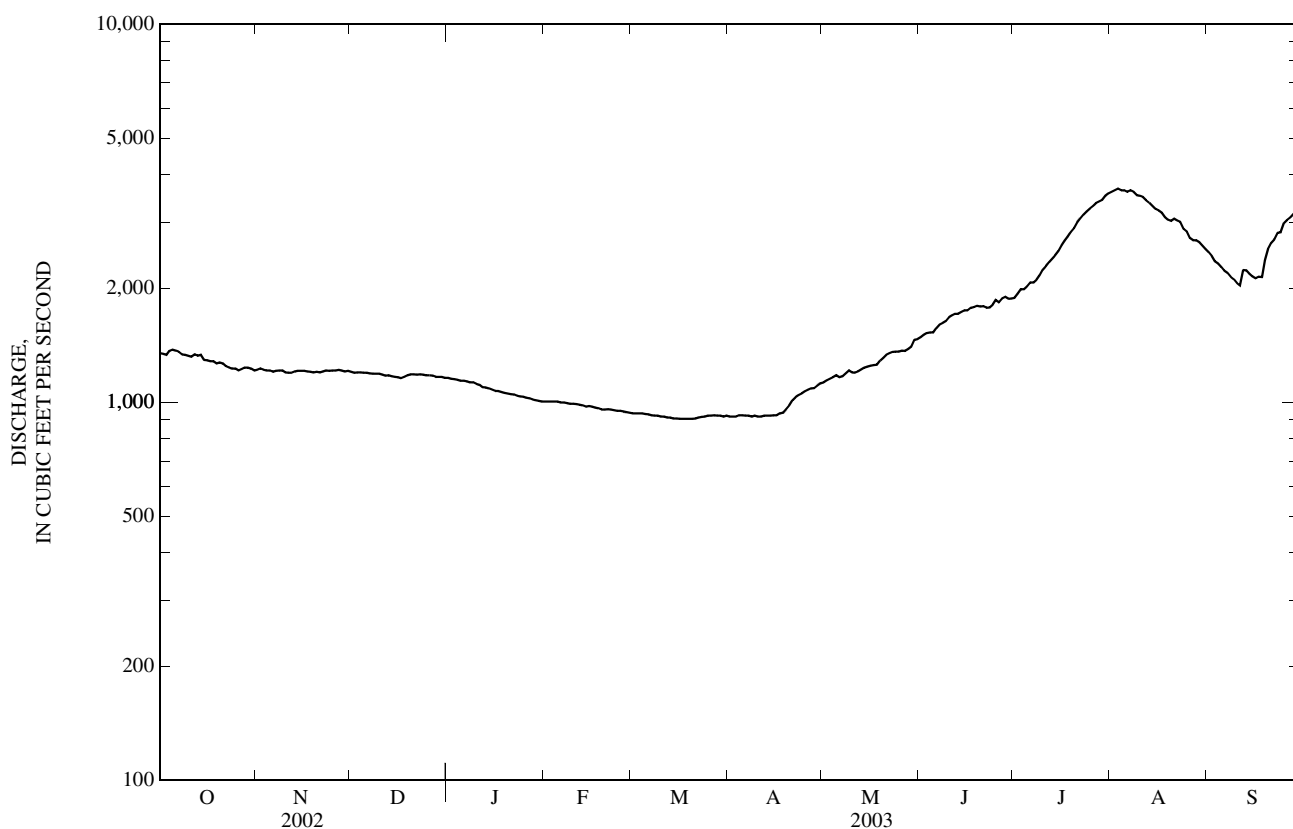
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1921 - 2003, BY WATER YEAR (WY)

MEAN	3,038	2,896	2,598	2,197	1,888	1,675	2,578	7,610	7,873	6,029	4,069	3,166
MAX	14,200	10,610	7,189	4,568	3,432	2,996	9,071	16,900	22,120	15,930	11,200	13,140
(WY)	(1978)	(1978)	(1972)	(1978)	(1966)	(1966)	(1945)	(1938)	(1950)	(1968)	(1944)	(1988)
MIN	744	624	567	547	540	535	614	899	1,475	1,263	1,123	774
(WY)	(1999)	(1977)	(1977)	(1977)	(1924)	(1924)	(1977)	(1977)	(1924)	(1924)	(1998)	(1998)

05128000 NAMAKAN RIVER AT OUTLET OF LAC LA CROIX, ONTARIO—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1921 - 2003	
ANNUAL TOTAL	922,460		578,893		3,819	
ANNUAL MEAN	2,527		1,586		964	
HIGHEST ANNUAL MEAN					7,270 1950	
LOWEST ANNUAL MEAN					964 1924	
HIGHEST DAILY MEAN	6,110	Jul 6	3,670	Aug 3	a28,200	May 31, 1950
LOWEST DAILY MEAN	1,160	Dec 16	904	Mar 16-20	535	Feb 4, 1924
ANNUAL SEVEN-DAY MINIMUM	1,170	Dec 12	905	Mar 14	535	Feb 4, 1924
MAXIMUM PEAK FLOW			3,670	Aug 3	28,200	May 31, 1950
MAXIMUM PEAK STAGE			1,184.38	Aug 3	a1,193.30	May 31, 1950
INSTANTANEOUS LOW FLOW			897	Mar 19	b535	Feb 1, 1924
ANNUAL RUNOFF (AC-FT)	1,830,000		1,148,000		2,767,000	
ANNUAL RUNOFF (CFSM)	0.49		0.31		0.74	
ANNUAL RUNOFF (INCHES)	6.64		4.17		10.04	
10 PERCENT EXCEEDS	4,240		3,020		8,240	
50 PERCENT EXCEEDS	2,080		1,220		2,680	
90 PERCENT EXCEEDS	1,200		925		1,180	

a Occurred May 31 to June 2, 1950.
 b Many days in 1924.
 c Estimated



05129115 VERMILION RIVER NEAR CRANE LAKE, MN

LOCATION.--Lat 48°15'53", long 92°33'57", in NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 30, T.67 N., R.17 W., St. Louis County, Hydrologic Unit 09030002, in Superior National Forest, on left bank 350 ft downstream from bridge on Forest Route 491, 3.5 mi upstream from mouth, and 3.5 mi west of city of Crane Lake.

DRAINAGE AREA.-- 905 mi².

PERIOD OF RECORD.--August 1979 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 1,180 ft above sea level (from topographic map).

REMARKS.--Records good.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of April 1979 reached a stage of 15.15 ft, from high-water mark, discharge approximately 4,600 ft³/s.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

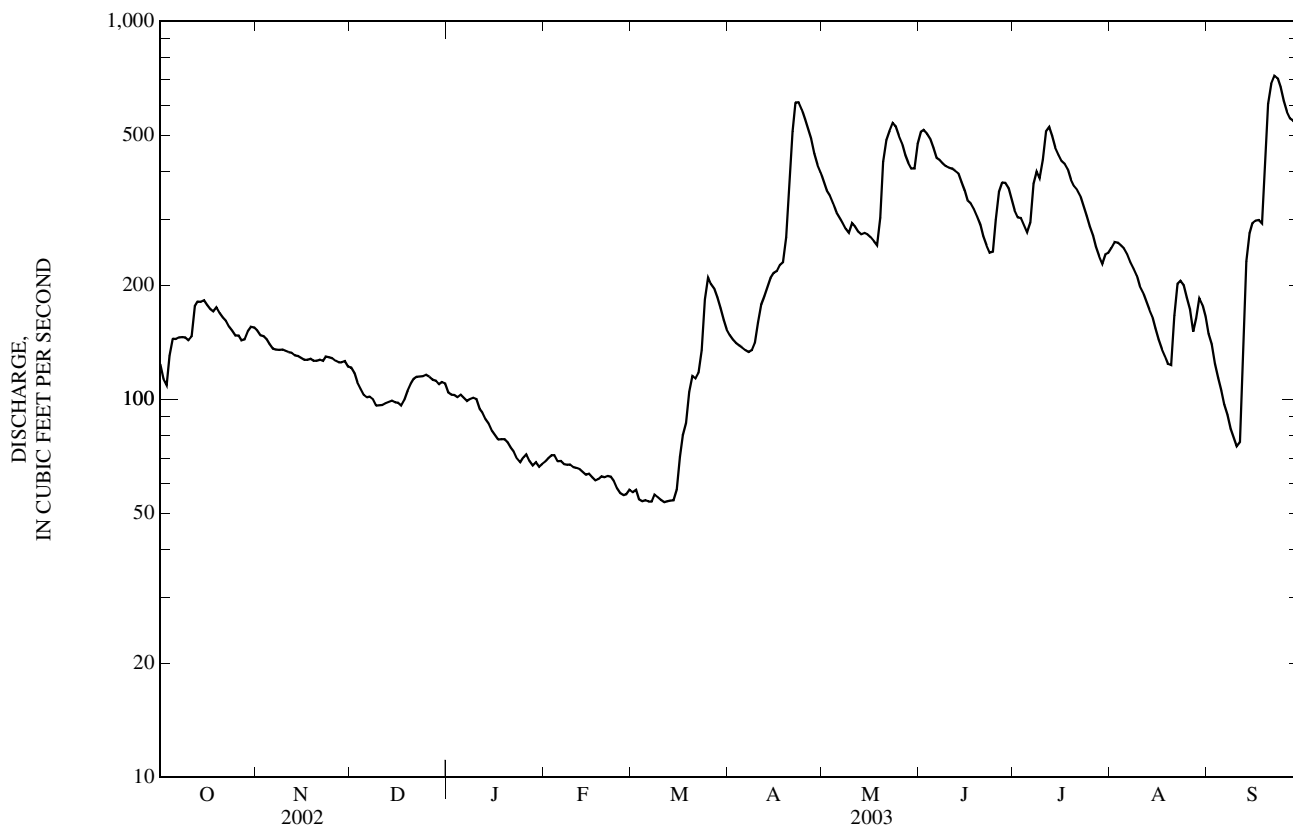
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	124	152	121	104	68	57	148	375	510	316	252	149
2	113	148	117	103	70	58	144	357	516	303	261	140
3	109	147	111	103	71	54	141	346	505	302	260	124
4	131	144	107	101	71	54	139	330	489	290	255	114
5	145	140	103	103	69	54	137	312	463	277	251	105
6	144	136	101	101	69	54	135	304	435	293	242	97
7	146	135	102	99	67	54	133	294	430	372	231	91
8	146	135	100	100	67	56	135	283	421	401	222	84
9	146	135	96	101	67	55	141	276	414	385	212	79
10	143	134	97	100	66	54	160	292	410	430	200	75
11	147	133	97	94	66	53	178	287	408	511	192	77
12	176	133	98	92	65	54	187	278	402	525	182	143
13	182	131	98	89	64	54	198	273	396	498	173	232
14	181	130	99	86	63	54	209	275	375	463	166	275
15	183	129	98	83	64	58	216	273	357	444	154	292
16	177	127	98	80	62	71	218	268	336	427	144	297
17	173	127	96	78	61	80	227	262	330	419	136	298
18	171	128	100	78	62	87	230	256	319	406	130	292
19	175	127	105	79	63	105	268	302	305	381	124	410
20	169	127	110	77	62	115	355	425	290	366	123	605
21	165	127	113	74	63	114	511	485	270	357	166	683
22	161	126	115	73	63	118	609	512	256	346	203	718
23	156	130	115	70	61	135	611	538	244	325	206	707
24	152	129	115	68	58	184	584	528	246	306	201	670
25	148	128	116	70	56	210	550	498	299	286	186	615
26	147	126	115	72	56	202	517	476	354	271	173	576
27	143	125	113	69	56	196	489	444	375	253	151	553
28	144	125	112	67	58	186	446	422	374	239	164	545
29	151	126	110	68	---	174	417	408	363	228	185	532
30	156	122	111	66	---	162	398	408	340	242	178	518
31	155	---	110	67	---	153	---	474	---	244	165	---
TOTAL	4,759	3,962	3,299	2,615	1,788	3,115	8,831	11,261	11,232	10,906	5,888	10,096
MEAN	154	132	106	84.4	63.9	100	294	363	374	352	190	337
MAX	183	152	121	104	71	210	611	538	516	525	261	718
MIN	109	122	96	66	56	53	133	256	244	228	123	75
AC-FT	9,440	7,860	6,540	5,190	3,550	6,180	17,520	22,340	22,280	21,630	11,680	20,030
CFSM	0.17	0.15	0.12	0.09	0.07	0.11	0.33	0.40	0.41	0.39	0.21	0.37
IN.	0.20	0.16	0.14	0.11	0.07	0.13	0.36	0.46	0.46	0.45	0.24	0.41

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1979 - 2003, BY WATER YEAR (WY)

MEAN	553	538	417	286	232	282	1,155	1,369	937	764	541	472
MAX	1,436	1,138	872	476	374	574	2,286	3,012	2,234	1,609	2,225	1,880
(WY)	(1996)	(1983)	(1983)	(1996)	(1997)	(1995)	(2001)	(2001)	(2001)	(1985)	(2001)	(1988)
MIN	110	132	106	84.4	63.9	89.5	294	363	205	113	60.0	69.1
(WY)	(1998)	(2003)	(2003)	(2003)	(2003)	(1988)	(2003)	(2003)	(1980)	(1980)	(1980)	(1998)

05129115 VERMILION RIVER NEAR CRANE LAKE, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1979 - 2003	
ANNUAL TOTAL	128,374		77,752		631	
ANNUAL MEAN	352		213		213	
HIGHEST ANNUAL MEAN					1,132	2001
LOWEST ANNUAL MEAN					213	2003
HIGHEST DAILY MEAN	1,310	Apr 17	718	Sep 22	4,300	Apr 25, 1985
LOWEST DAILY MEAN	96	Dec 9	53	Mar 11	38	Aug 13, 1980
ANNUAL SEVEN-DAY MINIMUM	98	Dec 9	54	Mar 5	40	Aug 10, 1980
MAXIMUM PEAK FLOW			726	Sep 22	4,360	Apr 25, 1985
MAXIMUM PEAK STAGE			7.79	Sep 22	15.20	Apr 25, 1985
INSTANTANEOUS LOW FLOW			52	Mar 4, 12	38	Aug 13, 1980
ANNUAL RUNOFF (AC-FT)	254,600		154,200		457,500	
ANNUAL RUNOFF (CFSM)	0.39		0.24		0.70	
ANNUAL RUNOFF (INCHES)	5.28		3.20		9.48	
10 PERCENT EXCEEDS	669		444		1,420	
50 PERCENT EXCEEDS	275		149		425	
90 PERCENT EXCEEDS	125		67		152	



05129290 GOLD PORTAGE OUTLET FROM KABETOGAMA LAKE NEAR RAY, MN

LOCATION.--Lat 48°31'28", long 93°04'29", in SW¹/₄NE¹/₄ sec. 30, T.70 N., R.21 W., St. Louis County, Hydrologic Unit 09030003, on right bank in bay at head of Gold Portage Outlet from Kabetogama Lake, 9.8 mi northeast of Ray.

PERIOD OF RECORD.--October 1982 to September 1993, October 1993 to September 1994 (peak gage height and discharge only), October 1997 to current year.

GAGE.--Water-stage recorder. Elevation of gage is 1,100 ft above sea level (NGVD of 1912, U.S. Army Corp of Engineers benchmark), water surface transfer.

REMARKS.--Records fair except those for estimated daily discharges, which are poor. Flow completely regulated by outlet dam on Namakan Lake.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	367	267	188	86	20	3.1	0.00	e0.01	1.5	31	e0.98	e0.12
2	367	268	184	83	19	2.8	0.00	e0.02	1.9	34	e0.76	e0.12
3	371	258	181	81	18	2.7	0.00	e0.02	2.1	35	e0.60	e0.12
4	365	254	178	77	16	2.4	0.00	e0.02	2.3	34	e0.50	e0.12
5	368	253	175	74	16	2.2	0.00	e0.01	2.2	39	e0.42	e0.12
6	362	243	172	72	14	2.2	0.00	e0.01	3.2	43	e0.35	e0.12
7	366	245	166	70	14	1.5	0.00	e0.01	4.3	42	e0.28	e0.12
8	361	240	163	67	13	1.2	0.00	e0.01	4.6	46	e0.23	e0.12
9	360	240	160	63	12	1.0	0.00	e0.02	5.3	53	e0.21	e0.12
10	363	229	156	60	11	0.86	0.00	e0.00	6.3	55	e0.18	e0.12
11	364	228	153	58	10	0.72	0.00	0.00	6.8	57	e0.16	e0.12
12	344	224	148	56	9.5	0.57	0.00	0.00	8.6	60	e0.14	e0.12
13	343	231	145	53	8.7	0.53	0.00	0.00	7.8	61	e0.13	e0.12
14	351	228	141	51	7.9	0.42	0.00	0.00	8.8	59	e0.12	e0.12
15	331	230	137	48	7.7	0.34	0.00	0.00	9.7	53	e0.12	e0.12
16	332	230	135	46	7.8	0.12	0.00	0.00	10	50	e0.12	e0.12
17	332	231	131	45	7.5	0.10	0.00	0.00	11	46	e0.12	e0.12
18	331	231	130	42	6.6	0.06	0.00	0.00	11	40	e0.12	e0.12
19	315	227	128	40	6.3	0.01	0.00	e0.00	12	33	e0.12	e0.12
20	318	224	124	37	5.8	0.00	0.00	e0.00	13	26	e0.12	e0.12
21	317	218	120	36	5.4	0.00	0.00	e0.00	14	23	e0.12	e0.12
22	308	217	117	33	5.2	0.00	0.00	e0.01	14	19	e0.12	e0.12
23	305	205	113	31	4.8	0.00	0.00	e0.01	14	17	e0.12	e0.12
24	305	201	111	30	4.4	0.00	0.00	e0.02	15	14	e0.12	e0.12
25	305	201	107	28	4.6	0.00	0.00	e0.02	20	11	e0.12	e0.12
26	295	198	104	27	4.1	0.00	e0.00	e0.03	18	8.0	e0.12	e0.12
27	296	199	101	27	3.7	0.00	e0.00	e0.02	23	6.1	e0.12	e0.12
28	303	199	97	24	3.4	0.00	e0.00	e0.01	28	4.5	e0.12	e0.12
29	295	193	96	23	---	0.00	e0.01	e0.07	27	3.0	e0.12	e0.12
30	284	190	92	22	---	0.00	e0.01	e0.12	29	2.2	e0.12	e0.12
31	272	---	87	21	---	0.00	---	e1.0	---	1.3	e0.12	---
TOTAL	10,296	6,802	4,240	1,511	266.4	22.83	0.02	1.44	334.4	1,006.1	7.10	3.60
MEAN	332	227	137	48.7	9.51	0.74	0.001	0.046	11.1	32.5	0.23	0.12
MAX	371	268	188	86	20	3.1	0.01	1.0	29	61	0.98	0.12
MIN	272	190	87	21	3.4	0.00	0.00	0.00	1.5	1.3	0.12	0.12
AC-FT	20,420	13,490	8,410	3,000	528	45	0.04	2.9	663	2,000	14	7.1

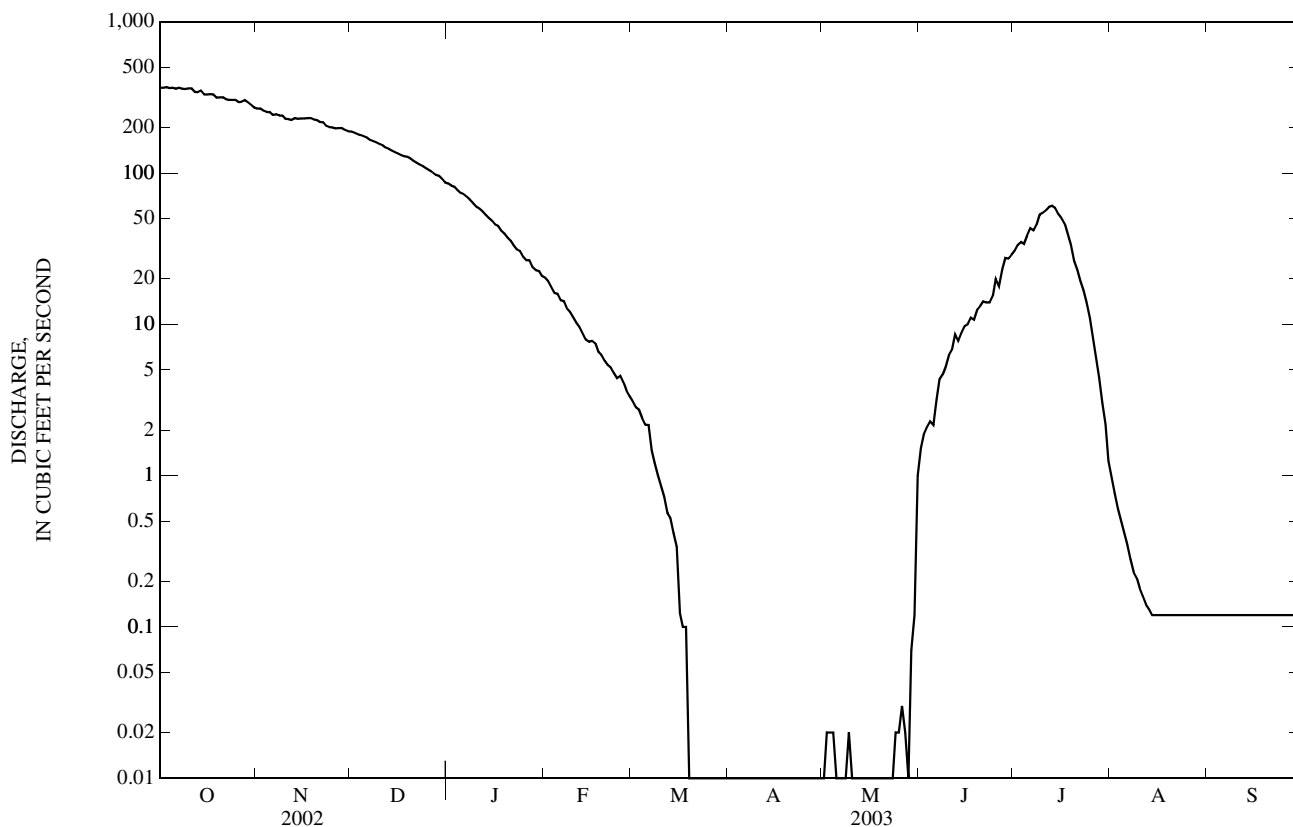
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1983 - 2003, BY WATER YEAR (WY)

MEAN	375	200	86.3	21.7	4.16	0.53	6.61	155	408	538	526	479
MAX	530	267	149	57.2	32.7	4.48	98.9	798	950	690	686	787
(WY)	(1986)	(1990)	(1992)	(2000)	(2000)	(2000)	(2001)	(2001)	(2001)	(2002)	(1988)	(1988)
MIN	140	115	16.5	1.10	0.000	0.000	0.000	0.000	11.1	32.5	0.23	0.12
(WY)	(1999)	(1988)	(1988)	(1988)	(1983)	(1983)	(1983)	(1987)	(2003)	(2003)	(2003)	(2003)

05129290 GOLD PORTAGE OUTLET FROM KABETOGAMA LAKE NEAR RAY, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1983 - 2003	
ANNUAL TOTAL	92,242.03		24,490.89		235	
ANNUAL MEAN	253		67.1		340	
HIGHEST ANNUAL MEAN					67.1	2001
LOWEST ANNUAL MEAN						2003
HIGHEST DAILY MEAN	942	Jul 6	371	Oct 3	1,310	May 30, 2001
LOWEST DAILY MEAN	0.00	Mar 27	a0.00	Mar 20	b0.00	Jan 21, 1983
ANNUAL SEVEN-DAY MINIMUM	0.00	Mar 27	0.00	Mar 20	0.00	Jan 21, 1983
MAXIMUM PEAK FLOW			c385	Oct 14	1,310	May 29, 2001
MAXIMUM PEAK STAGE			d17.55	Jul 14	20.53	May 31, 2001
ANNUAL RUNOFF (AC-FT)	183,000		48,580		170,000	
10 PERCENT EXCEEDS	640		248		591	
50 PERCENT EXCEEDS	201		7.8		141	
90 PERCENT EXCEEDS	0.51		0.00		0.00	

- a Occurred Mar. 20 to Apr. 28, and May 10-21.
- b Many days, several years.
- c Gage height, 17.14 ft.
- d Backwater from beaver dam.
- e Estimated.



05130500 STURGEON RIVER NEAR CHISHOLM, MN

LOCATION.--Lat 47°40'25", long 92°54'00", in NE¼NW¼ sec. 20, T.60 N., R.20 W., St. Louis County, Hydrologic Unit 09030005, on left bank 1,000 ft upstream from County Highway 65 bridge, 0.6 mi downstream from East Branch Sturgeon River, and 11.5 mi north of Chisholm.

DRAINAGE AREA.--180 mi².

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

REVISED RECORDS.--WSP 1438: 1946.

GAGE.--Water-stage recorder. Datum of gage is 1,305.7 ft above sea level (NGVD of 1929). Prior to Aug. 24, 1944, nonrecording gage at site 1,000 ft downstream at different datum. Aug. 25, 1944 to Sept. 30, 1975 at present site at datum 1.00 ft higher.

REMARKS.--Records good except those for estimated daily discharges, which are fair.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 500 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jul 15	0000	*301	*3.23	No peak greater than base discharge.			

Minimum discharge, 8.4 ft³/s (estimated daily-mean), Feb. 10; minimum recorded gage height, 1.28 ft, Jan. 27.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	57	e72	e43	e31	e10	e10	e50	101	162	86	84	50
2	56	e70	e40	e30	e9.9	e9.9	e47	95	140	77	85	44
3	55	e68	e38	e30	e9.5	e9.6	e45	89	121	81	85	38
4	70	e67	e35	e29	e9.2	e9.4	e44	82	103	104	86	34
5	88	e67	e34	e29	e9.0	e9.3	e42	75	89	176	77	32
6	97	e66	e33	e29	e8.9	e9.5	e44	71	81	205	70	33
7	103	e65	e33	e29	e8.8	e9.8	e47	71	75	176	64	31
8	101	e63	e33	e29	e8.7	e10	e55	68	70	128	58	27
9	95	e62	e33	e29	e8.5	e10	e65	70	67	99	53	26
10	93	e61	e33	e28	e8.4	e10	78	81	71	158	49	24
11	89	e60	e34	e26	e8.6	e11	95	94	73	203	45	28
12	96	e58	e36	e24	e8.8	e11	102	103	70	228	42	100
13	104	e56	e37	e21	e8.9	e12	96	94	67	219	39	132
14	96	e55	e37	e19	e9.2	e13	94	89	62	199	38	171
15	93	e54	e37	e18	e9.7	e20	103	81	56	255	36	186
16	89	e54	e37	e17	e10	e27	97	74	50	206	33	164
17	85	e54	e37	e16	e11	e37	96	70	54	186	30	132
18	82	e55	e38	e16	e11	e46	91	64	54	158	29	118
19	83	e55	e38	e15	e11	e58	108	78	49	142	28	132
20	82	e56	e39	e15	e11	e66	154	125	45	207	28	135
21	81	e58	e40	e13	e11	e72	222	148	41	203	32	144
22	85	e57	e39	e12	e10	e74	236	145	37	185	26	151
23	81	e56	e39	e11	e10	e76	217	141	37	141	27	136
24	77	e53	e38	e10	e10	e75	188	132	52	109	32	118
25	75	e52	e37	e10	e11	e73	168	117	84	91	32	103
26	73	e51	e37	e9.8	e11	e70	151	101	98	81	74	94
27	71	e50	e36	e9.6	e11	e67	141	91	100	71	67	86
28	71	e51	e36	e9.3	e11	e63	138	110	96	63	71	80
29	74	e51	e35	e9.1	---	e59	127	121	95	57	71	75
30	75	e48	e34	e9.4	---	e56	113	138	94	78	65	70
31	e74	---	e33	e9.8	---	e53	---	166	---	83	57	---
TOTAL	2,551	1,745	1,129	593.0	275.1	1,136.5	3,254	3,085	2,293	4,455	1,613	2,694
MEAN	82.3	58.2	36.4	19.1	9.82	36.7	108	99.5	76.4	144	52.0	89.8
MAX	104	72	43	31	11	76	236	166	162	255	86	186
MIN	55	48	33	9.1	8.4	9.3	42	64	37	57	26	24
AC-FT	5,060	3,460	2,240	1,180	546	2,250	6,450	6,120	4,550	8,840	3,200	5,340
CFSM	0.46	0.32	0.20	0.11	0.05	0.20	0.60	0.55	0.42	0.80	0.29	0.50
IN.	0.53	0.36	0.23	0.12	0.06	0.23	0.67	0.64	0.47	0.92	0.33	0.56

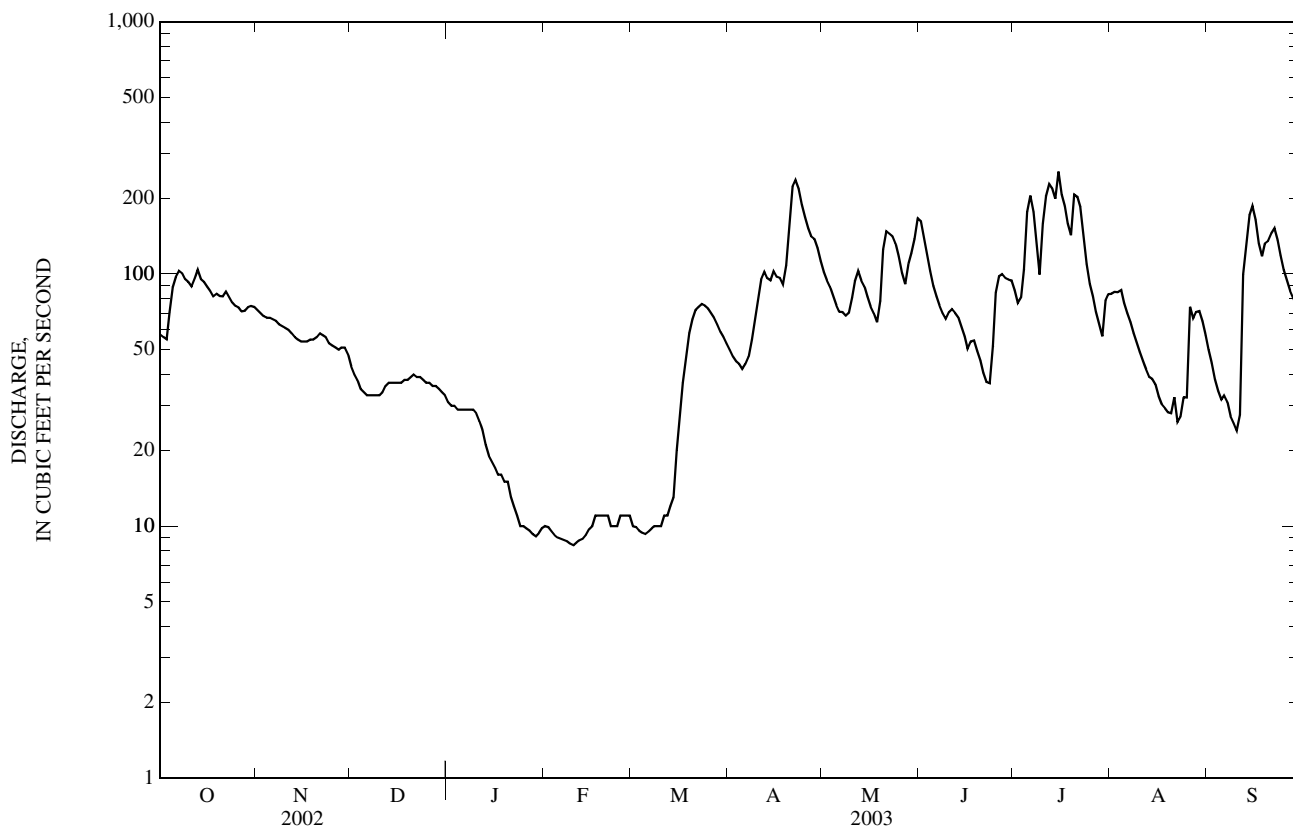
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1942 - 2003, BY WATER YEAR (WY)

MEAN	121	95.2	50.3	29.5	23.7	50.6	363	295	182	126	73.3	91.3
MAX	600	264	135	66.0	47.7	337	868	1,451	528	623	268	424
(WY)	(1996)	(1978)	(1999)	(1966)	(1984)	(1945)	(1948)	(1950)	(1944)	(1993)	(1988)	(1977)
MIN	7.85	8.90	4.82	3.98	4.54	10.0	41.0	22.9	14.7	5.99	12.6	4.60
(WY)	(1977)	(1977)	(1977)	(1977)	(1977)	(1957)	(1977)	(1977)	(1988)	(1988)	(1961)	(1976)

05130500 STURGEON RIVER NEAR CHISHOLM, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1942 - 2003	
ANNUAL TOTAL	36,587		24,823.6		125	
ANNUAL MEAN	100		68.0		218	
HIGHEST ANNUAL MEAN					63.1	1996
LOWEST ANNUAL MEAN					3,530	1977
HIGHEST DAILY MEAN	1,680	Jun 25	255	Jul 15	3,530	May 8, 1950
LOWEST DAILY MEAN	17	Mar 7	8.4	Feb 10	2.5	Jul 30, 1988
ANNUAL SEVEN-DAY MINIMUM	18	Mar 4	8.7	Feb 6	3.0	Jul 24, 1988
MAXIMUM PEAK FLOW			301	Jul 15	a3,630	May 7, 1950
MAXIMUM PEAK STAGE			3.23	Jul 15	b7.41	May 7, 1950
ANNUAL RUNOFF (AC-FT)	72,570		49,240		90,720	
ANNUAL RUNOFF (CFSM)	0.56		0.38		0.70	
ANNUAL RUNOFF (INCHES)	7.56		5.13		9.45	
10 PERCENT EXCEEDS	179		139		291	
50 PERCENT EXCEEDS	60		59		60	
90 PERCENT EXCEEDS	26		10		18	

- a From rating curve extended above 1,600 ft³/s, on basis of slope-area measurement of peak flow.
- b Present datum.
- c Estimated.



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 northeast of city 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 current year, in reports of Water Survey of Canada. 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 sea level (United States and Canadian Boundary Survey). January 1910 to December 1949, nonrecording gage 3 mi 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 south, used during winter months, at same datum.

REMARKS.-- Records furnished by Water Survey of Canada.

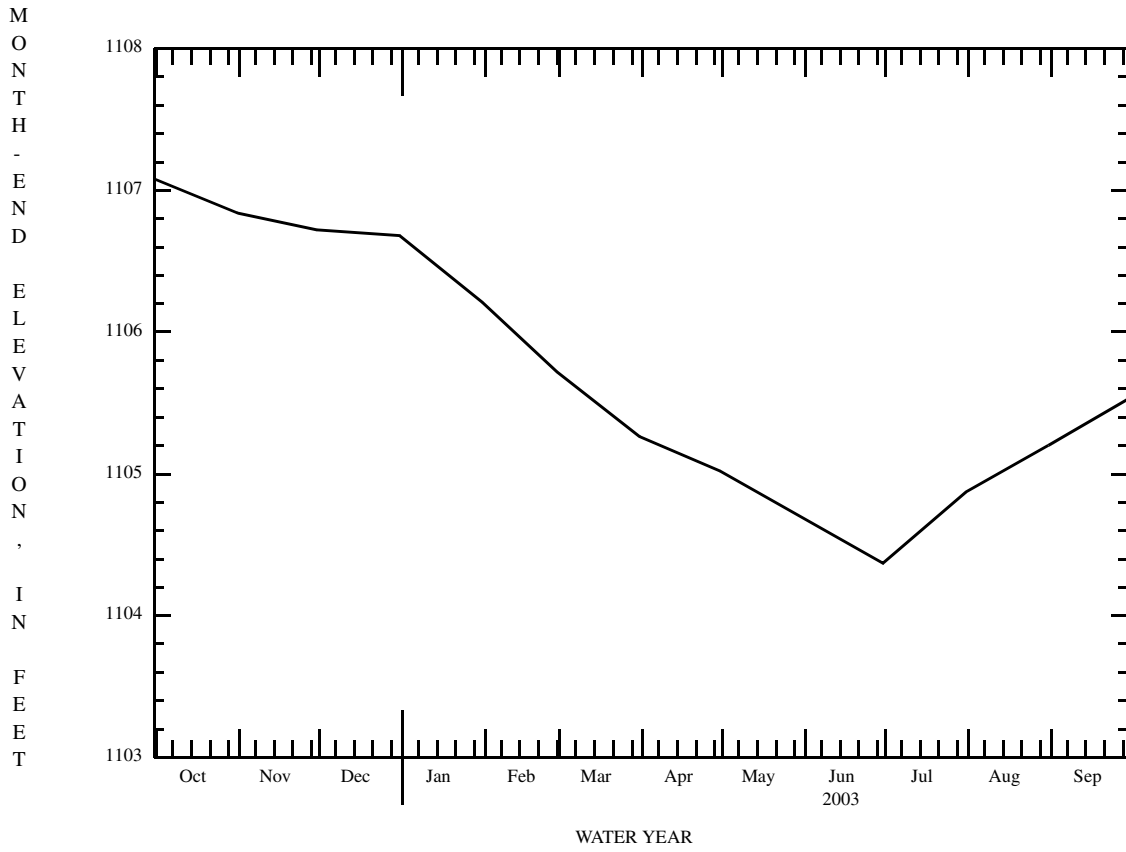
COOPERATION.--This station is one of the international gaging stations maintained by Canada under agreement with the United States.

EXTREMES FOR PERIOD OF RECORD.--Maximum elevation observed, 1,112.97 ft, July 5, 1950; minimum observed, 1,101.26 ft, Apr. 17, 1923, Apr. 2, 1930.

EXTREMES FOR CURRENT YEAR.--Maximum elevation, 1,107.13 ft, Oct. 6; maximum daily, 1107.05 ft, Oct. 4; minimum elevation, 1,104.24 ft, June 22; minimum daily, 1104.27 ft, June 23, 24.

MONTH-END ELEVATION, IN FEET ABOVE SEA LEVEL, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003			
Oct. 31	1,106.84	Apr. 30	1,105.02
Nov. 30	1,106.72	May 31	1,104.69
Dec. 31	1,106.68	June 30	1,104.37
Jan. 31	1,106.21	July 31	1,104.87
Feb. 28	1,105.72	Aug. 31	1,105.20
Mar. 31	1,105.26	Sep. 30	1,105.53

RAINY RIVER BASIN--Continued
05129400 RAINY LAKE NEAR FORT FRANCES, ONTARIO--Continued



05131448 WOOD DUCK CREEK NEAR NETT LAKE, MN

LOCATION.--Lat 48°09'24", long 93°08'20", in SW¹/₄SW¹/₄ sec. 35, T.66 N., R.22 W., Koochiching County, Hydrologic Unit 09030005, at bridge on Tribal Service Road, 2.9 miles above mouth at Nett Lake, and 3.5 miles northwest of the town of Nett Lake.

DRAINAGE AREA.--31.8 mi².

PERIOD OF RECORD.--October 1995 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,200.00 ft above sea level (NGVD of 1929), from GPS survey. Prior to Oct. 1, 2002 at datum 71.92 ft higher.

REMARKS.--Records fair except those for estimated daily discharges, which are poor. Backwater from Nett Lake occurs at times.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.23	2.9	e1.4	e0.24	e0.00	e0.00	e4.3	5.9	18	18	e1.3	e0.26
2	0.28	2.9	e1.3	e0.23	e0.00	e0.00	e3.9	5.1	16	14	e1.4	e0.26
3	0.39	2.8	e1.2	e0.22	e0.00	e0.00	e3.7	4.8	15	14	e1.4	e0.21
4	0.54	2.7	e1.1	e0.21	e0.00	e0.00	e3.7	4.7	13	11	e1.3	e0.23
5	0.76	2.7	e1.1	e0.20	e0.00	e0.00	e3.7	4.6	12	9.4	e1.3	e0.23
6	0.84	2.6	e1.0	e0.19	e0.00	e0.00	e3.9	4.2	11	8.8	e1.4	e0.22
7	1.1	2.7	e0.95	e0.18	e0.00	e0.00	e4.5	4.0	12	9.1	e1.4	e0.22
8	1.2	2.5	e0.89	e0.17	e0.00	e0.00	e5.6	3.9	12	8.6	e1.3	e0.21
9	1.5	2.4	e0.84	e0.16	e0.00	e0.00	7.1	4.4	12	8.7	e1.2	e0.22
10	1.8	2.3	e0.78	e0.15	e0.00	e0.00	6.2	5.1	13	10	e1.1	e0.22
11	2.4	2.3	e0.74	e0.14	e0.00	e0.00	4.9	5.3	12	11	e1.0	e0.21
12	2.8	2.3	e0.70	e0.13	e0.00	e0.00	3.9	5.6	13	11	e0.98	e0.25
13	2.6	2.3	e0.66	e0.13	e0.00	e0.00	3.5	5.8	13	9.9	e0.91	e0.25
14	2.9	2.5	e0.62	e0.12	e0.00	e0.03	2.0	5.4	12	9.6	e0.85	e0.23
15	2.8	2.5	e0.58	e0.11	e0.00	e0.10	2.3	5.0	11	9.1	e0.74	e0.23
16	2.8	2.4	e0.55	e0.11	e0.00	e0.20	5.2	4.4	10	12	e0.67	e0.24
17	2.7	2.4	e0.52	e0.10	e0.00	e0.50	2.5	4.0	12	8.1	e0.64	e0.27
18	2.8	2.3	e0.48	e0.09	e0.00	e1.6	2.7	4.1	16	6.5	e0.58	e0.25
19	2.9	2.3	e0.46	e0.08	e0.00	e3.9	4.8	14	12	5.5	e0.53	e0.24
20	2.9	2.2	e0.44	e0.07	e0.00	e6.4	10	26	9.7	4.7	e0.50	e0.28
21	2.9	2.2	e0.42	e0.06	e0.00	e7.4	22	26	8.7	4.1	e0.53	e0.30
22	2.8	e2.2	e0.40	e0.06	e0.00	e7.9	27	25	7.5	3.5	e0.51	e0.27
23	2.8	e2.2	e0.38	e0.05	e0.00	e8.1	20	28	6.8	2.9	e0.55	e0.28
24	2.8	e2.1	e0.35	e0.05	e0.00	e8.3	12	27	6.9	2.6	e0.47	e0.24
25	2.7	e2.0	e0.34	e0.04	e0.00	e8.3	8.5	24	14	2.1	e0.44	e0.28
26	2.7	e1.8	e0.32	e0.04	e0.00	e8.2	7.4	21	22	1.7	e0.38	e0.28
27	2.7	e1.7	e0.31	e0.03	e0.00	e8.1	7.3	17	22	1.5	e0.36	e0.26
28	2.8	e1.6	e0.29	e0.03	e0.00	e7.7	7.3	20	24	1.3	e0.38	e0.28
29	2.9	e1.5	e0.28	e0.02	---	e7.2	6.4	17	25	e1.2	e0.33	e0.27
30	2.9	e1.4	e0.26	e0.02	---	e6.6	6.4	17	23	e1.4	e0.32	e0.26
31	2.9	---	e0.25	e0.01	---	e5.2	---	20	---	e1.4	e0.29	---
TOTAL	67.14	68.7	19.91	3.44	0.00	95.73	212.7	368.3	414.6	222.7	25.06	7.45
MEAN	2.17	2.29	0.64	0.11	0.000	3.09	7.09	11.9	13.8	7.18	0.81	0.25
MAX	2.9	2.9	1.4	0.24	0.00	8.3	27	28	25	18	1.4	0.30
MIN	0.23	1.4	0.25	0.01	0.00	0.00	2.0	3.9	6.8	1.2	0.29	0.21
AC-FT	133	136	39	6.8	0.00	190	422	731	822	442	50	15
CFSM	0.07	0.07	0.02	0.00	0.00	0.10	0.22	0.37	0.43	0.23	0.03	0.01
IN.	0.08	0.08	0.02	0.00	0.00	0.11	0.25	0.43	0.49	0.26	0.03	0.01

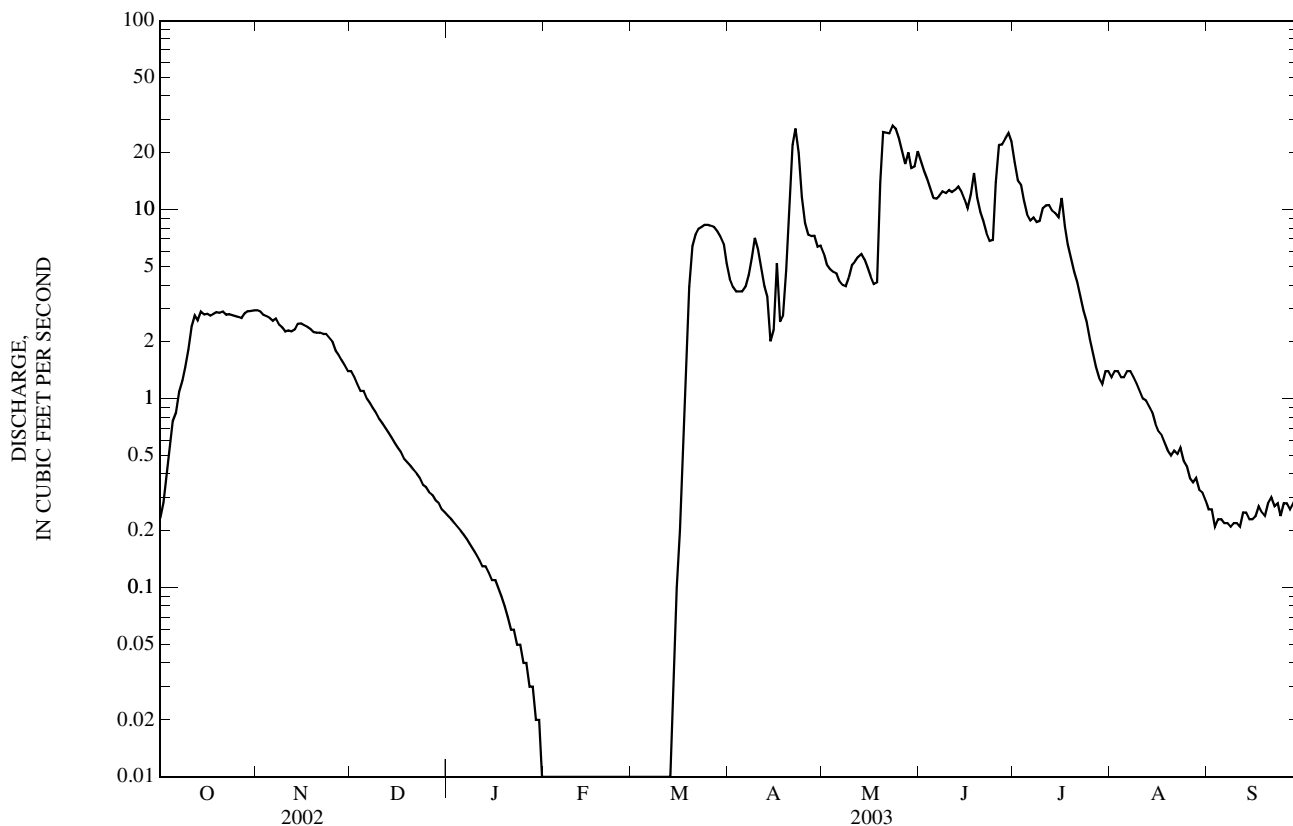
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1996 - 2003, BY WATER YEAR (WY)

MEAN	19.7	18.3	7.11	2.30	1.65	3.90	75.8	61.0	17.3	13.5	17.9	10.9
MAX	65.4	43.0	18.6	6.18	4.61	10.9	148	136	58.8	32.5	75.7	48.0
(WY)	(1996)	(2001)	(2002)	(1997)	(1998)	(1998)	(2001)	(1996)	(2002)	(1996)	(2001)	(1999)
MIN	2.17	2.29	0.64	0.11	0.000	0.47	7.09	11.9	6.78	3.70	0.81	0.042
(WY)	(2003)	(2003)	(2003)	(2003)	(1999)	(2002)	(2003)	(2003)	(1998)	(2001)	(2003)	(1998)

05131448 WOOD DUCK CREEK NEAR NETT LAKE, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1996 - 2003	
ANNUAL TOTAL	4,610.19		1,505.73			
ANNUAL MEAN	12.6		4.13		20.8	
HIGHEST ANNUAL MEAN					38.3	2001
LOWEST ANNUAL MEAN					4.13	2003
HIGHEST DAILY MEAN	150	Jun 25	28	May 23	432	May 23, 2001
LOWEST DAILY MEAN	0.16	Sep 27	0.00	Feb 1 to Mar.13	a0.00	Sep 8, 1998
ANNUAL SEVEN-DAY MINIMUM	0.18	Sep 22	0.00	Feb 1	0.00	Sep 8, 1998
MAXIMUM PEAK FLOW			b30	Apr 22	cd445	May 23, 2001
MAXIMUM PEAK STAGE			g79.14	Jun 29	df84.80	Apr 7, 1997
INSTANTANEOUS LOW FLOW			0.00	Feb 1	a0.00	Sep 7, 1998
ANNUAL RUNOFF (AC-FT)	9,140		2,990		15,080	
ANNUAL RUNOFF (CFSM)	0.40		0.13		0.65	
ANNUAL RUNOFF (INCHES)	5.39		1.76		8.89	
10 PERCENT EXCEEDS	44		12		53	
50 PERCENT EXCEEDS	2.1		1.5		5.8	
90 PERCENT EXCEEDS	0.41		0.00		0.30	

- a Many days, several years.
- b Gage height, 78.53 ft.
- c Gage height, 83.42 ft.
- d Present datum.
- e Estimated.
- f From highwater mark, backwater from ice.
- g Discharge, 26 ft³/s.



05131450 NETT LAKE AT NETT LAKE, MN

LOCATION.-- Lat 48°06'57", long 93°05'58", in NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 13, T.65 N., R.22 W., Koochiching County, Hydrologic Unit 09030005, on Bois Forte Indian Reservation at Nett Lake town boat ramp.

PERIOD OF RECORD.-- June 1998 to September 2001 (no winter record), October 2001 to current year.

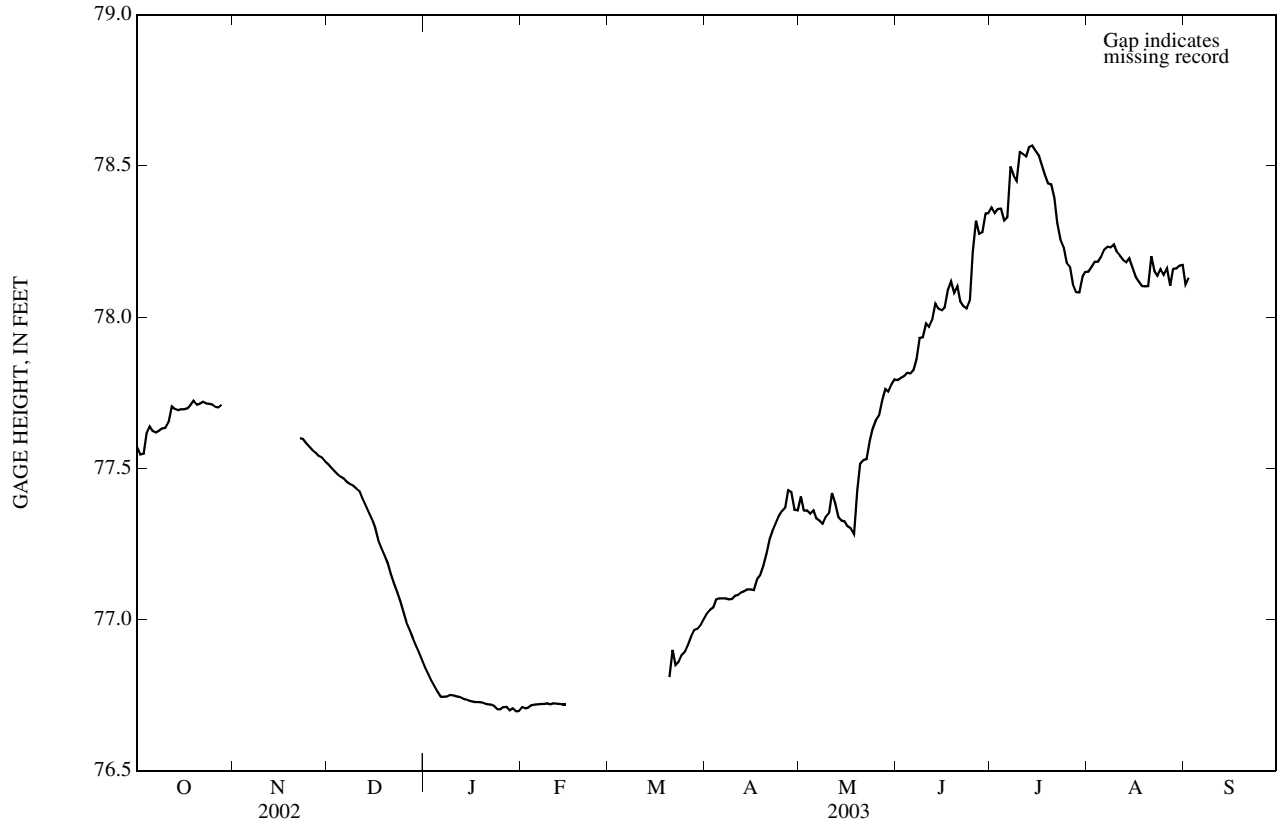
GAGE.-- Water-stage recorder. Datum of gage 1,200.00 ft above sea level (NGVD of 1929). Prior to Oct. 1, 2002, at datum 71.43 ft higher.

EXTREMES FOR PERIOD OF RECORD.--Maximum-recorded gage height, 80.00 ft., Apr. 18, 2001; maximum daily, 79.95 ft., Apr. 21, 2001; minimum-recorded gage height, 76.58 ft, Mar. 6, 2002, but may have been lower during period of no gage-height record, Mar. 7-26 and Mar. 28 to April 1, 2002; minimum daily, 76.60 ft, Mar. 6, 2002.

EXTREMES FOR CURRENT YEAR.--Maximum-recorded gage height, 78.66 ft., July 14; maximum daily, 78.57 ft., July 14; minimum-recorded gage height, 76.68 ft, Jan. 30,31, Feb. 15, but may have been lower during period of no gage-height record, Feb. 16-Mar. 19; minimum daily, 76.70 ft, Jan. 24, 25, 28, 30, 31.

GAGE HEIGHT, FEET
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	77.57	---	77.51	76.84	76.71	---	77.02	77.41	77.79	78.36	78.15	78.11
2	77.55	---	77.50	76.82	76.71	---	77.03	77.36	77.80	78.34	78.17	78.13
3	77.55	---	77.49	76.80	76.71	---	77.04	77.36	77.80	78.36	78.18	---
4	77.62	---	77.48	76.78	76.72	---	77.07	77.35	77.82	78.36	78.18	---
5	77.64	---	77.47	76.76	76.72	---	77.07	77.36	77.81	78.32	78.20	---
6	77.62	---	77.47	76.74	76.72	---	77.07	77.33	77.83	78.33	78.22	---
7	77.62	---	77.46	76.75	76.72	---	77.07	77.33	77.86	78.50	78.23	---
8	77.62	---	77.45	76.75	76.72	---	77.07	77.32	77.93	78.47	78.23	---
9	77.63	---	77.44	76.75	76.72	---	77.07	77.34	77.93	78.45	78.24	---
10	77.63	---	77.43	76.75	76.72	---	77.08	77.35	77.98	78.54	78.22	---
11	77.65	---	77.42	76.75	76.72	---	77.08	77.42	77.97	78.54	78.20	---
12	77.70	---	77.40	76.74	76.72	---	77.09	77.38	77.99	78.53	78.19	---
13	77.70	---	77.38	76.74	76.72	---	77.09	77.34	78.04	78.56	78.18	---
14	77.69	---	77.35	76.74	76.72	---	77.10	77.33	78.03	78.57	78.19	---
15	77.70	---	77.33	76.73	76.72	---	77.10	77.33	78.02	78.55	78.16	---
16	77.70	---	77.31	76.73	---	---	77.10	77.31	78.03	78.54	78.13	---
17	77.70	---	77.26	76.73	---	---	77.13	77.30	78.09	78.50	78.12	---
18	77.71	---	77.24	76.73	---	---	77.15	77.28	78.12	78.47	78.10	---
19	77.72	---	77.21	76.73	---	---	77.18	77.43	78.08	78.44	78.10	---
20	77.71	---	77.19	76.72	---	76.81	77.22	77.51	78.10	78.44	78.10	---
21	77.71	---	77.15	76.72	---	76.90	77.27	77.53	78.05	78.39	78.20	---
22	77.72	77.60	77.12	76.72	---	76.85	77.29	77.53	78.04	78.31	78.15	---
23	77.71	77.60	77.09	76.71	---	76.86	77.32	77.59	78.03	78.26	78.14	---
24	77.71	77.58	77.06	76.70	---	76.88	77.34	77.63	78.05	78.23	78.16	---
25	77.71	77.57	77.03	76.70	---	76.89	77.36	77.66	78.22	78.18	78.14	---
26	77.70	77.56	76.99	76.71	---	76.92	77.37	77.67	78.32	78.16	78.16	---
27	77.70	77.55	76.97	76.71	---	76.94	77.43	77.72	78.28	78.11	78.10	---
28	77.71	77.54	76.94	76.70	---	76.97	77.42	77.76	78.28	78.08	78.16	---
29	---	77.54	76.91	76.71	---	76.97	77.36	77.75	78.34	78.08	78.16	---
30	---	77.52	76.89	76.70	---	76.98	77.36	77.78	78.34	78.13	78.17	78.21
31	---	---	76.87	76.70	---	77.00	---	77.79	---	78.15	78.17	---
MEAN	---	---	77.25	76.74	---	---	77.18	77.47	78.03	78.36	78.17	---
MAX	---	---	77.51	76.84	---	---	77.43	77.79	78.34	78.57	78.24	---
MIN	---	---	76.87	76.70	---	---	77.02	77.28	77.79	78.08	78.10	---



05131455 NETT LAKE RIVER NEAR NETT LAKE, MN

LOCATION.--Lat 48°06'38", long 93°11'13", in NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 20, T.65 N., R.22 W., Koochiching County, Hydrologic Unit 09030005, downstream from dam at outlet of Nett Lake, 4 miles west of the town of Nett Lake.

DRAINAGE AREA.--128 mi².

PERIOD OF RECORD.--October 1995 to current year.

GAGE.--Water-stage recorder. Datum of gage 1,200.00 ft above sea level (NGVD of 1929). Prior to October 2002, water stage recorder at site 450 ft downstream at datum 70.05 ft higher.

REMARKS.--Records fair except those for estimated daily discharges, which are poor. Regulation from Nett Lake Dam upstream of gage.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.7	28	48	74	e0.11	e0.00	0.76	1.00	5.3	92	3.6	4.6
2	1.1	29	47	68	e0.07	e0.00	0.49	1.2	6.0	93	3.4	2.0
3	1.1	28	46	65	e0.05	e0.00	0.30	1.0	6.1	97	5.9	1.4
4	0.85	28	43	61	e0.03	e0.00	0.34	0.87	5.6	88	6.9	1.4
5	0.71	45	42	57	e0.02	e0.00	0.84	0.81	5.3	92	7.7	1.9
6	0.61	57	40	31	e0.02	e0.00	1.4	0.60	7.3	98	8.5	1.8
7	0.58	54	39	6.6	e0.01	e0.00	1.1	0.74	8.5	128	8.5	1.8
8	0.49	55	38	6.7	e0.01	e0.00	1.4	0.70	11	167	8.7	1.7
9	0.60	54	36	6.5	e0.00	e0.00	2.0	0.39	12	185	10	1.4
10	0.87	50	35	6.1	e0.00	e0.00	1.7	0.29	16	201	11	1.1
11	1.1	46	76	5.6	e0.00	e0.00	1.1	0.21	16	200	9.5	1.1
12	0.37	45	107	5.5	e0.00	e0.00	0.80	0.24	18	199	7.7	1.2
13	0.33	47	101	5.0	e0.00	e0.00	0.84	0.32	18	194	8.2	0.74
14	0.37	46	96	4.8	e0.00	e0.00	0.67	0.36	21	191	8.3	0.59
15	0.33	45	93	4.4	e0.00	e0.00	0.28	0.31	20	204	9.5	0.60
16	0.37	44	145	3.9	e0.00	e0.03	0.14	0.21	18	204	9.6	0.63
17	0.43	43	185	3.8	e0.00	e0.04	0.08	0.17	22	213	9.2	0.67
18	0.41	41	176	3.7	e0.00	e0.05	0.12	0.11	26	196	10	0.46
19	0.40	51	164	3.4	e0.00	e0.05	0.08	0.09	27	190	10	0.42
20	0.50	69	155	2.8	e0.00	e0.06	0.07	0.14	22	180	8.4	0.53
21	0.60	67	145	2.3	e0.00	e0.07	0.17	0.12	24	184	8.3	0.50
22	0.64	66	136	1.7	e0.00	e0.07	0.28	0.08	23	176	9.8	0.42
23	16	62	134	1.3	e0.00	e0.08	0.37	0.17	22	166	7.5	0.48
24	29	61	123	e1.0	e0.00	e0.09	0.22	0.22	27	155	7.0	0.42
25	30	59	114	e0.85	e0.00	0.10	0.49	0.20	37	152	7.3	0.59
26	28	57	106	e0.64	e0.00	0.23	0.83	0.20	42	148	6.5	0.67
27	28	56	100	e0.50	e0.00	0.29	0.75	0.11	79	147	5.0	0.49
28	30	54	95	e0.37	e0.00	0.27	0.44	0.11	87	67	3.9	0.47
29	32	50	89	e0.28	---	0.23	0.57	0.10	91	2.3	3.3	0.43
30	31	52	83	e0.21	---	0.30	0.91	6.2	95	2.2	3.7	0.39
31	29	---	86	e0.16	---	0.67	---	4.8	---	3.2	4.5	---
TOTAL	267.46	1,489	2,923	434.11	0.32	2.63	19.54	22.07	818.1	4,414.7	231.4	30.90
MEAN	8.63	49.6	94.3	14.0	0.011	0.085	0.65	0.71	27.3	142	7.46	1.03
MAX	32	69	185	74	0.11	0.67	2.0	6.2	95	213	11	4.6
MIN	0.33	28	35	0.16	0.00	0.00	0.07	0.08	5.3	2.2	3.3	0.39
AC-FT	531	2,950	5,800	861	0.6	5.2	39	44	1,620	8,760	459	61
CFSM	0.07	0.39	0.74	0.11	0.00	0.00	0.01	0.01	0.21	1.11	0.06	0.01
IN.	0.08	0.43	0.85	0.13	0.00	0.00	0.01	0.01	0.24	1.28	0.07	0.01

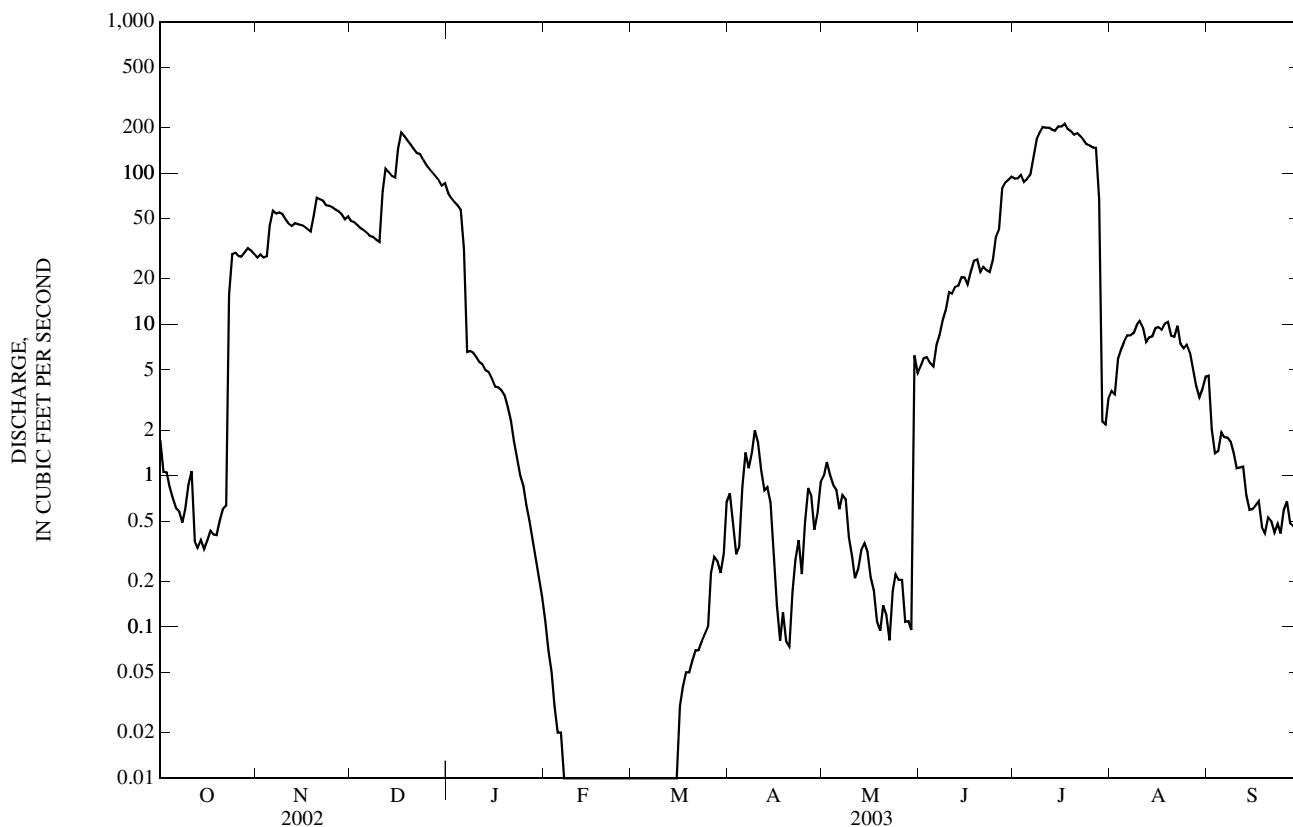
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1996 - 2003, BY WATER YEAR (WY)

	70.3	94.9	65.0	29.7	17.0	15.0	266	296	109	63.1	23.2	33.3
MEAN	187	211	128	54.3	37.3	40.1	464	566	322	142	98.0	154
(WY)	(2001)	(2002)	(2002)	(1997)	(1996)	(1998)	(1999)	(2001)	(2001)	(2003)	(2001)	(1999)
MIN	0.22	0.063	1.38	1.50	0.011	0.085	0.65	0.71	11.9	1.41	0.059	0.000
(WY)	(1999)	(1999)	(1999)	(1999)	(2003)	(2003)	(2003)	(2003)	(2000)	(1996)	(1998)	(1998)

05131455 NETT LAKE RIVER NEAR NETT LAKE, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1996 - 2003	
ANNUAL TOTAL	19,486.46		10,653.23		90.3	
ANNUAL MEAN	53.4		29.2		162	
HIGHEST ANNUAL MEAN					2001	
LOWEST ANNUAL MEAN					2003	
HIGHEST DAILY MEAN	403	Jun 25	213	Jul 17	1,470	Apr 13, 1999
LOWEST DAILY MEAN	0.13	Mar 21	0.00	Feb 9-Mar 15	a0.00	Jun 21, 1996
ANNUAL SEVEN-DAY MINIMUM	0.13	Mar 21	0.00	Feb 9	0.00	Aug 13, 1996
MAXIMUM PEAK FLOW			225	Jul 17	1,490	Apr 13, 1999
MAXIMUM PEAK STAGE			74.85	Jul 17	b7.26	Apr 13, 1999
ANNUAL RUNOFF (AC-FT)	38,650		21,130		65,420	
ANNUAL RUNOFF (CFSM)	0.42		0.23		0.71	
ANNUAL RUNOFF (INCHES)	5.66		3.10		9.59	
10 PERCENT EXCEEDS	162		97		274	
50 PERCENT EXCEEDS	28		2.8		24	
90 PERCENT EXCEEDS	0.21		0.01		0.14	

a Many days, several years..
 b Site and datum then in use.
 c Estimated.



05131500 LITTLE FORK RIVER AT LITTLEFORK, MN

LOCATION.--Lat 48°23'45", long 93°32'57", in NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 9, T.68 N., R.25 W., Koochiching County, Hydrologic Unit 09030005, on right bank at town of Littlefork, 0.9 mi upstream from bridge on State Highway 217, 2.8 mi upstream from Beaver Creek, and 19 mi upstream from mouth.

DRAINAGE AREA.--1,680 mi².

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.

REVISED RECORDS.--WSP 955: Drainage area. WSP 1508: 1913, 1916, 1928-32, 1934. WRD MN-74: 1963.

GAGE.--Water-stage recorder. Datum of gage is 1,083.59 ft above sea level (NGVD of 1929). June 23, 1909 to March 4, 1917, nonrecording gage, and July 21, 1937 to October 23, 1979, water-stage recorder at site 1.2 mi downstream at datum 10.53 ft lower; March 5 to September 30, 1917, and June 22, 1928 to July 20, 1937, non-recording gage at site 1.18 mi downstream at datum 10.53 ft lower.

REMARKS.--Records good except those for estimated daily discharges, which are fair.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	234	468	e260	e195	e76	e70	e480	699	1,240	1,660	649	461
2	228	462	e250	e189	e74	e70	e455	638	1,340	1,430	779	411
3	226	463	e245	e188	e74	e70	e424	580	1,250	1,280	803	361
4	240	465	e240	e188	e73	e70	e380	532	1,060	1,180	875	324
5	249	436	e235	e187	e72	e70	e350	497	886	1,020	910	287
6	289	455	e230	e187	e71	e70	e355	466	766	893	819	260
7	334	421	e230	e186	e70	e70	e360	429	689	802	741	235
8	426	467	e225	e185	e69	e70	e350	396	648	805	680	213
9	464	455	e220	e184	e68	e70	e365	380	627	826	606	199
10	472	448	e220	e182	e68	e70	e395	381	716	804	526	183
11	467	423	e215	e179	e68	e70	e450	398	811	916	472	171
12	451	e380	e215	e176	e68	e70	e510	439	871	1,170	432	169
13	484	e300	e215	e172	e69	e70	e620	482	902	1,350	392	161
14	635	e260	e220	e167	e69	e70	678	503	873	1,370	352	181
15	719	e244	e220	e160	e69	e71	619	510	774	1,310	317	412
16	694	e247	e225	e154	e70	e74	579	473	691	1,280	285	667
17	657	e284	e230	e147	e70	e77	595	430	609	1,410	257	760
18	621	e358	e230	e140	e70	e86	613	401	616	1,350	237	736
19	579	e399	e235	e133	e70	e96	616	390	605	1,200	223	658
20	550	e357	e235	e125	e70	e120	766	520	548	1,020	208	584
21	538	e340	e235	e118	e70	e210	1,400	1,270	502	1,070	206	634
22	530	e330	e235	e114	e70	e500	1,980	1,470	451	1,210	266	889
23	513	e330	e235	e108	e70	e760	2,130	1,530	410	1,100	285	1,000
24	492	e325	e230	e104	e70	e800	1,890	1,750	380	933	259	1,020
25	474	e310	e225	e100	e70	e795	1,580	1,600	509	786	261	998
26	483	e295	e220	e95	e70	e760	1,310	1,370	1,200	672	255	904
27	477	e290	e220	e92	e70	e720	1,120	1,150	1,490	580	242	792
28	462	e280	e215	e87	e70	e680	953	972	1,570	509	256	695
29	458	e270	e210	e84	---	e625	845	861	1,780	474	332	626
30	464	e265	e205	e81	---	e580	772	848	1,870	449	458	575
31	459	---	e195	e78	---	e520	---	960	---	433	483	---
TOTAL	14,369	10,827	7,020	4,485	1,968	8,454	23,940	23,325	26,684	31,292	13,866	15,566
MEAN	464	361	226	145	70.3	273	798	752	889	1,009	447	519
MAX	719	468	260	195	76	800	2,130	1,750	1,870	1,660	910	1,020
MIN	226	244	195	78	68	70	350	380	380	433	206	161
AC-FT	28,500	21,480	13,920	8,900	3,900	16,770	47,480	46,270	52,930	62,070	27,500	30,880
CFSM	0.28	0.21	0.13	0.09	0.04	0.16	0.47	0.45	0.53	0.60	0.27	0.31
IN.	0.32	0.24	0.16	0.10	0.04	0.19	0.53	0.52	0.59	0.69	0.31	0.34

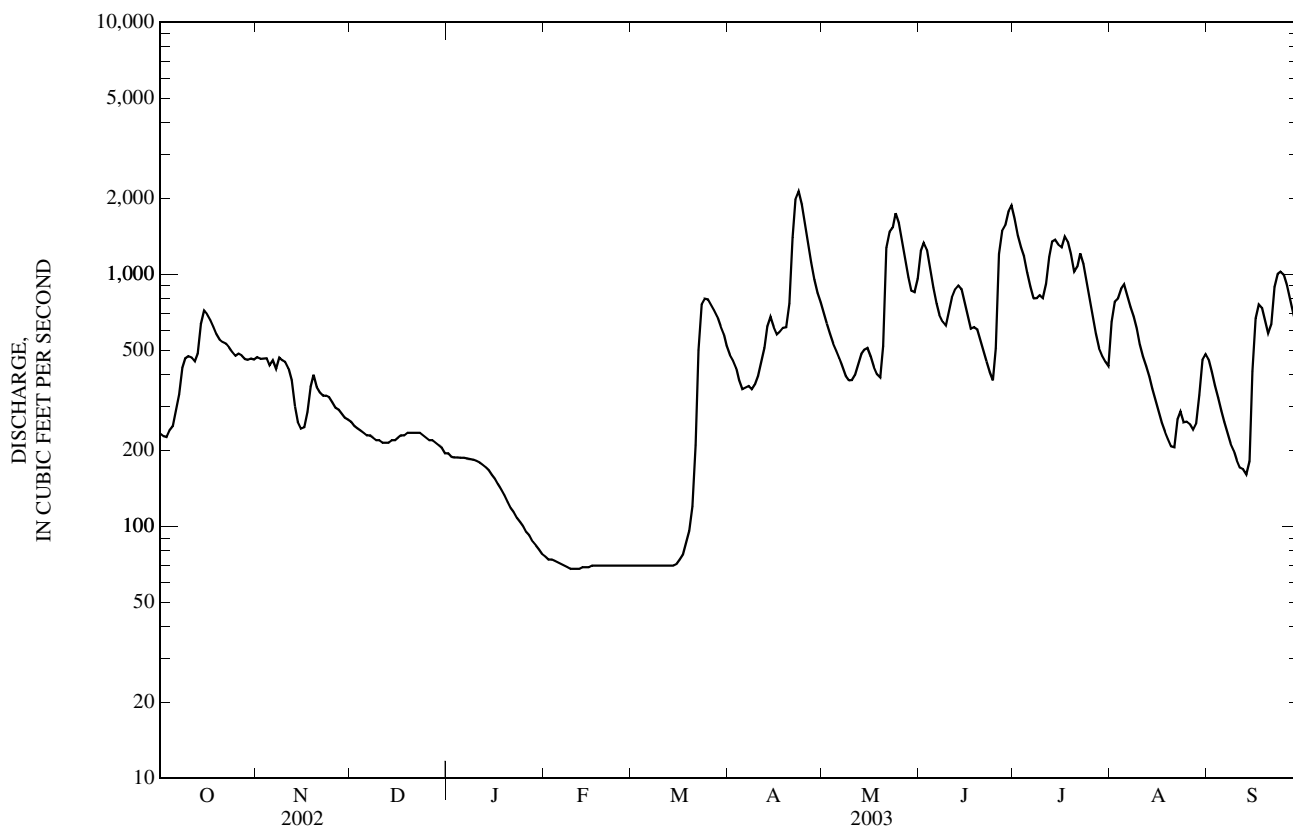
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 2003, BY WATER YEAR (WY)

MEAN	899	733	328	153	115	282	3,181	2,849	1,741	997	572	727
MAX	4,450	3,044	1,186	477	270	3,022	8,421	12,190	5,490	3,643	2,679	5,189
(WY)	(1996)	(1972)	(2002)	(1966)	(1969)	(1945)	(1966)	(1950)	(1944)	(1944)	(1988)	(1977)
MIN	43.4	60.8	52.6	43.5	42.2	50.2	292	173	182	75.4	34.3	29.2
(WY)	(1977)	(1977)	(1977)	(1931)	(1963)	(1940)	(1977)	(1977)	(1988)	(1988)	(1936)	(1976)

05131500 LITTLE FORK RIVER AT LITTLEFORK, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1909 - 2003	
ANNUAL TOTAL	299,503		181,796			
ANNUAL MEAN	821		498		1,063	
HIGHEST ANNUAL MEAN					1,912	1966
LOWEST ANNUAL MEAN					306	1931
HIGHEST DAILY MEAN	7,630	Jun 26	2,130	Apr 23	25,000	Apr 18, 1916
LOWEST DAILY MEAN	110	Mar 10	68	Feb 9-12	21	Aug 26, 1936
ANNUAL SEVEN-DAY MINIMUM	114	Mar 8	68	Feb 8	22	Aug 21, 1936
MAXIMUM PEAK FLOW			2,190	Apr 23	25,000	Apr 18, 1916
MAXIMUM PEAK STAGE			5.24	Apr 23	a37.00	Apr 18, 1916
INSTANTANEOUS LOW FLOW			b68	Feb 9	21	Aug 26, 1936
ANNUAL RUNOFF (AC-FT)	594,100		360,600		769,800	
ANNUAL RUNOFF (CFSM)	0.49		0.30		0.63	
ANNUAL RUNOFF (INCHES)	6.63		4.03		8.59	
10 PERCENT EXCEEDS	1,930		1,080		2,800	
50 PERCENT EXCEEDS	421		412		375	
90 PERCENT EXCEEDS	131		71		87	

a Also occurred May 11, 1950, site and datum then in use.
 b Estimated, minimum daily.
 c Estimated.



05132000 BIG FORK RIVER AT BIG FALLS, MN

LOCATION.--Lat 48°11'45", long 93°48'25", in SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec.35, T.155 N., R.25 W., Koochiching County, Hydrologic Unit 09030006, on left bank at town of Big Falls, 700 ft downstream from falls, 0.3 mi downstream from bridge on U.S. Highway 71, and 4.8 mi upstream from Sturgeon River.

DRAINAGE AREA.--1,480 mi².

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 September 1979, October 1979 to September 1982 (annual maximum only), October 1982 to September 1993, October 1993 to September 1994 (annual maximum only) and October 1997 to current year.

REVISED RECORDS.--WSP 1308:1935 (M).

GAGE.--Water-stage recorder. Datum of gage is 1,144.71 ft above sea level (NGVD of 1929). Prior to June 10, 1911, nonrecording gage at railroad bridge about 0.4 mi upstream at different datum. June 10, 1911 to Sept. 30, 1912, and June 22, 1928 to Dec. 17, 1937, nonrecording gage at site 200 ft upstream at same datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair. Prior to 1971, a powerplant, located 0.3 mi upstream, caused some diurnal fluctuation at low flows.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	325	443	e305	e215	e73	e62	e380	397	493	1,510	814	425
2	318	461	e290	e210	e71	e62	e360	381	542	1,290	766	383
3	317	e400	e280	e210	e70	e62	e345	378	501	1,180	773	331
4	346	e370	e265	e205	e68	e62	e325	366	445	1,030	702	287
5	378	e370	e255	e205	e66	e62	e315	354	403	876	616	259
6	392	e410	e250	e205	e64	e62	e300	350	388	754	561	230
7	406	e405	e245	e205	e63	e62	e295	349	380	665	490	207
8	416	e440	e240	e200	e62	e63	e290	348	364	627	419	188
9	411	e420	e240	e197	e62	e63	e285	360	374	613	374	179
10	399	e400	e240	e195	e61	e63	e360	399	378	581	339	164
11	394	e400	e245	e190	e61	e63	e430	428	401	631	316	155
12	394	e395	e245	e185	e61	e63	e540	489	432	692	293	152
13	400	e370	e250	e180	e61	e64	e640	508	570	633	270	154
14	418	e350	e255	e175	e62	e66	709	477	580	582	249	166
15	423	e320	e260	e165	e62	e68	425	436	538	545	223	182
16	414	e340	e260	e160	e62	e75	391	405	478	479	199	184
17	401	e490	e265	e155	e63	e82	390	381	432	433	180	173
18	399	e555	e270	e145	e63	e94	372	364	520	394	164	172
19	399	e540	e270	e140	e63	e115	380	359	804	353	154	177
20	403	e483	e275	e135	e63	e190	446	388	596	317	152	182
21	404	e450	e275	e125	e63	e360	590	487	466	292	164	194
22	409	e430	e275	e120	e63	e550	708	570	395	277	188	210
23	409	e420	e270	e115	e63	e560	706	565	341	254	204	210
24	407	e420	e265	e105	e63	e560	642	523	307	230	198	207
25	400	e400	e265	e98	e63	e560	579	493	586	210	210	201
26	399	e375	e255	e93	e63	e550	526	460	1,050	196	233	192
27	399	e365	e245	e88	e63	e520	482	419	1,310	188	291	188
28	406	e345	e240	e83	e63	e490	455	389	1,450	184	338	184
29	424	e330	e230	e80	---	e460	440	371	1,780	181	318	180
30	446	e320	e230	e78	---	e430	427	387	1,690	268	452	178
31	443	---	e220	e76	---	e410	---	431	---	621	449	---
TOTAL	12,299	12,217	7,975	4,738	1,785	6,953	13,533	13,012	18,994	17,086	11,099	6,294
MEAN	397	407	257	153	63.8	224	451	420	633	551	358	210
MAX	446	555	305	215	73	560	709	570	1,780	1,510	814	425
MIN	317	320	220	76	61	62	285	348	307	181	152	152
AC-FT	24,400	24,230	15,820	9,400	3,540	13,790	26,840	25,810	37,670	33,890	22,010	12,480
CFSM	0.27	0.28	0.17	0.10	0.04	0.15	0.30	0.28	0.43	0.37	0.24	0.14
IN.	0.31	0.31	0.20	0.12	0.04	0.17	0.34	0.33	0.48	0.43	0.28	0.16

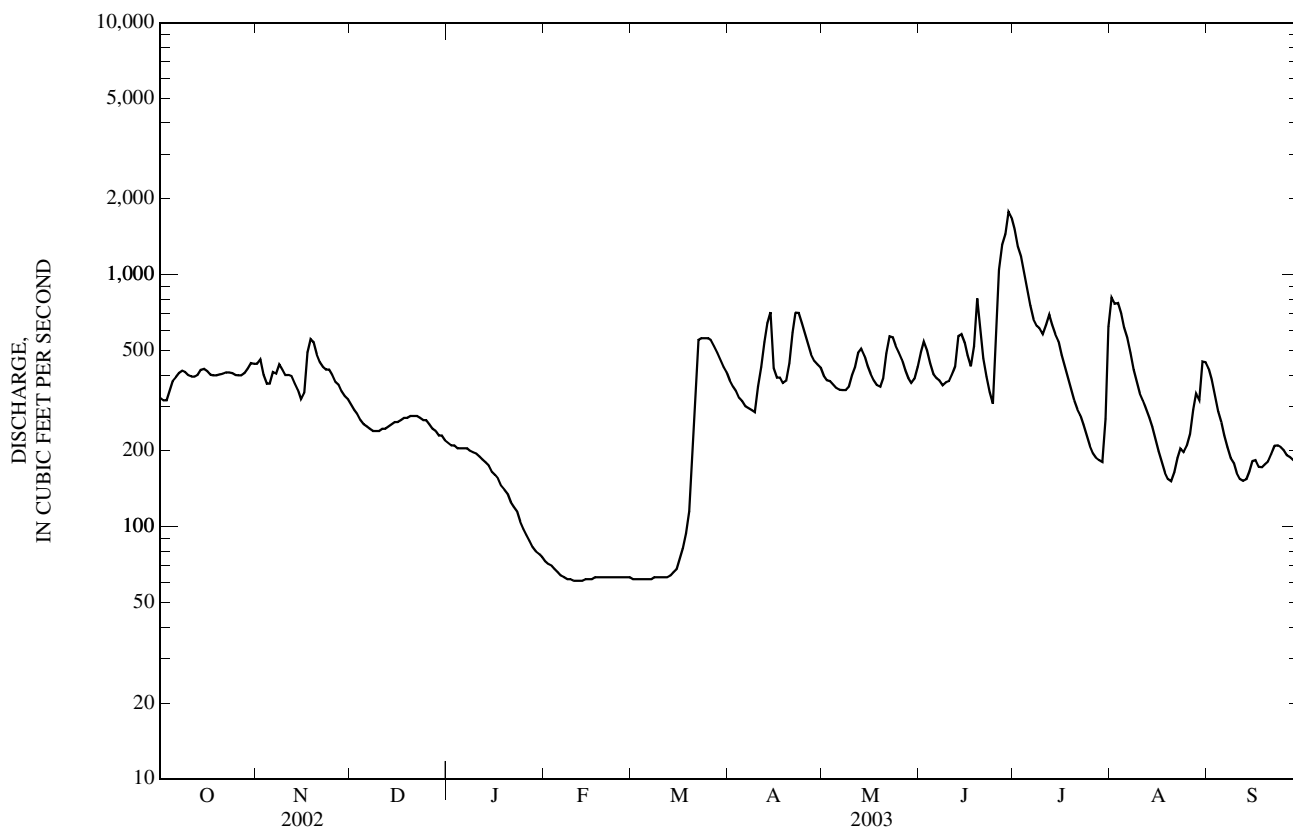
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 2003, BY WATER YEAR (WY)

MEAN	665	551	294	178	141	252	1,894	1,987	1,177	653	416	560
MAX	2,247	2,034	685	399	335	1,928	5,186	7,496	2,890	2,321	1,799	2,989
(WY)	(1970)	(1972)	(1970)	(1969)	(1969)	(1945)	(1966)	(1950)	(1974)	(1944)	(1978)	(1937)
MIN	38.3	44.5	31.6	22.2	22.9	32.9	175	138	180	46.0	26.7	22.4
(WY)	(1932)	(1935)	(1935)	(1935)	(1935)	(1940)	(1931)	(1931)	(1934)	(1931)	(1934)	(1934)

05132000 BIG FORK RIVER AT BIG FALLS, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1909 - 2003	
ANNUAL TOTAL	248,287		125,985		731	
ANNUAL MEAN	680		345		92.0	
HIGHEST ANNUAL MEAN					1,362	1950
LOWEST ANNUAL MEAN					92.0	1931
HIGHEST DAILY MEAN	9,420	Jun 25	1,780	Jun 29	14,800	May 9, 1950
LOWEST DAILY MEAN	185	Mar 3	61	Feb 10-13	14	Jan 10, 1940
ANNUAL SEVEN-DAY MINIMUM	194	Mar 1	61	Feb 8	18	Jan 22, 1935
MAXIMUM PEAK FLOW			a1,810	Jun 29	14,800	May 8, 1950
MAXIMUM PEAK STAGE			b5.54	Mar 20	17.08	May 8, 1950
INSTANTANEOUS LOW FLOW			c61	Feb 10	7.0	Aug 7, 1939
ANNUAL RUNOFF (AC-FT)	492,500		249,900		529,700	
ANNUAL RUNOFF (CFSM)	0.46		0.23		0.49	
ANNUAL RUNOFF (INCHES)	6.24		3.17		6.71	
10 PERCENT EXCEEDS	1,310		574		1,790	
50 PERCENT EXCEEDS	403		340		338	
90 PERCENT EXCEEDS	215		65		81	

- a Gage-height, 5.44 ft.
- b Backwater from ice.
- c Estimated, minimum daily.
- e Estimated.



05133500 RAINY RIVER AT MANITOU RAPIDS, MN
(International Gaging Station)

LOCATION.--Lat 48°38'04", long 93°54'47", in NW¹/₄SE¹/₄ sec. 36, T.160 N., R.26 W., Koochiching County, Hydrologic Unit 09030004, on left bank at Manitou Rapids, 4 mi west of Indus.

DRAINAGE AREA.--19,400 mi² (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 U.S. Army Corps of Engineers. Published as "near Birchdale" 1932-34.

GAGE.--Water-stage recorder. Datum of gage is 1,062.48 ft above sea level (NGVD of 1929). Prior to Nov. 10, 1934, nonrecording gage at site near Birchdale, 7 mi. downstream at different datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair. Diurnal fluctuation caused by power plants at International Falls. Some regulation at Rainy and Namakan Lakes affects low and medium flows.

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

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5,200	5,590	e5,000	e6,100	e6,100	e4,750	8,070	5,830	5,710	9,340	4,230	4,160
2	5,210	5,550	e5,000	e5,950	e5,950	e4,750	7,910	5,690	5,980	8,940	4,890	3,890
3	5,210	5,550	e4,950	e6,050	e5,850	e4,700	6,610	5,580	6,220	8,450	5,300	3,890
4	5,190	5,600	e4,950	e6,200	e5,750	e4,700	5,770	5,460	6,220	7,930	5,440	4,120
5	5,270	5,520	e4,900	e6,350	e5,700	e4,700	5,470	5,320	6,070	7,560	5,510	4,030
6	5,250	5,520	e4,900	e6,400	e5,700	e4,750	5,370	5,170	5,850	7,090	5,460	3,930
7	5,340	5,520	e4,900	e6,400	e5,700	e4,900	5,210	5,120	5,630	6,660	5,240	3,880
8	5,380	5,560	e4,850	e6,350	e5,650	e5,050	5,100	5,090	5,530	6,390	5,030	3,830
9	5,490	5,620	e4,850	e6,300	e5,450	e5,000	5,070	5,020	5,580	6,070	4,840	3,730
10	5,560	5,590	e4,800	e6,300	e5,250	e5,050	5,100	4,970	5,800	5,800	4,680	3,620
11	5,550	5,590	e4,800	e6,250	e5,300	e5,000	5,380	4,930	6,010	5,640	4,520	3,480
12	5,540	5,490	e4,800	e6,200	e5,450	e5,000	5,720	5,130	6,190	5,600	4,350	3,450
13	5,580	5,300	e4,800	e6,200	e5,550	e5,000	5,960	5,160	6,290	5,790	4,250	3,520
14	5,590	e5,200	e4,800	e6,200	e5,600	e5,000	6,200	5,210	6,440	5,880	4,190	3,580
15	5,650	e5,100	e4,800	e6,150	e5,550	e5,000	6,270	5,290	6,500	6,030	4,050	3,620
16	5,850	e5,050	e4,800	e6,100	e5,500	e5,000	6,060	5,260	6,350	e5,900	4,000	3,780
17	5,870	e5,050	e4,750	e6,000	e5,450	e5,000	5,720	5,200	6,060	5,730	3,910	4,080
18	5,790	e5,300	e4,800	e6,000	e5,350	e5,050	5,690	5,130	5,810	5,690	3,820	4,130
19	5,740	e5,400	e4,900	e5,950	e5,250	e5,100	6,840	5,030	5,690	5,540	3,770	4,050
20	5,690	e5,350	e5,100	e5,900	e5,200	e5,200	6,930	5,040	5,350	5,310	3,740	4,010
21	5,640	e5,250	e5,500	e5,850	e5,100	e5,400	6,470	5,140	5,060	5,090	3,770	3,920
22	5,590	e5,200	e5,900	e5,800	e5,000	e5,900	6,530	5,710	4,690	4,960	3,780	3,940
23	5,580	e5,150	e5,900	e5,800	e4,850	e6,700	7,020	6,190	4,430	4,970	3,770	4,160
24	5,590	e5,150	e6,100	e5,800	e4,750	e7,100	7,360	6,420	4,280	4,870	3,760	4,310
25	5,560	e5,150	e6,200	e5,800	e4,750	e7,600	7,330	6,610	4,580	4,670	3,820	4,570
26	5,530	e5,150	e6,200	e5,800	e4,750	e8,000	7,020	6,520	5,040	4,480	3,800	4,470
27	5,540	e5,100	e6,200	e5,800	e4,750	e8,000	6,680	6,270	6,610	4,360	3,840	4,370
28	5,570	e5,100	e6,200	e6,000	e4,750	8,110	6,390	6,020	7,800	4,200	3,860	4,310
29	5,550	e5,050	e6,200	e6,150	---	7,820	6,260	5,870	8,520	4,130	3,910	4,170
30	5,560	e5,050	e6,200	e6,200	---	7,700	6,020	5,680	9,160	4,130	3,940	4,090
31	5,560	---	e6,200	e6,150	---	7,670	---	5,630	---	4,090	3,950	---
TOTAL	171,220	159,800	164,250	188,500	150,000	178,700	187,530	170,690	179,450	181,290	133,420	119,090
MEAN	5,523	5,327	5,298	6,081	5,357	5,765	6,251	5,506	5,982	5,848	4,304	3,970
MAX	5,870	5,620	6,200	6,400	6,100	8,110	8,070	6,610	9,160	9,340	5,510	4,570
MIN	5,190	5,050	4,750	5,800	4,750	4,700	5,070	4,930	4,280	4,090	3,740	3,450
AC-FT	339,600	317,000	325,800	373,900	297,500	354,500	372,000	338,600	355,900	359,600	264,600	236,200
CFSM	0.28	0.27	0.27	0.31	0.28	0.30	0.32	0.28	0.31	0.30	0.22	0.20
IN.	0.33	0.31	0.31	0.36	0.29	0.34	0.36	0.33	0.34	0.35	0.26	0.23

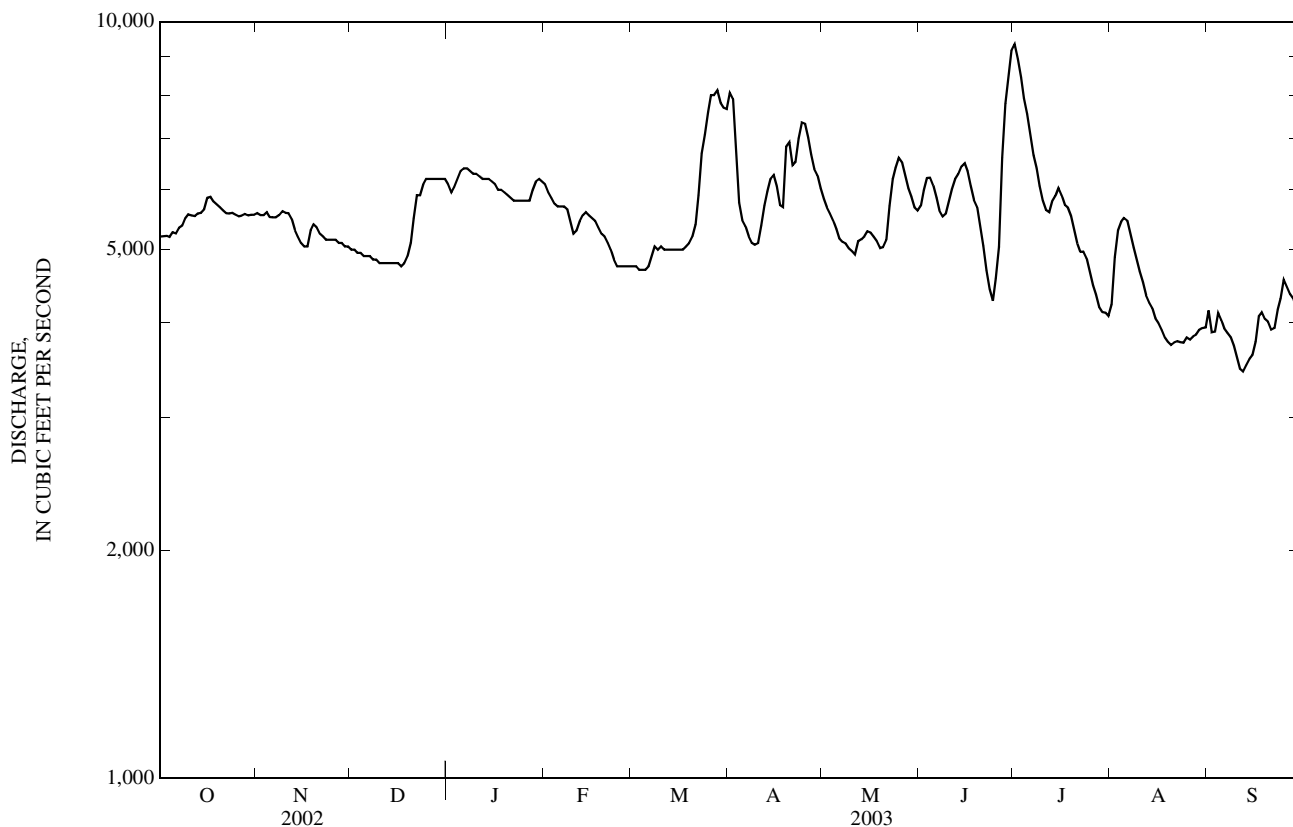
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1929 - 2003, BY WATER YEAR (WY)

MEAN	11,810	11,420	10,210	9,153	8,696	8,911	15,460	19,550	20,140	16,800	11,590	11,030
MAX	42,410	37,280	27,790	18,430	17,240	16,640	38,100	52,880	49,480	47,970	33,700	30,620
(WY)	(1942)	(1972)	(1972)	(1972)	(1969)	(1945)	(1966)	(1950)	(1950)	(1950)	(1944)	(1988)
MIN	4,728	3,796	3,190	2,900	3,129	2,926	4,378	4,106	3,676	3,483	3,422	3,746
(WY)	(1981)	(1977)	(1930)	(1931)	(1931)	(1931)	(1977)	(1977)	(1980)	(1980)	(1980)	(1998)

05133500 RAINY RIVER AT MANITOU RAPIDS, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1929 - 2003	
ANNUAL TOTAL	4,808,570		1,983,940			
ANNUAL MEAN	13,170		5,435		12,910	
HIGHEST ANNUAL MEAN					23,260 1950	
LOWEST ANNUAL MEAN					4,470 1931	
HIGHEST DAILY MEAN	63,100	Jun 26	9,340	Jul 1	71,300	May 11, 1950
LOWEST DAILY MEAN	4,750	Dec 17	3,450	Sep 12	928	Dec 26, 1929
ANNUAL SEVEN-DAY MINIMUM	4,790	Dec 11	3,570	Sep 9	1,500	Dec 24, 1929
MAXIMUM PEAK FLOW			a9,380	Jun 30	71,600	May 12, 1950
MAXIMUM PEAK STAGE			b5.58	Mar 24	21.04	May 12, 1950
ANNUAL RUNOFF (AC-FT)	9,538,000		3,935,000		9,354,000	
ANNUAL RUNOFF (CFSM)	0.68		0.28		0.67	
ANNUAL RUNOFF (INCHES)	9.22		3.80		9.04	
10 PERCENT EXCEEDS	38,000		6,430		25,500	
50 PERCENT EXCEEDS	8,810		5,450		10,300	
90 PERCENT EXCEEDS	5,210		4,090		5,000	

a Gage height, 4.89 ft
 b Backwater from ice.
 c Estimated.



05140520 LAKE OF THE WOODS AT WARROD, MN
(International gaging station)

LOCATION.--Lat 48°54'15", long 95°18'57", in SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec.29, T. 163 N., R. 36 W., Roseau County, Hydrologic Unit 09030009, on left bank of Warroad River in Warroad, 300 ft downstream from Canadian National railroad bridge, 1,000 ft downstream from bridge on State Highway 11, and 4,000 ft upstream from mouth of Warroad River.

DRAINAGE AREA.--27,200 mi².

PERIOD OF RECORD.--April to September 1978, month-end elevations only. October 1978 to September 1985, daily-mean elevations; October 1985 to December 1994 and October 1997 to current year, daily-mean elevations (gage heights). Records collected prior to April 1978 are in reports of the Water Survey of Canada.

GAGE.--Water-stage recorder. Datum at gage is 1,000.00 ft above sea level (Lake of the Woods datum).

REMARKS.--Records good. Runoff conditions of the Warroad River can affect water levels at this station. Water level subject to fluctuation caused by changes in direction and velocity of wind and resulting seiches.

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

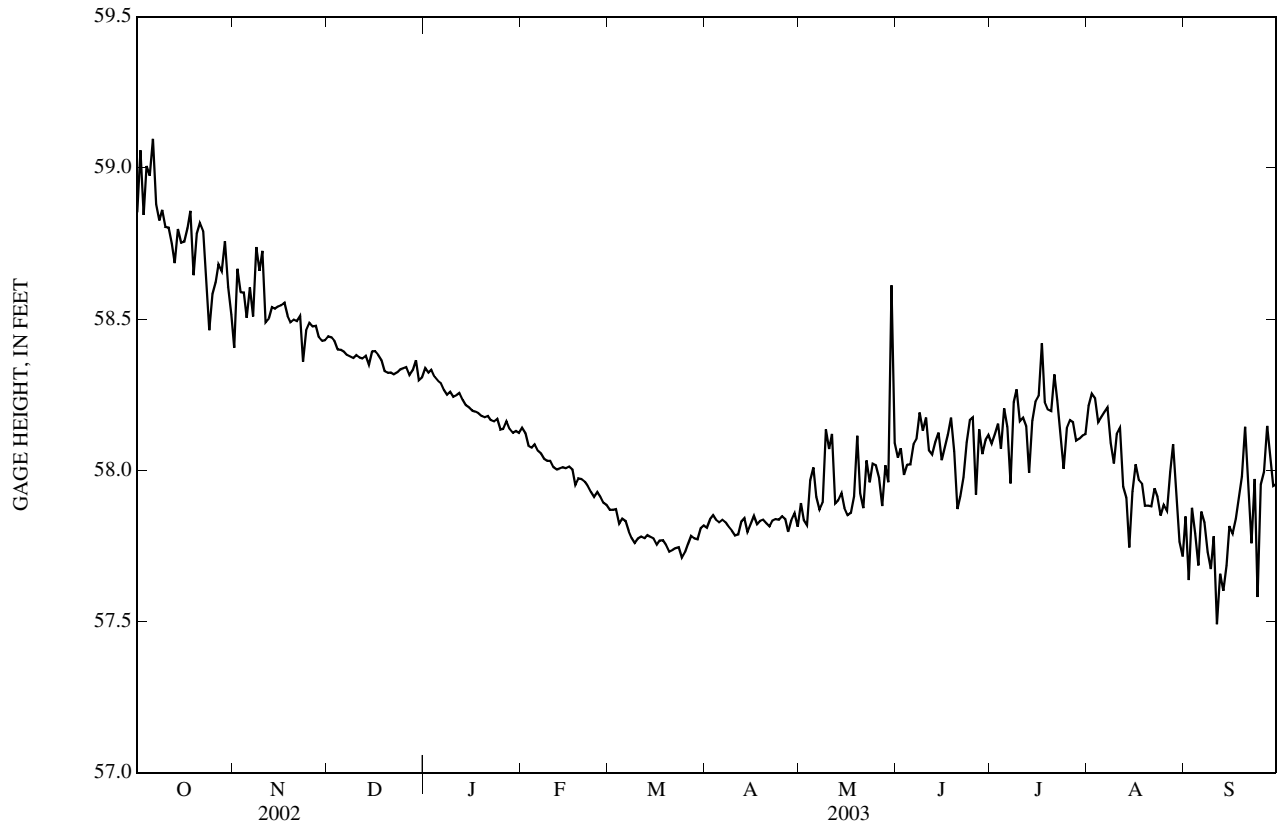
EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 62.55 ft, June 27, 2001; maximum daily, 62.31 ft, Jul. 9, 2002; minimum gage height recorded, 55.94 ft, Sept. 4, 1980; minimum daily recorded, 56.52 ft, Apr. 15, 1981.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 59.39 ft, May 30; maximum daily, 59.10 ft, Oct. 6; minimum gage height, 57.02 ft, Sep. 24; minimum daily, 57.49 ft, Sep. 11.

GAGE HEIGHT, FEET
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	58.85	58.40	58.44	58.34	58.14	57.87	57.81	57.89	58.04	58.09	58.21	57.85
2	59.06	58.67	58.44	58.32	58.12	57.87	57.84	57.84	58.07	58.12	58.25	57.64
3	58.84	58.59	58.43	58.33	58.08	57.87	57.85	57.82	57.98	58.15	58.24	57.88
4	59.01	58.59	58.40	58.31	58.07	57.82	57.84	57.97	58.02	58.07	58.16	57.79
5	58.97	58.50	58.40	58.30	58.09	57.84	57.83	58.01	58.02	58.20	58.17	57.69
6	59.10	58.61	58.39	58.29	58.07	57.83	57.84	57.91	58.09	58.14	58.19	57.86
7	58.88	58.51	58.38	58.27	58.06	57.80	57.83	57.87	58.10	57.96	58.21	57.83
8	58.83	58.74	58.38	58.25	58.04	57.78	57.81	57.89	58.19	58.22	58.09	57.73
9	58.86	58.66	58.37	58.26	58.03	57.76	57.80	58.14	58.13	58.27	58.02	57.67
10	58.80	58.73	58.38	58.24	58.03	57.77	57.79	58.07	58.17	58.16	58.12	57.78
11	58.80	58.49	58.37	58.25	58.01	57.78	57.79	58.12	58.07	58.17	58.14	57.49
12	58.75	58.50	58.37	58.26	58.00	57.78	57.83	57.89	58.05	58.15	57.95	57.66
13	58.68	58.54	58.38	58.23	58.01	57.79	57.84	57.90	58.09	57.99	57.91	57.60
14	58.80	58.53	58.35	58.22	58.01	57.78	57.80	57.92	58.12	58.16	57.74	57.69
15	58.75	58.54	58.39	58.21	58.01	57.77	57.82	57.88	58.03	58.23	57.93	57.82
16	58.76	58.55	58.39	58.20	58.01	57.75	57.85	57.85	58.07	58.25	58.02	57.79
17	58.80	58.55	58.38	58.19	58.00	57.77	57.82	57.86	58.12	58.42	57.97	57.84
18	58.86	58.51	58.36	58.19	57.95	57.77	57.83	57.91	58.17	58.23	57.96	57.92
19	58.65	58.49	58.33	58.18	57.97	57.75	57.84	58.11	58.06	58.20	57.88	57.98
20	58.78	58.50	58.32	58.18	57.97	57.73	57.82	57.92	57.87	58.20	57.88	58.14
21	58.82	58.49	58.32	58.18	57.96	57.74	57.81	57.87	57.91	58.32	57.88	57.95
22	58.79	58.51	58.32	58.17	57.95	57.74	57.83	58.03	57.98	58.23	57.94	57.76
23	58.64	58.36	58.32	58.16	57.93	57.75	57.84	57.96	58.09	58.11	57.91	57.97
24	58.46	58.46	58.33	58.17	57.91	57.71	57.84	58.02	58.17	58.00	57.85	57.58
25	58.58	58.49	58.34	58.14	57.93	57.73	57.85	58.02	58.18	58.14	57.89	57.95
26	58.62	58.48	58.34	58.14	57.91	57.76	57.84	57.98	57.92	58.17	57.87	57.99
27	58.68	58.48	58.31	58.16	57.89	57.78	57.80	57.88	58.13	58.16	58.00	58.15
28	58.66	58.44	58.33	58.14	57.89	57.78	57.83	58.02	58.05	58.10	58.09	58.05
29	58.76	58.43	58.36	58.12	---	57.77	57.86	57.96	58.10	58.10	57.91	57.95
30	58.61	58.43	58.30	58.13	---	57.81	57.81	58.61	58.12	58.11	57.76	57.95
31	58.52	---	58.31	58.12	---	57.82	---	58.09	---	58.12	57.72	---
MEAN	58.77	58.53	58.36	58.21	58.00	57.78	57.83	57.97	58.07	58.16	58.00	57.83
MAX	59.10	58.74	58.44	58.34	58.14	57.87	57.86	58.61	58.19	58.42	58.25	58.15
MIN	58.46	58.36	58.30	58.12	57.89	57.71	57.79	57.82	57.87	57.96	57.72	57.49

05140520 LAKE OF THE WOODS AT WARROAD, MN—Continued



05140521 LAKE OF THE WOODS AT SPRINGSTEEL ISLAND NEAR WARROAD, MN

LOCATION.--Lat 48°56'45", long 95°18'24", in SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 9, T. 163 N., R. 36 W., Roseau County, Hydrologic Unit 09030009, at Springsteel Resort on Springsteel Island, 2.8 mi north of Warroad.

DRAINAGE AREA.--27,200 mi².

PERIOD OF RECORD.--June 1985 to current year.

GAGE.--Water-stage recorder. Datum at gage is 1,000.00 ft above sea level (Lake of the Woods datum).

REMARKS.--Records fair. Water level subject to fluctuation caused by changes in direction and velocity of wind and resulting seiches.

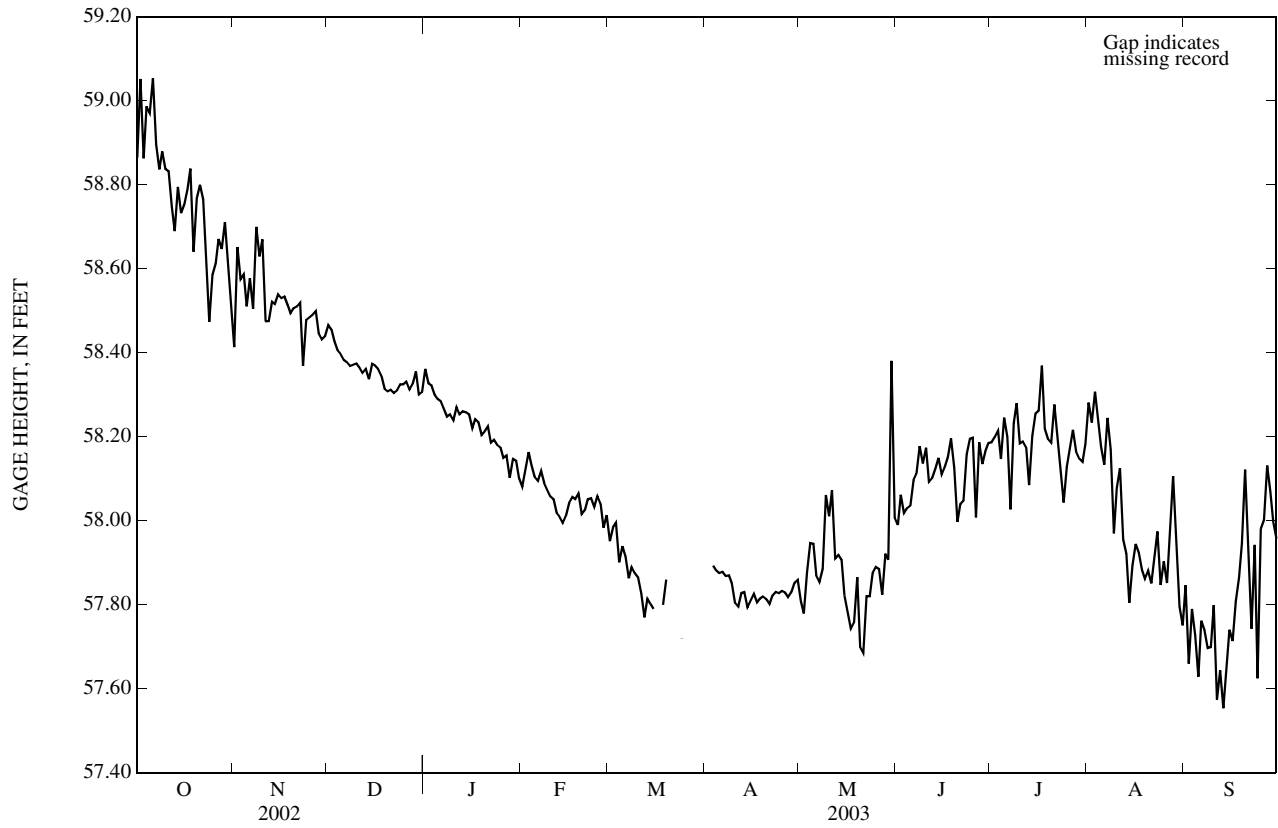
EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 62.53 ft, July 5, 2002; maximum daily, 62.25 ft, July 9, 2002; minimum gage height, 57.22 ft, Nov. 22, 1990; minimum daily, 57.43 ft, Mar. 18, 19, 20, 1988.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 59.23 ft, Oct. 6; maximum daily, 59.05 ft, Oct. 2,6; minimum gage height, 57.32 ft, Sept. 24; minimum daily, 57.55 ft, Sept. 13.

GAGE HEIGHT, FEET
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	58.86	58.41	58.47	58.36	58.08	57.95	---	57.81	57.99	58.19	58.28	57.85
2	59.05	58.65	58.45	58.33	58.12	57.98	---	57.78	58.06	58.20	58.23	57.66
3	58.86	58.57	58.43	58.32	58.16	57.99	57.89	57.88	58.02	58.21	58.31	57.79
4	58.99	58.59	58.41	58.30	58.13	57.90	57.88	57.95	58.03	58.15	58.23	57.73
5	58.97	58.51	58.40	58.29	58.10	57.94	57.88	57.95	58.04	58.25	58.18	57.63
6	59.05	58.58	58.38	58.28	58.09	57.91	57.88	57.87	58.10	58.20	58.13	57.76
7	58.90	58.50	58.38	58.26	58.12	57.86	57.87	57.85	58.11	58.03	58.24	57.74
8	58.84	58.70	58.37	58.25	58.09	57.89	57.87	57.89	58.18	58.23	58.17	57.70
9	58.88	58.63	58.37	58.25	58.07	57.88	57.85	58.06	58.14	58.28	57.97	57.70
10	58.84	58.67	58.37	58.24	58.06	57.87	57.80	58.01	58.17	58.18	58.08	57.80
11	58.83	58.47	58.36	58.27	58.05	57.83	57.80	58.07	58.09	58.19	58.12	57.57
12	58.75	58.48	58.35	58.25	58.02	57.77	57.83	57.91	58.10	58.17	57.96	57.64
13	58.69	58.52	58.36	58.26	58.01	57.81	57.83	57.92	58.12	58.08	57.92	57.55
14	58.79	58.52	58.34	58.26	57.99	57.80	57.79	57.91	58.15	58.20	57.80	57.65
15	58.73	58.54	58.37	58.25	58.01	57.79	57.81	57.82	58.11	58.25	57.89	57.74
16	58.75	58.53	58.37	58.22	58.04	---	57.83	57.78	58.13	58.26	57.94	57.71
17	58.79	58.53	58.36	58.24	58.06	---	57.81	57.74	58.15	58.37	57.92	57.81
18	58.84	58.51	58.35	58.23	58.05	57.80	57.81	57.76	58.20	58.22	57.88	57.86
19	58.64	58.49	58.31	58.20	58.06	57.86	57.82	57.87	58.13	58.19	57.86	57.95
20	58.77	58.51	58.31	58.21	58.02	---	57.81	57.70	58.00	58.19	57.88	58.12
21	58.80	58.51	58.31	58.22	58.03	---	57.80	57.69	58.04	58.28	57.85	57.95
22	58.76	58.52	58.30	58.19	58.05	---	57.82	57.82	58.05	58.20	57.92	57.74
23	58.63	58.37	58.31	58.19	58.05	---	57.83	57.82	58.16	58.12	57.97	57.94
24	58.47	58.48	58.32	58.18	58.03	57.72	57.83	57.88	58.20	58.04	57.85	57.62
25	58.58	58.48	58.32	58.17	58.06	---	57.83	57.89	58.20	58.13	57.90	57.98
26	58.61	58.49	58.33	58.15	58.04	---	57.83	57.89	58.01	58.18	57.85	58.00
27	58.67	58.50	58.31	58.16	57.98	---	57.82	57.82	58.19	58.22	58.00	58.13
28	58.65	58.45	58.33	58.10	58.01	---	57.83	57.92	58.14	58.16	58.11	58.07
29	58.71	58.43	58.35	58.15	---	---	57.85	57.91	58.17	58.15	57.95	58.00
30	58.61	58.44	58.30	58.14	---	---	57.86	58.38	58.19	58.14	57.80	57.96
31	58.51	---	58.31	58.10	---	---	---	58.01	---	58.18	57.75	---
MEAN	58.77	58.52	58.35	58.23	58.06	---	---	57.89	58.11	58.19	58.00	57.81
MAX	59.05	58.70	58.47	58.36	58.16	---	---	58.38	58.20	58.37	58.31	58.13
MIN	58.47	58.37	58.30	58.10	57.98	---	---	57.69	57.99	58.03	57.75	57.55

05140521 LAKE OF THE WOODS AT SPRINGSTEEL ISLAND NEAR WARROAD, MN—Continued



05211000 MISSISSIPPI RIVER AT GRAND RAPIDS, MN

LOCATION.--Lat 47°13'56", long 93°31'48", in SW¹/₄NW¹/₄ sec. 27, T.55 N., R.25 W., Itasca County, Hydrologic Unit 07010103, on left bank, in utility room of Blandin Paper Mill in Grand Rapids, 400 ft downstream from Blandin Dam, 400 ft upstream from bridge on U.S. Highway 169, 2.5 mi upstream from Prairie River, and at mile 1,182 upstream from Ohio River.

DRAINAGE AREA.--3,370 mi² (approximately).

PERIOD OF RECORD.--October 1883 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,242.03 ft above sea level (NGVD of 1929). See WSP 1914 for history of changes prior to Jan. 17, 1951.

REMARKS.--Records good except those for estimated daily discharges, which are fair. Flow regulated by Winnibigoshish Lake, Leech Lake, Pokegama Lake, Blandin Paper Mill (up to 16 ft³/s diverted for paper production), and occasionally at low flow by power plant at Blandin Dam. Backwater from Prairie River occurs at times in most years.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	793	1,420	1,340	e1,440	664	529	676	277	514	329	1,080	334
2	862	1,480	e1,340	e1,430	575	571	700	288	504	367	899	334
3	834	1,450	e1,340	1,430	626	538	670	292	359	530	969	339
4	1,110	1,390	e1,340	1,430	615	503	618	278	330	583	989	314
5	991	1,480	e1,350	1,410	e610	510	672	280	375	557	737	288
6	1,120	1,440	e1,360	1,390	609	517	645	314	365	646	831	287
7	1,200	1,430	e1,380	1,370	602	538	609	295	337	608	730	349
8	1,430	1,430	e1,370	1,370	591	546	548	256	360	706	783	335
9	1,380	1,570	e1,360	1,400	605	496	518	287	376	826	739	292
10	1,320	1,530	e1,350	1,340	618	517	597	325	333	917	694	316
11	1,350	1,480	e1,340	e1,310	618	554	537	294	335	1,050	670	343
12	1,340	1,580	e1,330	e1,300	624	521	520	287	301	1,180	e660	351
13	1,330	1,740	1,310	e1,270	616	528	e520	260	304	1,090	647	437
14	1,350	1,570	1,360	e1,120	591	377	525	266	293	1,080	e440	418
15	1,290	1,530	1,300	e1,110	587	397	500	300	295	1,180	e410	e415
16	e1,280	1,420	1,340	e1,090	610	447	476	282	301	1,200	e330	413
17	e1,270	1,410	1,390	1,030	611	419	391	272	305	1,150	e300	415
18	e1,270	1,470	1,510	923	e600	427	419	277	316	1,150	301	355
19	e1,270	1,330	1,570	981	490	430	416	418	407	1,140	367	382
20	e1,270	1,410	1,540	984	500	424	399	425	403	1,170	362	398
21	e1,270	1,710	1,540	948	574	417	379	534	358	1,200	336	362
22	e1,270	1,640	1,550	830	569	435	385	631	370	1,150	337	319
23	e1,270	1,700	1,550	999	517	431	399	575	378	1,110	337	350
24	e1,430	1,710	1,470	1,040	536	440	398	524	387	1,130	355	376
25	1,450	1,570	e1,440	947	543	467	396	579	330	1,170	349	328
26	1,420	1,440	e1,420	925	520	519	389	642	301	1,150	308	370
27	1,480	1,250	e1,420	899	511	579	388	541	234	1,160	298	367
28	1,420	1,300	e1,430	949	530	649	409	480	289	1,140	297	361
29	1,460	1,320	e1,430	889	---	723	346	495	312	1,090	305	354
30	1,460	1,340	e1,430	664	---	654	278	475	336	1,100	322	352
31	1,470	---	e1,440	636	---	677	---	485	---	1,140	327	---
TOTAL	39,460	44,540	43,640	34,854	16,262	15,780	14,723	11,934	10,408	29,999	16,509	10,654
MEAN	1,273	1,485	1,408	1,124	581	509	491	385	347	968	533	355
MAX	1,480	1,740	1,570	1,440	664	723	700	642	514	1,200	1,080	437
MIN	793	1,250	1,300	636	490	377	278	256	234	329	297	287
AC-FT	78,270	88,350	86,560	69,130	32,260	31,300	29,200	23,670	20,640	59,500	32,750	21,130
CFSM	0.38	0.44	0.42	0.33	0.17	0.15	0.15	0.11	0.10	0.29	0.16	0.11
IN.	0.44	0.49	0.48	0.38	0.18	0.17	0.16	0.13	0.11	0.33	0.18	0.12

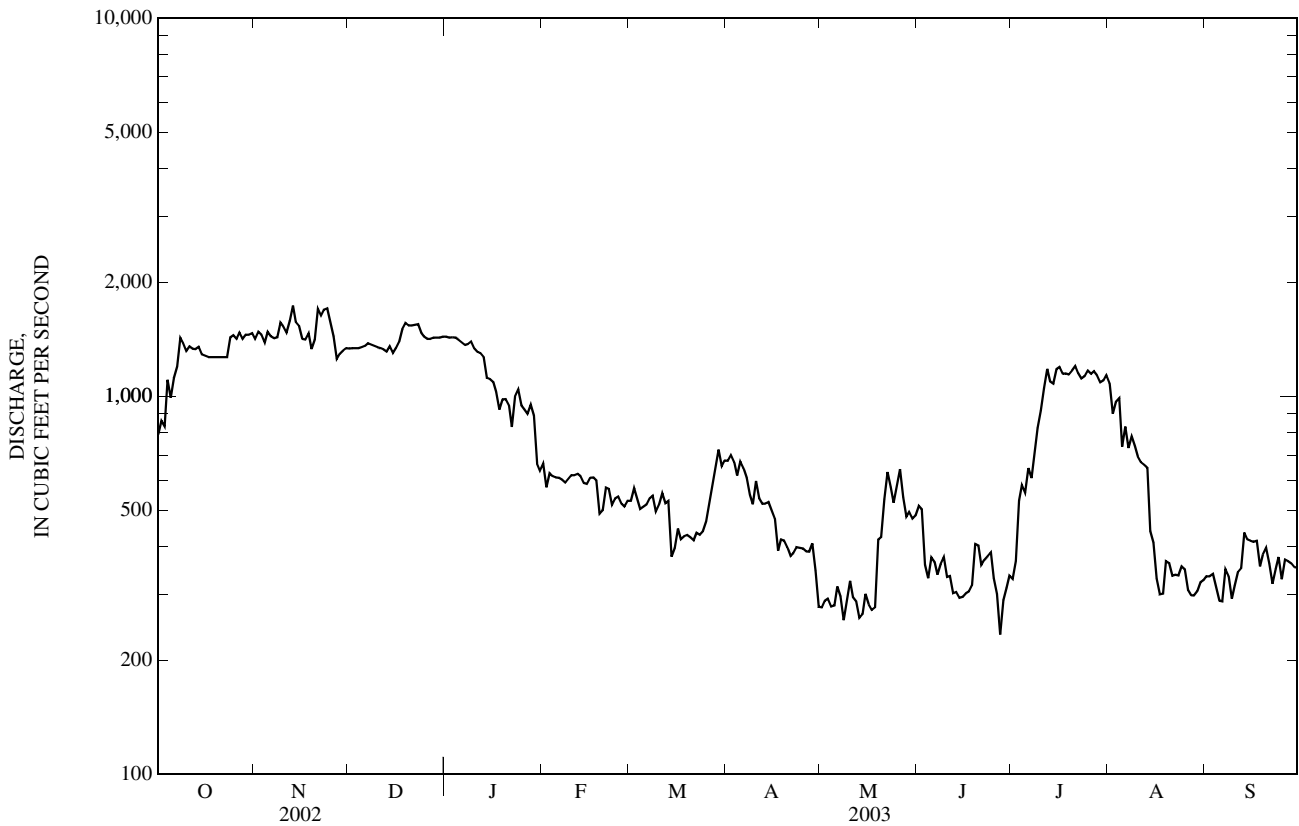
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1884 - 2003, BY WATER YEAR (WY)

MEAN	1,456	1,358	1,158	1,141	1,125	1,069	1,035	1,156	1,237	1,368	1,345	1,386
MAX	3,544	3,259	2,608	2,410	2,729	2,762	3,622	3,668	3,271	3,363	4,505	4,438
(WY)	(1902)	(1903)	(2000)	(1952)	(1945)	(1945)	(1901)	(1901)	(1962)	(1962)	(1905)	(1905)
MIN	103	122	150	165	155	129	106	32.5	185	125	88.3	89.2
(WY)	(1937)	(1937)	(1937)	(1937)	(1934)	(1937)	(1937)	(1949)	(1936)	(1961)	(1934)	(1934)

05211000 MISSISSIPPI RIVER AT GRAND RAPIDS, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1884 - 2003	
ANNUAL TOTAL	449,781		288,763			
ANNUAL MEAN	1,232		791		a1,245	
HIGHEST ANNUAL MEAN					2,429	1906
LOWEST ANNUAL MEAN					193	1934
HIGHEST DAILY MEAN	2,280	Aug 2	1,740	Nov 13	8,900	Sep 29, 1914
LOWEST DAILY MEAN	326	Apr 30	234	Jun 27	b0.00	Oct 2, 1948
ANNUAL SEVEN-DAY MINIMUM	388	Jun 7	278	May 12	24	May 9, 1949
MAXIMUM PEAK FLOW			1,830	Nov 21	c12,500	Sep 3, 1948
MAXIMUM PEAK STAGE			5.91	Nov 21	d15.20	Sep 3, 1948
INSTANTANEOUS LOW FLOW			f32	Jul 2	b0.00	Oct 2, 1948
ANNUAL RUNOFF (AC-FT)	892,100		572,800		902,200	
ANNUAL RUNOFF (CFSM)	0.37		0.23		0.37	
ANNUAL RUNOFF (INCHES)	4.96		3.19		5.02	
10 PERCENT EXCEEDS	1,880		1,430		2,350	
50 PERCENT EXCEEDS	1,340		610		1,160	
90 PERCENT EXCEEDS	457		313		311	

- a Median of annual mean discharges is 1230 ft³/s.
- b Many days, several years.
- c From rating curve extended above 4500 ft³/s. Result of dam failure.
- d From floodmark; result of dam failure.
- e Estimated.
- f Result of regulation.



05212700 PRAIRIE RIVER NEAR TACONITE, MN

LOCATION.--Lat 47°23'20", long 93°22'50", in NW¹/₄SW¹/₄ sec. 21, T.57 N., R.24 W., Itasca County, Hydrologic Unit 07010103, on left bank 125 ft downstream from bridge on County Highway 7, 1.5 mi downstream from outlet of Lawrence Lake and 5 mi north of Taconite.

DRAINAGE AREA.--371 mi² (revised).

PERIOD OF RECORD.--April 1967 to September 1983, February 2001 to current year.

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

REMARKS.--Records good except those for estimated daily discharges, which are poor.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	47	126	e93	e81	e56	e50	99	195	238	132	139	65
2	48	125	e91	e80	e56	e49	99	183	239	135	144	63
3	44	124	e87	e80	e56	e49	97	166	238	165	152	61
4	55	121	e84	e79	e56	e49	95	150	231	170	157	58
5	60	119	e80	e79	e56	e49	88	149	217	186	161	55
6	63	119	e78	e78	e55	e48	86	142	203	205	163	53
7	66	115	e76	e78	e55	e48	86	130	189	225	164	51
8	70	115	e76	e79	e54	e48	86	119	183	227	160	49
9	72	113	e75	e80	e54	e48	86	124	175	228	154	47
10	76	117	e75	e79	e53	e48	89	133	176	275	148	46
11	79	111	e77	e77	e53	e48	92	138	172	298	143	48
12	97	109	e79	e74	e52	e48	93	133	165	318	137	55
13	97	108	e80	e71	e51	e49	94	136	162	333	131	55
14	97	106	e81	e69	e51	e52	99	141	153	344	125	54
15	107	e104	e80	e67	e50	e58	102	145	144	353	121	55
16	112	e102	e80	e66	e51	e66	101	145	138	344	116	57
17	118	100	e80	e64	e52	e73	102	143	138	334	109	57
18	125	99	e80	e63	e52	e79	101	139	139	315	103	62
19	129	99	e79	e61	e52	e85	112	166	127	294	98	67
20	129	99	e79	e60	e52	e89	124	189	119	274	92	64
21	130	99	e78	e59	e51	e92	142	193	114	253	90	64
22	130	97	e78	e58	e50	e95	154	215	112	228	84	65
23	127	99	e77	e57	e49	97	174	235	109	203	82	65
24	123	98	e77	e56	e49	102	199	245	115	182	79	64
25	121	97	e78	e56	e48	104	220	247	122	166	77	63
26	120	e97	e79	e55	e48	105	233	242	125	153	82	62
27	120	e96	e81	e54	e48	106	237	232	125	140	78	63
28	120	96	e82	e54	e49	110	236	235	126	128	76	61
29	128	96	e82	e54	---	106	224	223	135	119	73	59
30	130	e95	e82	e55	---	103	208	235	135	137	70	59
31	127	---	e82	e56	---	100	---	238	---	137	67	---
TOTAL	3,067	3,201	2,486	2,079	1,459	2,253	3,958	5,506	4,764	7,001	3,575	1,747
MEAN	98.9	107	80.2	67.1	52.1	72.7	132	178	159	226	115	58.2
MAX	130	126	93	81	56	110	237	247	239	353	164	67
MIN	44	95	75	54	48	48	86	119	109	119	67	46
AC-FT	6,080	6,350	4,930	4,120	2,890	4,470	7,850	10,920	9,450	13,890	7,090	3,470
CFSM	0.27	0.29	0.22	0.18	0.14	0.20	0.36	0.48	0.43	0.61	0.31	0.16
IN.	0.31	0.32	0.25	0.21	0.15	0.23	0.40	0.55	0.48	0.70	0.36	0.18

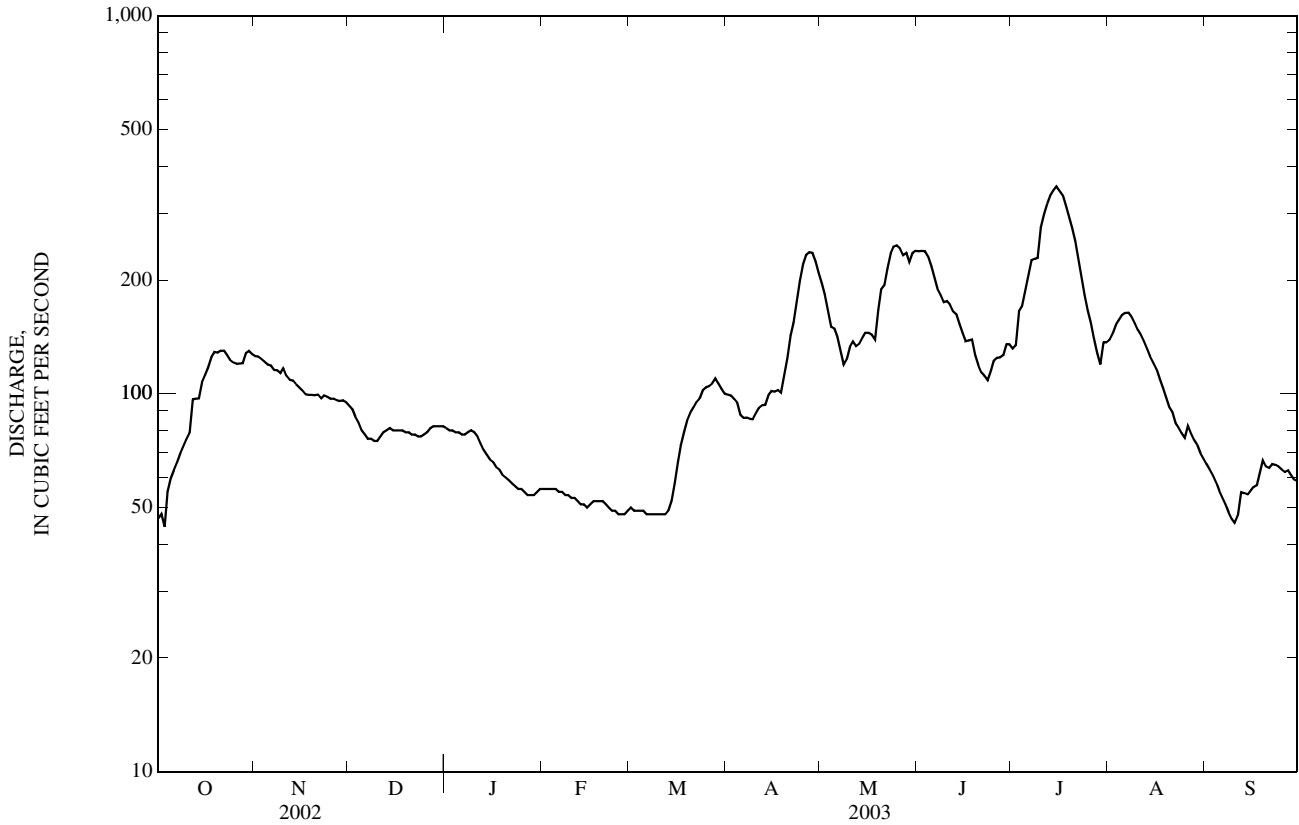
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1967 - 2003, BY WATER YEAR (WY)

MEAN	196	197	109	74.8	70.4	92.1	587	525	352	237	114	124
MAX	586	605	222	110	106	170	1,329	1,094	866	618	295	482
(WY)	(1974)	(1972)	(1978)	(1978)	(1969)	(1983)	(1969)	(1975)	(1974)	(1975)	(1978)	(1977)
MIN	11.4	14.0	15.5	24.1	37.0	60.1	86.9	57.0	69.7	61.3	24.3	15.4
(WY)	(1977)	(1977)	(1977)	(1977)	(1968)	(1977)	(1977)	(1977)	(1980)	(1980)	(1976)	(1976)

05212700 PRAIRIE RIVER NEAR TACONITE, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1967 - 2003	
ANNUAL TOTAL	75,782		41,096		220	
ANNUAL MEAN	208		113		89.1	
HIGHEST ANNUAL MEAN					327	1974
LOWEST ANNUAL MEAN					89.1	1977
HIGHEST DAILY MEAN	3,170	Jun 27	353	Jul 15	3,240	Apr 17, 1969
LOWEST DAILY MEAN	44	Oct 3	44	Oct 3	8.0	Oct 5, 1970
ANNUAL SEVEN-DAY MINIMUM	47	Sep 27	48	Mar 6	11	Oct 17, 1976
MAXIMUM PEAK FLOW			357	Jul 15	3,260	Apr 17, 1969
MAXIMUM PEAK STAGE			4.78	Jul 15	11.81	Apr 17, 1969
INSTANTANEOUS LOW FLOW			43	Oct 3	7.0	Oct 5, 1970
ANNUAL RUNOFF (AC-FT)	150,300		81,510		159,600	
ANNUAL RUNOFF (CFSM)	0.56		0.30		0.59	
ANNUAL RUNOFF (INCHES)	7.60		4.12		8.07	
10 PERCENT EXCEEDS	290		211		508	
50 PERCENT EXCEEDS	109		97		112	
90 PERCENT EXCEEDS	76		52		49	

e Estimated.



05227500 MISSISSIPPI RIVER AT AITKIN, MN

LOCATION.--Lat 46°32'26", long 93°42'26", in SW¹/₄NW¹/₄ sec. 24, T.47 N., R.27 W., Aitkin County, Hydrologic Unit 07010104, on right bank upstream side of highway bridge at north edge of Aitkin, 1 mi downstream from Ripple River and at mile 1,055.9 upstream from Ohio River.

DRAINAGE AREA.--6,140 mi² (approximately).

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

GAGE.--Water-stage recorder. Datum of gage is 1,182.41 ft above sea level (NGVD of 1929, levels by U.S. Army Corps of Engineers). Mar. 1, 1945 to Mar. 14, 1961, nonrecording gage, and Mar. 15, 1961 to Sept. 30, 1967, water-stage recorder at same site at datum 3.0 ft higher. Diversion channel: Non-recording gage and crest-stage gage. Datum of gage is 1,182.02 ft above sea level (NGVD of 1929). Apr. 9, 1955 to Apr. 10, 1956, nonrecording gage at site 4 mi downstream at different datum. Apr. 11, 1956 to Sept. 30, 1967, non-recording gage at same site at datum 3.0 ft higher.

REMARKS.--Records good except those for estimated daily discharges, which are fair. Flow regulated by Winnibigoshish Lake, Leech Lake, Pokegama Lake, and Sandy Lake. Water diverted at medium and high stages into Aitkin diversion channel 6.5 mi above station, bypasses station and returns to river 15.5 mi below station. Diversion began Apr. 2, 1955. These records include flow in diversion channel.

EXTREMES FOR CURRENT YEAR.--Main channel: maximum discharge, 3,160 ft³/s, July 13; gage height, 8.47 ft. Diversion channel: maximum discharge, 739 ft³/s, July 13, gage height, 6.42 ft (determined based on change in stage at main gage, and observer's readings).

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1,530	2,610	e1,740	e1,900	e1,160	e940	e1,330	1,850	1,960	2,710	1,760	623
2	1,550	2,570	e1,760	e1,900	e1,120	e940	e1,360	1,710	1,880	2,730	1,810	623
3	1,560	2,530	e1,720	e1,890	e1,090	e930	e1,380	1,530	1,810	3,090	1,850	628
4	1,630	2,490	e1,690	e1,880	e1,060	e930	e1,390	1,420	1,750	3,200	1,820	619
5	1,820	2,470	e1,700	e1,880	e1,040	e920	e1,400	1,390	1,680	3,160	1,730	605
6	2,070	2,440	e1,760	e1,870	e1,030	e920	e1,390	1,440	1,560	3,080	1,700	585
7	2,370	2,390	e1,810	e1,850	e1,030	e910	e1,380	1,470	1,460	3,030	1,650	569
8	2,530	2,390	e1,900	e1,840	e1,020	e910	e1,370	1,450	1,390	2,960	1,550	549
9	2,670	2,380	e1,950	e1,840	e1,020	e910	e1,360	1,570	1,360	2,810	1,490	531
10	2,910	2,360	e2,020	e1,810	e1,010	e900	e1,340	1,920	1,410	2,980	1,420	537
11	3,210	2,360	e2,040	e1,790	e1,010	e900	e1,320	2,190	1,510	3,490	1,390	599
12	3,340	2,390	e2,060	e1,750	e1,010	e900	1,310	2,380	1,530	3,920	1,340	662
13	3,400	2,390	e2,070	e1,690	e1,010	e900	1,330	2,450	1,500	4,070	1,270	681
14	3,470	2,340	e2,080	e1,570	e1,010	e910	1,300	2,510	1,460	4,000	1,220	759
15	3,520	2,290	e2,080	e1,500	e1,010	e910	1,250	2,500	1,400	3,910	1,140	847
16	3,460	2,300	e2,070	e1,440	e1,000	e910	1,250	2,390	1,360	3,800	1,100	896
17	3,360	2,280	e2,060	e1,370	e1,000	e920	1,270	2,310	1,310	3,610	1,030	881
18	3,280	2,310	e2,040	e1,340	e990	e920	1,250	2,270	1,290	3,340	901	850
19	3,190	2,360	e2,030	e1,300	e980	e930	1,380	2,250	1,280	3,070	809	841
20	3,150	2,350	e2,010	e1,280	e980	e940	1,700	2,340	1,260	2,850	750	836
21	3,150	2,280	e2,010	e1,270	e980	e940	2,140	2,420	1,230	2,690	720	831
22	3,110	2,180	e2,020	e1,260	e980	e950	2,430	2,610	1,200	2,560	717	843
23	3,000	2,210	e2,020	e1,250	e980	e970	2,470	2,770	1,300	2,410	725	860
24	2,900	e2,210	e2,030	e1,240	e970	e990	2,420	2,780	1,440	2,300	703	824
25	2,780	e2,120	e2,010	e1,230	e970	e1,030	2,340	2,730	1,610	2,190	686	763
26	2,730	e1,800	e1,980	e1,220	e960	e1,080	2,240	2,610	1,860	2,080	683	735
27	2,770	e1,450	e1,970	e1,210	e950	e1,130	2,140	2,450	2,150	1,970	682	740
28	2,790	e1,540	e1,950	e1,200	e950	e1,170	2,070	2,370	2,330	1,910	699	736
29	2,770	e1,660	e1,930	e1,190	---	e1,220	1,970	2,270	2,270	2,580	692	723
30	2,750	e1,710	e1,910	e1,180	---	e1,260	1,910	2,160	2,700	1,810	668	706
31	2,690	---	e1,910	e1,170	---	e1,290	---	2,040	---	1,760	642	---
TOTAL	85,460	67,160	60,330	47,110	28,320	30,380	49,190	66,550	48,560	89,340	35,347	21,482
MEAN	2,757	2,239	1,946	1,520	1,011	980	1,640	2,147	1,619	2,882	1,140	716
MAX	3,520	2,610	2,080	1,900	1,160	1,290	2,470	2,780	2,700	4,070	1,850	896
MIN	1,530	1,450	1,690	1,170	950	900	1,250	1,390	1,200	1,760	642	531
AC-FT	169,500	133,200	119,700	93,440	56,170	60,260	97,570	132,000	96,320	177,200	70,110	42,610
CFSM	0.45	0.36	0.32	0.25	0.16	0.16	0.27	0.35	0.26	0.47	0.19	0.12
IN.	0.52	0.41	0.37	0.29	0.17	0.18	0.30	0.40	0.29	0.54	0.21	0.13

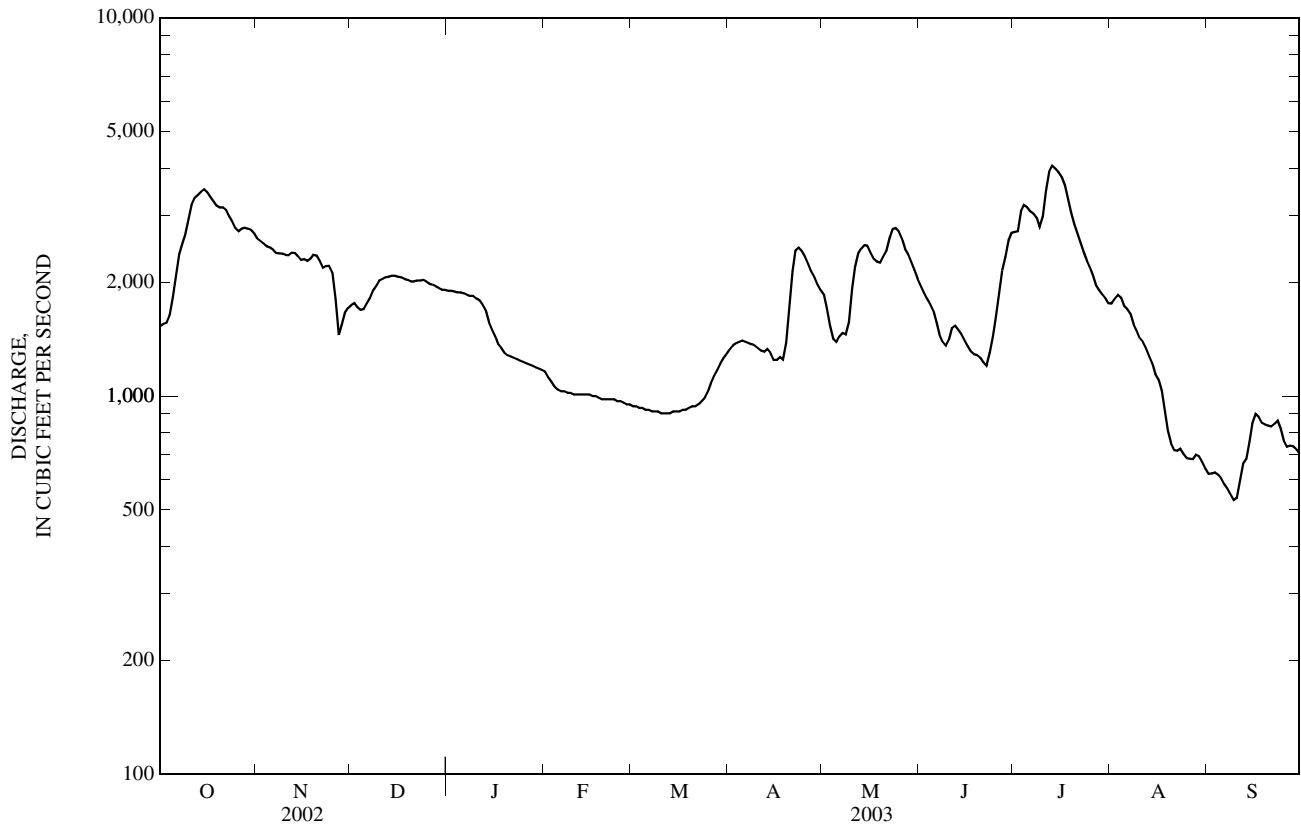
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1945 - 2003, BY WATER YEAR (WY)

MEAN	2,705	2,828	2,318	1,997	1,894	2,236	5,156	5,238	3,659	3,153	2,358	2,210
MAX	6,534	6,756	4,498	3,525	3,196	5,415	10,830	15,510	8,072	8,201	8,270	6,689
(WY)	(1966)	(1972)	(1997)	(1966)	(1966)	(1945)	(1966)	(1950)	(1965)	(1993)	(1953)	(1986)
MIN	313	328	324	345	398	638	1,074	669	540	346	273	321
(WY)	(1977)	(1977)	(1977)	(1977)	(1977)	(1977)	(1977)	(1958)	(1988)	(1961)	(1961)	(1976)

05227500 MISSISSIPPI RIVER AT AITKIN, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1945 - 2003	
ANNUAL TOTAL	956,352		629,229		2,973	
ANNUAL MEAN	2,620		1,724		4,985	
HIGHEST ANNUAL MEAN					1966	
LOWEST ANNUAL MEAN					1977	
HIGHEST DAILY MEAN	7,560	Jul 12	4,070	Jul 13	19,900	May 20, 1950
LOWEST DAILY MEAN	885	Jun 19	531	Sep 9	153	Sep 1, 1961
ANNUAL SEVEN-DAY MINIMUM	942	Jun 15	568	Sep 5	195	Aug 26, 1961
MAXIMUM PEAK FLOW			4,080	Jul 13	20,000	May 20, 1950
MAXIMUM PEAK STAGE			8.47	Jul 13	a22.49	May 20, 1950
INSTANTANEOUS LOW FLOW			517	Sep 9	151	Sep 1, 1961
ANNUAL RUNOFF (AC-FT)	1,897,000		1,248,000		2,154,000	
ANNUAL RUNOFF (CFSM)	0.43		0.28		0.48	
ANNUAL RUNOFF (INCHES)	5.79		3.81		6.58	
10 PERCENT EXCEEDS	4,410		2,770		5,830	
50 PERCENT EXCEEDS	2,280		1,630		2,370	
90 PERCENT EXCEEDS	1,460		839		980	

a Present datum.
 e Estimated.



05242300 MISSISSIPPI RIVER AT BRAINERD, MN

LOCATION.--Lat 46°22'40", long 94°10'59", in SE¹/₄/SW¹/₄ sec. 18, T. 145 N., R.30 W., Crow Wing County, Hydrologic Unit 07010104, on left bank in hydropower plant of Potlach Corporation, Northwest Paper Division in Brainerd, 12.7 mi upstream from Crow Wing River, and at mile 1,003.7 upstream from Ohio River.

DRAINAGE AREA.--7,320 mi² (approximately).

PERIOD OF RECORD.--October 1987 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,146.96 ft above sea level (NGVD of 1929).

REMARKS.--Records good except those for estimated daily discharges, which are fair. Flow regulated by Winnibigoshish Lake, Leech Lake, Pokegama Lake, Sandy Lake, Pine River Reservoir at Cross Lake, and by hydropower plant in Brainerd.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1,820	3,140	2,080	e2,300	e1,520	e1,250	1,820	2,360	2,820	3,730	2,050	734
2	1,840	3,020	e2,070	e2,300	e1,490	e1,240	2,090	2,270	2,650	3,580	2,100	735
3	1,860	2,900	e2,050	e2,290	e1,460	e1,240	1,870	1,940	2,530	4,730	2,270	734
4	2,260	2,860	e2,020	e2,290	e1,420	e1,230	1,660	2,000	2,410	4,830	2,170	733
5	2,100	2,930	e2,020	e2,280	e1,370	e1,230	1,800	1,960	2,340	4,410	2,080	687
6	2,510	2,920	e2,040	e2,280	e1,360	e1,220	2,080	1,800	2,160	4,350	2,110	739
7	2,790	2,860	e2,100	e2,280	e1,350	e1,210	1,840	1,980	1,970	4,200	2,080	669
8	3,100	2,820	e2,200	e2,280	e1,340	e1,200	1,860	1,980	2,090	4,090	1,880	633
9	3,180	2,820	e2,340	e2,290	e1,340	e1,200	1,890	2,170	1,790	3,980	1,810	618
10	3,340	2,880	2,420	e2,270	e1,340	e1,200	1,970	2,680	2,210	3,940	1,790	614
11	3,640	2,860	2,510	e2,250	e1,340	e1,200	2,020	3,030	2,070	4,350	1,760	756
12	3,860	2,810	2,420	e2,230	e1,340	e1,200	1,520	2,950	2,080	4,790	1,610	899
13	3,960	2,890	2,480	e2,200	e1,340	e1,210	1,590	3,360	2,220	5,150	1,640	860
14	4,000	2,870	2,610	e2,140	e1,340	e1,230	1,760	3,280	2,000	5,100	1,510	850
15	4,090	2,850	2,450	e2,060	e1,340	1,240	1,570	3,290	2,030	5,030	1,450	789
16	4,020	2,570	2,520	e1,820	e1,340	1,470	1,970	3,270	1,920	4,800	1,540	976
17	4,090	2,930	2,550	e1,780	e1,330	1,340	1,530	2,970	1,920	4,600	1,280	1,010
18	3,780	2,650	2,340	e1,750	e1,330	1,450	1,820	3,110	1,780	4,260	1,100	1,100
19	3,760	2,840	2,420	e1,710	e1,330	1,270	1,860	3,470	1,650	3,830	1,070	883
20	3,660	2,980	2,450	e1,700	e1,320	1,450	2,340	3,300	1,730	3,660	1,020	975
21	3,650	2,830	2,420	e1,680	e1,320	1,430	2,670	3,470	1,670	3,410	801	929
22	3,520	2,780	2,440	e1,670	e1,310	1,370	3,170	3,620	1,620	3,260	763	937
23	3,480	2,560	e2,440	e1,650	e1,310	1,610	3,200	3,830	2,220	3,050	931	941
24	3,310	2,600	e2,440	e1,640	e1,300	1,490	3,270	3,910	2,110	2,870	898	936
25	3,300	2,480	e2,410	e1,610	e1,280	1,630	3,150	3,870	2,510	2,780	794	932
26	3,110	2,330	e2,370	e1,580	e1,270	1,710	2,780	3,750	2,620	2,540	742	901
27	3,090	1,690	e2,330	e1,570	e1,270	1,610	2,760	3,570	3,130	2,460	830	874
28	3,180	1,870	e2,310	e1,570	e1,260	1,690	2,720	3,440	3,220	2,360	821	838
29	3,270	2,010	e2,300	e1,570	---	1,560	2,570	3,250	3,620	2,240	819	819
30	3,150	2,210	e2,300	e1,560	---	1,770	2,360	3,260	3,810	2,190	788	825
31	3,020	---	e2,300	e1,540	---	1,800	---	2,850	---	2,180	737	---
TOTAL	99,740	80,760	72,150	60,140	37,660	42,950	65,510	91,990	68,900	116,750	43,244	24,926
MEAN	3,217	2,692	2,327	1,940	1,345	1,385	2,184	2,967	2,297	3,766	1,395	831
MAX	4,090	3,140	2,610	2,300	1,520	1,800	3,270	3,910	3,810	5,150	2,270	1,100
MIN	1,820	1,690	2,020	1,540	1,260	1,200	1,520	1,800	1,620	2,180	737	614
AC-FT	197,800	160,200	143,100	119,300	74,700	85,190	129,900	182,500	136,700	231,600	85,770	49,440
CFSM	0.44	0.37	0.32	0.27	0.18	0.19	0.30	0.41	0.31	0.51	0.19	0.11
IN.	0.51	0.41	0.37	0.31	0.19	0.22	0.33	0.47	0.35	0.59	0.22	0.13

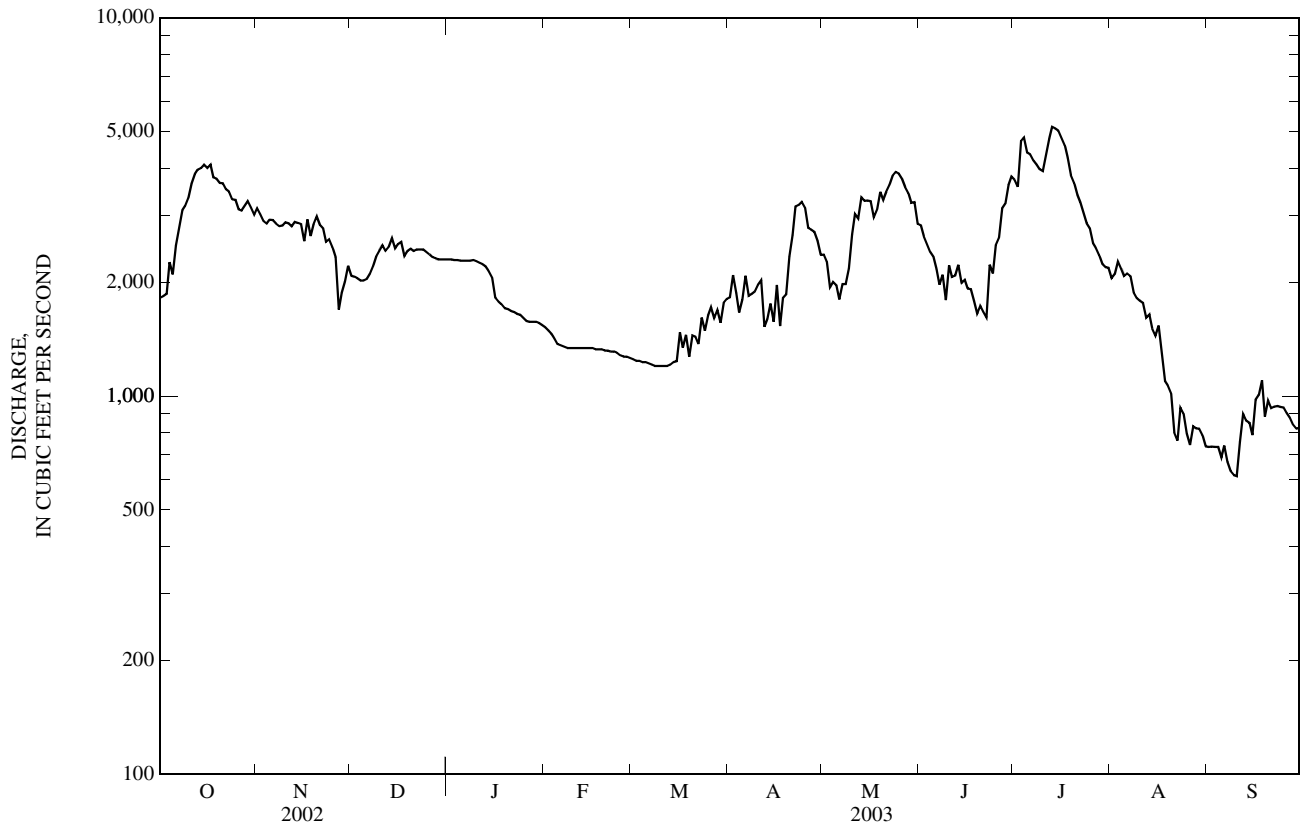
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1987 - 2003, BY WATER YEAR (WY)

MEAN	3,373	3,732	3,155	2,656	2,432	2,785	5,996	5,870	4,069	4,506	2,668	2,457
MAX	8,002	6,655	5,926	4,081	3,973	4,306	12,890	12,890	10,100	10,260	6,950	6,925
(WY)	(1996)	(2001)	(1997)	(1997)	(1997)	(2000)	(1997)	(2001)	(2001)	(1993)	(1999)	(1999)
MIN	1,840	1,931	1,362	1,140	1,040	1,385	2,184	1,928	662	442	935	831
(WY)	(1992)	(1993)	(1991)	(1991)	(1991)	(2003)	(2003)	(1988)	(1988)	(1988)	(1990)	(2003)

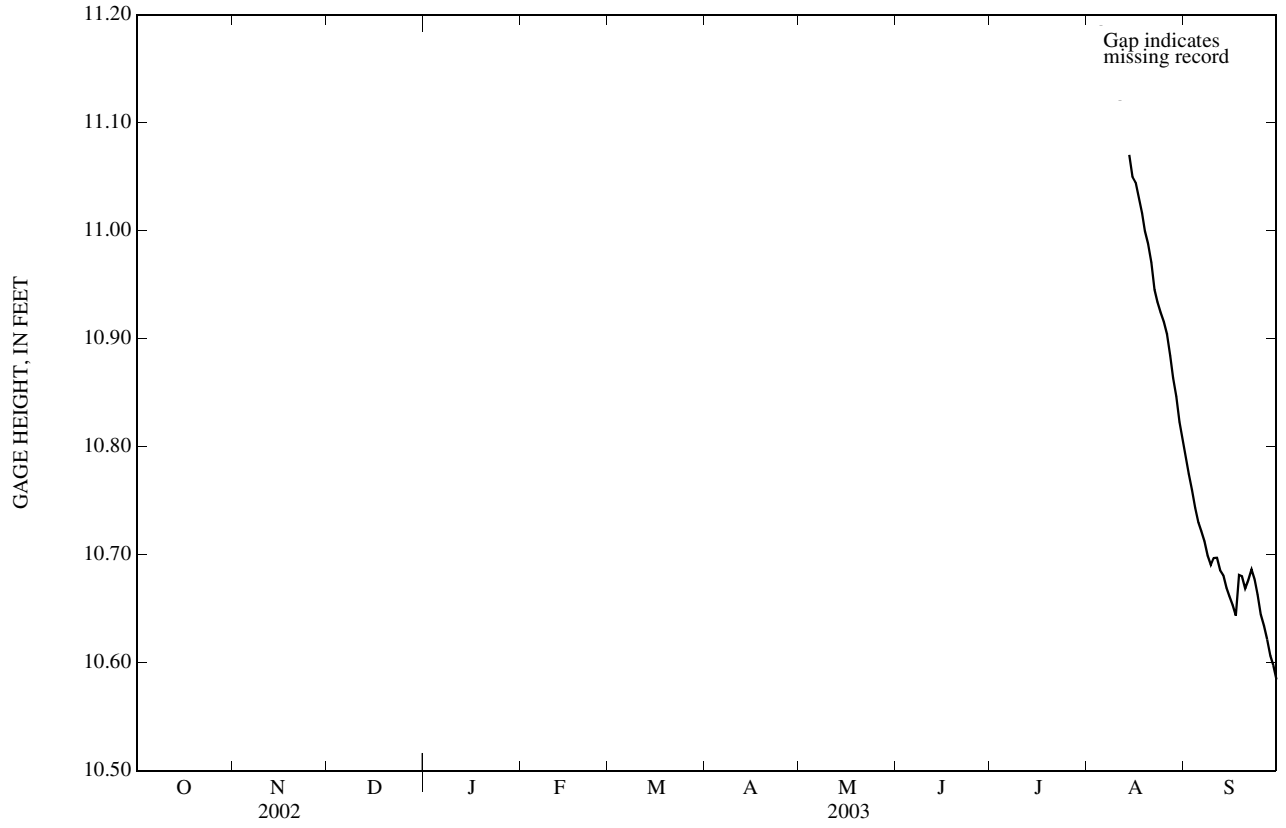
05242300 MISSISSIPPI RIVER AT BRAINERD, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1987 - 2003	
ANNUAL TOTAL	1,170,490		804,720			
ANNUAL MEAN	3,207		2,205		3,683	
HIGHEST ANNUAL MEAN					5,707	2001
LOWEST ANNUAL MEAN					1,950	1988
HIGHEST DAILY MEAN	9,950	Jul 13	5,150	Jul 13	17,400	Apr 28, 2001
LOWEST DAILY MEAN	1,190	Jun 18	614	Sep 10	348	Jul 30, 1988
ANNUAL SEVEN-DAY MINIMUM	1,340	Jun 15	670	Sep 4	357	Jul 29, 1988
MAXIMUM PEAK FLOW			5,300	Jul 14	17,500	Apr 30, 2001
MAXIMUM PEAK STAGE			8.32	Jul 14	16.70	Apr 30, 2001
INSTANTANEOUS LOW FLOW			a462	Sep 18	273	Jul 12, 1988
ANNUAL RUNOFF (AC-FT)	2,322,000		1,596,000		2,668,000	
ANNUAL RUNOFF (CFSM)	0.44		0.30		0.50	
ANNUAL RUNOFF (INCHES)	5.95		4.09		6.84	
10 PERCENT EXCEEDS	5,590		3,620		6,810	
50 PERCENT EXCEEDS	2,670		2,090		3,100	
90 PERCENT EXCEEDS	1,800		939		1,460	

a Result of regulation.
 e Estimated.



05243300 LONG LOST LAKE, SOUTHWEST BAY, NEAR ZERKEL, MN—Continued



05243725 STRAIGHT RIVER NEAR PARK RAPIDS, MN

LOCATION.--Lat 46°52'30", long 95°03'56", in NW¼NE¼ sec. 11, T. 139 N., R. 35 W., Hubbard County, Hydrologic Unit 07010106, upstream from culvert on U.S. Highway 71, 3.2 mi south of Park Rapids.

DRAINAGE AREA.--53.2 mi².

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1970-71, 1973, 1975-76, October 1986 to current year (no winter records in 1987, 1990-91). May 1988 through August 1989, records of hourly water temperature (available in files of the Geological Survey).

GAGE.--Water-stage recorder. Datum of gage is 1,399.55 ft above sea level (NGVD of 1929, levels by Minnesota Department of Natural Resources).

REMARKS.--Records good except those for estimated daily discharges, which are fair. Diurnal fluctuations in flow due to ground-water withdrawals.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	58	59	e49	e45	e44	e44	52	54	57	59	43	36
2	58	58	e49	e45	e44	e43	52	54	56	55	41	35
3	58	57	e48	e45	e44	e43	51	53	57	53	45	37
4	63	57	e48	e45	e44	e43	53	52	57	51	44	35
5	63	56	e47	e45	e44	e43	54	56	56	49	43	37
6	64	56	e47	e45	e44	e43	53	69	56	47	42	39
7	64	56	e47	e45	e44	e43	52	71	57	49	39	37
8	62	55	e46	e44	e44	e43	52	66	56	47	39	37
9	60	55	e46	e45	e44	e43	52	71	56	51	40	36
10	59	55	e46	e45	e44	e43	53	78	59	54	38	37
11	58	55	e45	e45	e44	e43	52	74	58	54	37	36
12	59	54	e45	e45	e44	e43	52	70	59	53	37	36
13	59	55	e45	e45	e44	e43	51	66	59	52	37	38
14	59	54	e45	e45	e44	e44	52	64	57	52	36	37
15	60	52	e45	e45	e44	e46	52	63	54	49	34	36
16	61	e52	e45	e45	e44	e48	52	61	54	47	35	38
17	59	e52	e45	e45	e44	e50	55	59	53	47	35	39
18	61	e52	e45	e44	e44	e53	55	59	52	46	35	39
19	61	53	e45	e44	e44	e55	63	62	50	49	35	40
20	60	53	e45	e44	e44	57	64	63	49	50	38	39
21	60	53	e45	e44	e44	59	62	60	51	48	39	41
22	59	53	e45	e44	e44	60	60	59	56	47	37	42
23	59	53	e45	e44	e44	59	58	59	59	46	37	41
24	58	52	e45	e44	e44	58	57	58	66	43	35	41
25	58	e51	e45	e44	e44	54	56	58	79	45	38	39
26	58	e51	e45	e44	e44	52	55	59	81	43	38	39
27	58	e50	e45	e44	e44	53	56	60	76	44	39	38
28	58	e50	e45	e44	e44	53	55	60	71	44	38	38
29	59	e50	e45	e44	---	51	55	59	67	43	37	38
30	60	e49	e45	e44	---	51	54	58	62	42	37	38
31	60	---	e45	e44	---	51	---	59	---	42	36	---
TOTAL	1,853	1,608	1,418	1,380	1,232	1,514	1,640	1,914	1,780	1,501	1,184	1,139
MEAN	59.8	53.6	45.7	44.5	44.0	48.8	54.7	61.7	59.3	48.4	38.2	38.0
MAX	64	59	49	45	44	60	64	78	81	59	45	42
MIN	58	49	45	44	44	43	51	52	49	42	34	35
AC-FT	3,680	3,190	2,810	2,740	2,440	3,000	3,250	3,800	3,530	2,980	2,350	2,260
CFSM	1.12	1.01	0.86	0.84	0.83	0.92	1.03	1.16	1.12	0.91	0.72	0.71
IN.	1.30	1.12	0.99	0.96	0.86	1.06	1.15	1.34	1.24	1.05	0.83	0.80

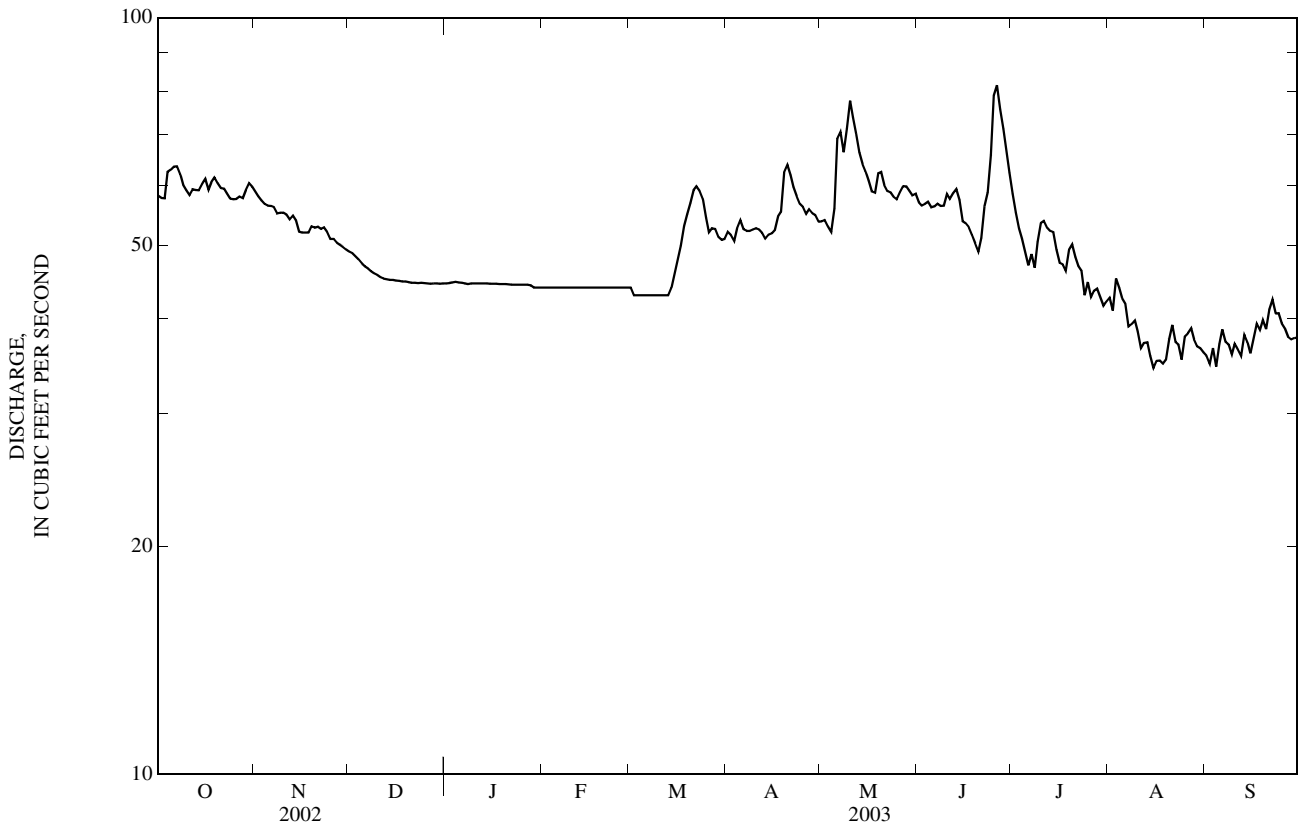
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1987 - 2003, BY WATER YEAR (WY)

MEAN	63.1	64.0	60.5	55.9	55.9	62.3	70.9	67.0	61.1	58.2	55.5	58.5
MAX	83.1	77.6	74.5	77.7	69.8	76.8	101	86.6	76.1	81.5	81.2	81.4
(WY)	(1996)	(1998)	(1995)	(1999)	(1998)	(1995)	(1997)	(1999)	(1999)	(1997)	(1999)	(1999)
MIN	42.2	47.4	45.7	41.9	44.0	48.8	54.7	46.2	41.9	39.5	35.9	38.0
(WY)	(1993)	(1989)	(2003)	(1992)	(2003)	(2003)	(2003)	(1992)	(1992)	(1988)	(1990)	(2003)

05243725 STRAIGHT RIVER NEAR PARK RAPIDS, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1987 - 2003	
ANNUAL TOTAL	21,187		18,163			
ANNUAL MEAN	58.0		49.8		62.0	
HIGHEST ANNUAL MEAN					78.3	1999
LOWEST ANNUAL MEAN					48.0	1992
HIGHEST DAILY MEAN	103	Jun 24	81	Jun 26	144	Apr 6, 1997
LOWEST DAILY MEAN	45	Dec 11	34	Aug 15	a28	Jan 9, 1992
ANNUAL SEVEN-DAY MINIMUM	45	Dec 11	35	Aug 13	34	Aug 5, 1990
MAXIMUM PEAK FLOW			b84	Jun 25	149	Apr 6, 1997
MAXIMUM PEAK STAGE			c3.42	Mar 15	c3.42	Mar 15, 2003
INSTANTANEOUS LOW FLOW			25	Sep 8	ad25	Jan 9, 1992
ANNUAL RUNOFF (AC-FT)	42,020		36,030		44,930	
ANNUAL RUNOFF (CFSM)	1.09		0.94		1.17	
ANNUAL RUNOFF (INCHES)	14.81		12.70		15.84	
10 PERCENT EXCEEDS	64		60		78	
50 PERCENT EXCEEDS	58		49		61	
90 PERCENT EXCEEDS	49		38		45	

- a Estimated, result of freezeup.
- b Gage height, 1.95 ft.
- c Backwater from ice.
- d Also occurred Sept. 8, 2003.
- e Estimated.



05244000 CROW WING RIVER AT NIMROD, MN

LOCATION.--Lat 46°38'25", long 94°52'44", in SE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 32, T. 137 N., R. 33 W., Wadena County, Hydrologic Unit 07010106, on right bank 200 ft upstream from County Highway 227 bridge, 0.2 mi north of Nimrod, and 0.7 mi upstream from Cat River.

DRAINAGE AREA.--1,030 mi².

PERIOD OF RECORD.--April 1910 to September 1914, July 1930 to September 1981, October 1991 to current year (winter records incomplete prior to 1940). October 1981 to September 1987, annual maximums only.

REVISED RECORDS.--WSP 1508: 1910-11, 1913-14, 1937, 1942(M), 1944(M).

GAGE.--Water-stage recorder. Datum of gage is 1,313.27 ft above sea level (NGVD of 1929, levels by Wadena County Highway Department from Minnesota Department of Transportation benchmark). Apr. 15, 1910 to Sept. 30, 1914, nonrecording gage at same site, at datum 2.2 ft lower. July 28, 1930 to Nov. 4, 1949, nonrecording gages at same site and datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair. Flow affected by natural storage in many lakes.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	291	e410	e354	e295	e231	e231	380	435	492	565	301	220
2	284	e405	e354	e292	e231	e231	376	420	454	554	305	211
3	286	391	e353	e290	e231	e231	359	405	439	552	304	202
4	341	385	e353	e287	e231	e231	360	393	418	519	299	199
5	369	381	e352	e284	e231	e231	362	428	409	486	303	191
6	389	384	e352	e280	e231	e231	344	483	417	457	308	188
7	425	383	e352	e277	e231	e231	334	494	439	463	307	185
8	415	381	e351	e274	e231	e231	331	486	436	444	305	184
9	393	383	e351	e272	e231	e231	334	597	439	458	302	183
10	384	389	e350	e268	e231	e231	338	710	462	515	302	189
11	381	387	e349	e266	e231	e232	340	732	460	500	301	201
12	406	383	e348	e263	e231	e232	332	716	453	492	299	205
13	402	e381	e346	e261	e231	e233	331	691	450	481	290	193
14	389	e379	e343	e259	e231	e234	333	677	429	475	278	185
15	378	e377	e340	e257	e231	e239	336	667	408	479	266	186
16	373	e375	e338	e254	e231	e242	351	637	387	469	255	183
17	374	e373	e335	e252	e231	e253	389	614	409	451	240	180
18	388	e372	e333	e250	e231	e272	410	589	399	434	224	189
19	402	e371	e331	e248	e231	e296	490	631	376	439	219	195
20	411	364	e329	e246	e231	e328	566	650	349	441	223	189
21	416	366	e327	e244	e231	e368	602	619	321	402	215	191
22	415	371	e324	e242	e231	e437	595	610	345	380	213	199
23	421	370	e321	e240	e231	e499	583	612	367	359	213	202
24	427	e358	e319	e237	e231	e521	583	582	417	344	220	201
25	422	e355	e316	e235	e231	e520	572	559	493	329	223	198
26	417	e351	e313	e233	e231	e505	539	532	537	326	231	201
27	410	e355	e311	e232	e231	e490	517	508	551	319	227	200
28	399	e355	e308	e231	e231	e470	477	496	558	309	233	197
29	400	e355	e305	e231	---	e440	465	502	568	299	237	201
30	408	e354	e301	e231	---	e420	451	523	574	304	235	199
31	409	---	e298	e231	---	e400	---	534	---	301	230	---
TOTAL	12,025	11,244	10,357	7,962	6,468	9,941	12,780	17,532	13,256	13,346	8,108	5,847
MEAN	388	375	334	257	231	321	426	566	442	431	262	195
MAX	427	410	354	295	231	521	602	732	574	565	308	220
MIN	284	351	298	231	231	231	331	393	321	299	213	180
AC-FT	23,850	22,300	20,540	15,790	12,830	19,720	25,350	34,770	26,290	26,470	16,080	11,600
CFSM	0.38	0.37	0.33	0.25	0.23	0.32	0.42	0.56	0.44	0.43	0.26	0.19

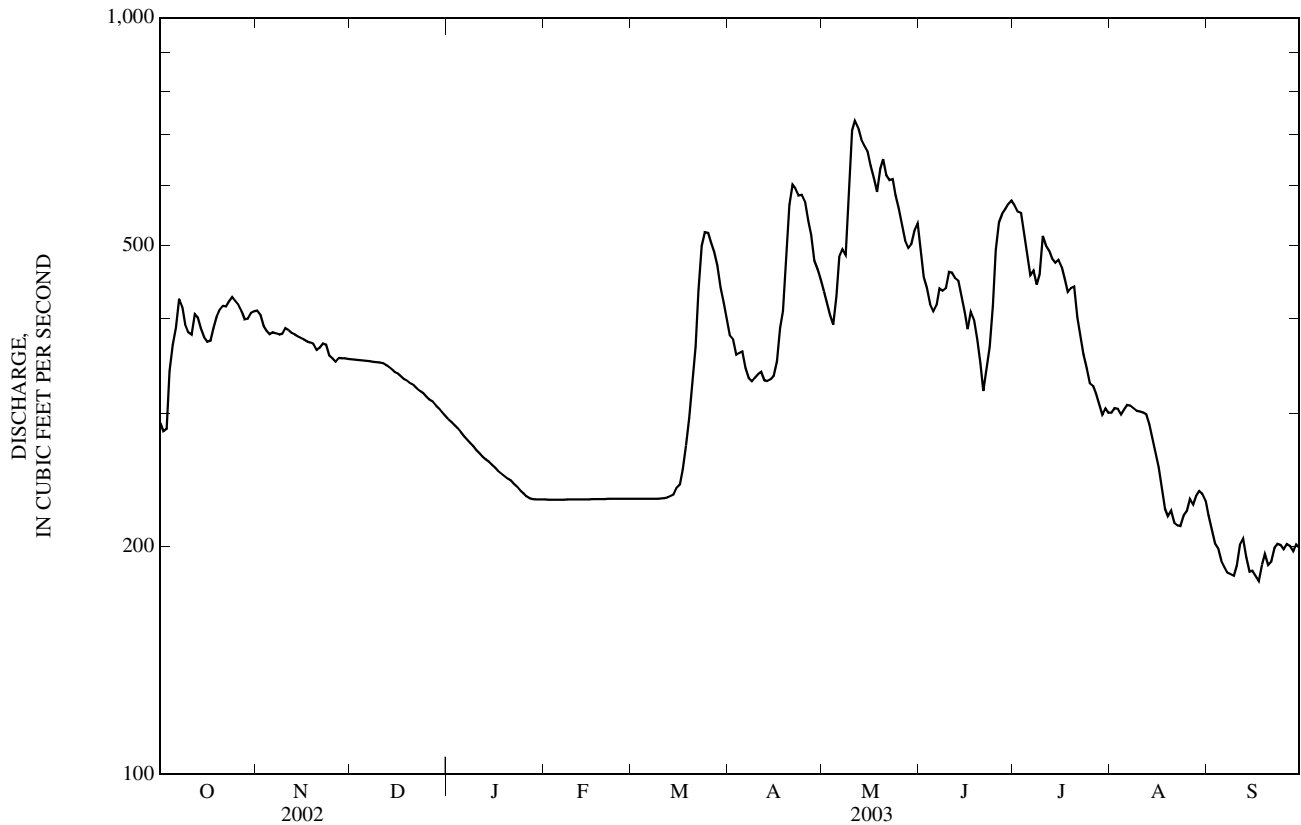
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1910 - 2003, BY WATER YEAR (WY)

MEAN	417	417	354	307	313	413	764	682	577	456	378	383
MAX	1,463	871	692	462	527	780	1,624	1,615	1,354	1,124	1,452	929
(WY)	(1974)	(1972)	(1999)	(1966)	(2000)	(1995)	(1966)	(1950)	(1965)	(1997)	(1944)	(1944)
MIN	137	146	131	125	170	171	202	181	149	84.0	74.3	131
(WY)	(1937)	(1937)	(1940)	(1940)	(1940)	(1940)	(1911)	(1911)	(1934)	(1936)	(1936)	(1934)

05244000 CROW WING RIVER AT NIMROD, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1910 - 2003	
ANNUAL TOTAL	154,679		128,866			
ANNUAL MEAN	424		353		484	
HIGHEST ANNUAL MEAN					757	1999
LOWEST ANNUAL MEAN					230	1940
HIGHEST DAILY MEAN	965	Jul 11	732	May 11	3,580	Oct 10, 1973
LOWEST DAILY MEAN	258	Mar 21	180	Sep 17	45	Aug 7, 1936
ANNUAL SEVEN-DAY MINIMUM	260	Mar 21	187	Sep 14	55	Aug 3, 1936
MAXIMUM PEAK FLOW			a735	May 11	3,700	Oct 10, 1973
MAXIMUM PEAK STAGE			b4.69	Mar 21	b7.64	Apr 20, 1950
INSTANTANEOUS LOW FLOW			175	Sep 8	45	Aug 7, 1936
ANNUAL RUNOFF (AC-FT)	306,800		255,600		350,300	
ANNUAL RUNOFF (CFSM)	0.42		0.35		0.48	
10 PERCENT EXCEEDS	620		520		826	
50 PERCENT EXCEEDS	382		346		400	
90 PERCENT EXCEEDS	280		223		240	

a Gage-height, 3.45 ft.
 b Backwater from ice.
 c Estimated.



05245100 LONG PRAIRIE RIVER AT LONG PRAIRIE, MN

LOCATION.--Lat 45°58'30", long 94°51'56", in NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 20, T. 129 N., R. 33 W., Todd County, Hydrologic Unit 07010108, on right bank 90 ft upstream from bridge on First Avenue at Long Prairie and 400 ft downstream from Venewitz Creek.

DRAINAGE AREA.--434 mi².

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

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

REMARKS.--Records good except those for estimated daily discharges, which are fair to poor.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	89	e126	e120	e72	e54	e68	109	176	190	1,130	262	150
2	89	e117	e112	e71	e55	e67	105	169	183	980	251	149
3	89	e110	e100	e71	e56	e65	105	165	175	950	241	145
4	118	e104	e96	e70	e55	e64	101	162	170	931	237	141
5	135	e99	e91	e69	e53	e63	e98	175	168	870	232	141
6	165	e99	e90	e67	e52	e61	e100	211	171	827	227	141
7	203	e100	e89	e66	e51	e60	103	254	184	829	220	134
8	197	e102	e88	e68	e50	e61	103	269	196	816	213	130
9	191	e103	e87	e69	e51	e62	102	303	205	782	207	128
10	186	e103	e86	e67	e51	e63	101	381	212	751	203	137
11	176	e99	e87	e65	e52	e64	101	455	230	714	199	158
12	e170	e98	e87	e64	e53	e65	100	475	261	693	194	161
13	e163	99	e88	e64	e55	e67	100	429	275	685	187	156
14	e157	104	e88	e63	e58	e72	101	380	252	691	183	155
15	e154	e112	e88	e61	e60	e75	103	380	220	682	178	156
16	e152	e116	e87	e59	e63	e81	132	386	196	652	173	153
17	e149	123	e87	e59	e66	e92	161	355	183	620	166	150
18	e144	130	e86	e58	e69	e96	188	312	176	588	162	155
19	e143	125	e86	e58	e69	e99	264	329	179	561	162	153
20	e143	130	e85	e57	e69	e103	372	334	168	539	159	146
21	e146	132	e84	e56	e70	e107	421	322	154	508	158	143
22	e147	133	e83	e55	e70	e110	374	300	170	474	155	144
23	e149	135	e82	e54	e69	e113	288	277	452	443	152	139
24	e152	e133	e81	e54	e68	e119	248	263	1,190	413	150	136
25	e155	e130	e80	e54	e67	e122	231	257	1,770	386	149	133
26	e152	e127	e79	e54	e67	e129	218	243	2,350	362	145	133
27	e149	e124	e78	e54	e67	e132	205	229	2,240	339	142	129
28	e147	e128	e77	e54	e68	130	196	220	1,900	319	156	122
29	e144	e124	e76	e54	---	120	190	212	1,590	303	159	119
30	e138	e120	e75	e53	---	114	183	203	1,340	283	156	117
31	e132	---	e73	e54	---	111	---	198	---	275	152	---
TOTAL	4,624	3,485	2,696	1,894	1,688	2,755	5,203	8,824	17,150	19,396	5,730	4,254
MEAN	149	116	87.0	61.1	60.3	88.9	173	285	572	626	185	142
MAX	203	135	120	72	70	132	421	475	2,350	1,130	262	161
MIN	89	98	73	53	50	60	98	162	154	275	142	117
AC-FT	9,170	6,910	5,350	3,760	3,350	5,460	10,320	17,500	34,020	38,470	11,370	8,440
CFSM	0.34	0.27	0.20	0.14	0.14	0.20	0.40	0.66	1.32	1.44	0.43	0.33
IN.	0.40	0.30	0.23	0.16	0.14	0.24	0.45	0.76	1.47	1.66	0.49	0.36

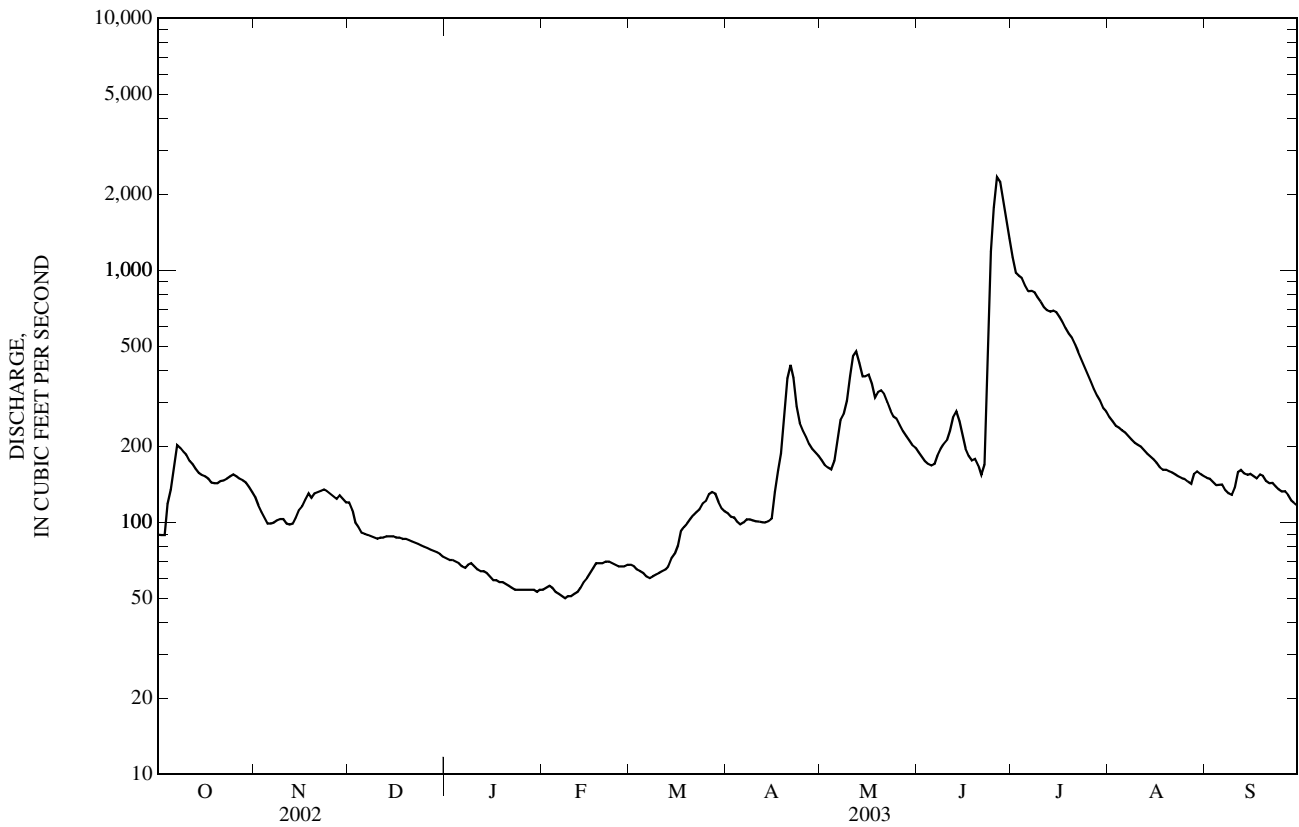
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1972 - 2003, BY WATER YEAR (WY)

MEAN	131	118	76.4	63.5	66.7	169	376	284	239	211	142	122
MAX	512	425	270	217	208	441	1,062	653	774	777	715	607
(WY)	(1987)	(1972)	(1987)	(1987)	(1987)	(1985)	(2001)	(1986)	(2001)	(1972)	(1972)	(1986)
MIN	13.4	8.69	3.19	1.05	1.62	19.8	71.8	45.5	27.5	4.73	10.0	5.32
(WY)	(1977)	(1977)	(1977)	(1977)	(1977)	(1989)	(1977)	(1977)	(1988)	(1988)	(1989)	(1976)

05245100 LONG PRAIRIE RIVER AT LONG PRAIRIE, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1972 - 2003	
ANNUAL TOTAL	62,586		77,699		167	
ANNUAL MEAN	171		213		25.2	
HIGHEST ANNUAL MEAN					366	1972
LOWEST ANNUAL MEAN					25.2	1977
HIGHEST DAILY MEAN	735	Jul 11	2,350	Jun 26	2,900	Jul 22, 1972
LOWEST DAILY MEAN	62	Jan 1	50	Feb 8	a0.84	Jan 12, 1977
ANNUAL SEVEN-DAY MINIMUM	71	Jan 1	51	Feb 5	0.84	Jan 12, 1977
MAXIMUM PEAK FLOW			2,570	Jun 26	3,270	Jul 22, 1972
MAXIMUM PEAK STAGE			b8.78	Jun 26	9.37	Jul 22, 1972
INSTANTANEOUS LOW FLOW			a50	Feb 8	a0.84	Jan 12, 1977
ANNUAL RUNOFF (AC-FT)	124,100		154,100		120,800	
ANNUAL RUNOFF (CFSM)	0.40		0.49		0.38	
ANNUAL RUNOFF (INCHES)	5.36		6.66		5.22	
10 PERCENT EXCEEDS	335		397		371	
50 PERCENT EXCEEDS	135		136		107	
90 PERCENT EXCEEDS	83		63		27	

- a Estimated daily-mean discharge, backwater from ice.
- b From direct observations.
- c Estimated.



05247500 CROW WING RIVER NEAR PILLAGER, MN

LOCATION.--Lat 46°18'18", long 94°22'38", in SW¹/₄NE¹/₄ sec. 30, T. 133 N., R. 29 W., Cass County, Hydrologic Unit 07010106, at Sylvan Dam power plant of Minnesota Power Co., 3.6 mi above mouth and 4.9 mi southeast of Pillager.

DRAINAGE AREA.--3,520 mi² (approximately).

PERIOD OF RECORD.--October 1968 to September 1986, October 1987 to current year. Records for August 1924 to September 1968 available in files of the Minnesota District Office.

GAGE.--Water-stage recorder. Datum of gage is 1,151.00 ft above sea level, adjustment of 1912. Prior to January 16, 1991, staff gage attached to retaining wall approximately 20 ft below the turbine outlet bays, at datum 1,150.00 ft, adjustment of 1912.

REMARKS.--Records good. Discharge computed on the basis of power plant records prior to January 16, 1991. Records for Oct. 1, 1968 to Sept. 30, 1975, were adjusted for storage change in the Sylvan dam reservoir. Flow partly regulated by Sylvan Dam power plant and Gull Lake reservoir.

COOPERATION.--Prior to February 1991, records collected by Minnesota Power Company in connection with a Federal Energy Regulatory Commission project.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum daily discharge since 1924, 18,300 ft³/s, Apr. 14, 1965.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	478	1,390	834	894	603	544	1,330	2,050	1,840	5,870	1,230	666
2	489	1,390	1,040	894	608	568	1,430	2,010	1,820	5,510	1,320	675
3	445	1,390	948	960	686	574	1,440	1,660	1,810	5,530	1,220	657
4	708	1,400	866	879	683	573	1,020	1,700	1,800	5,290	1,190	624
5	1,030	1,390	863	821	682	565	1,050	2,020	1,740	4,980	1,170	613
6	1,150	1,380	1,080	895	682	564	1,260	2,090	1,480	4,670	1,120	599
7	1,240	1,280	996	892	683	566	1,260	2,500	1,590	4,530	1,100	574
8	1,370	1,250	994	889	681	570	1,260	2,800	2,000	4,050	1,100	586
9	1,340	1,250	962	890	680	565	1,190	3,000	2,040	3,770	1,010	571
10	1,320	1,330	927	916	680	566	1,070	3,540	2,190	3,850	907	577
11	1,310	1,500	928	895	678	565	985	3,610	2,540	3,820	951	710
12	1,280	1,420	952	844	661	565	971	3,560	2,740	3,640	954	776
13	1,300	1,310	963	791	613	567	979	3,500	2,740	3,560	952	770
14	1,330	1,240	996	739	586	569	1,020	3,350	2,360	3,640	953	764
15	1,320	1,120	1,040	744	582	567	1,020	3,150	2,090	3,410	936	742
16	1,300	961	1,040	690	581	600	1,700	3,050	2,080	3,270	848	684
17	1,290	1,160	1,020	635	574	751	2,080	3,020	2,060	3,120	735	614
18	1,160	1,190	1,020	636	590	956	2,130	3,110	2,040	2,860	705	595
19	1,180	1,380	1,020	635	594	1,070	2,710	3,040	1,890	2,750	786	591
20	1,280	1,500	997	636	604	1,070	3,020	3,240	1,710	2,690	786	679
21	1,290	1,490	1,000	695	591	1,060	3,170	3,240	1,630	2,710	774	697
22	1,320	1,230	1,000	683	610	1,070	3,100	3,240	1,600	2,470	769	698
23	1,330	1,230	1,010	605	635	1,080	3,110	2,990	2,270	2,100	706	693
24	1,340	1,150	975	599	631	1,410	3,030	2,950	3,190	1,990	668	720
25	1,220	966	941	599	618	1,460	2,940	2,730	3,540	1,780	676	766
26	1,230	668	966	597	581	1,590	2,810	2,530	3,960	1,710	673	723
27	1,320	752	917	587	570	1,540	2,810	2,470	5,460	1,550	661	669
28	1,340	965	878	580	523	1,470	2,600	2,490	6,950	1,550	647	622
29	1,360	1,230	884	548	---	1,390	2,330	2,220	6,890	1,560	639	633
30	1,370	1,320	958	549	---	1,360	2,070	2,150	6,340	1,390	629	627
31	1,380	---	940	591	---	1,370	---	2,130	---	1,160	627	---
TOTAL	36,820	37,232	29,955	22,808	17,490	27,735	56,895	85,140	82,390	100,780	27,442	19,915
MEAN	1,188	1,241	966	736	625	895	1,896	2,746	2,746	3,251	885	664
MAX	1,380	1,500	1,080	960	686	1,590	3,170	3,610	6,950	5,870	1,320	776
MIN	445	668	834	548	523	544	971	1,660	1,480	1,160	627	571
AC-FT	73,030	73,850	59,420	45,240	34,690	55,010	112,900	168,900	163,400	199,900	54,430	39,500
CFSM	0.36	0.38	0.29	0.22	0.19	0.27	0.57	0.83	0.83	0.99	0.27	0.20
IN.	0.42	0.42	0.34	0.26	0.20	0.31	0.64	0.96	0.93	1.14	0.31	0.22

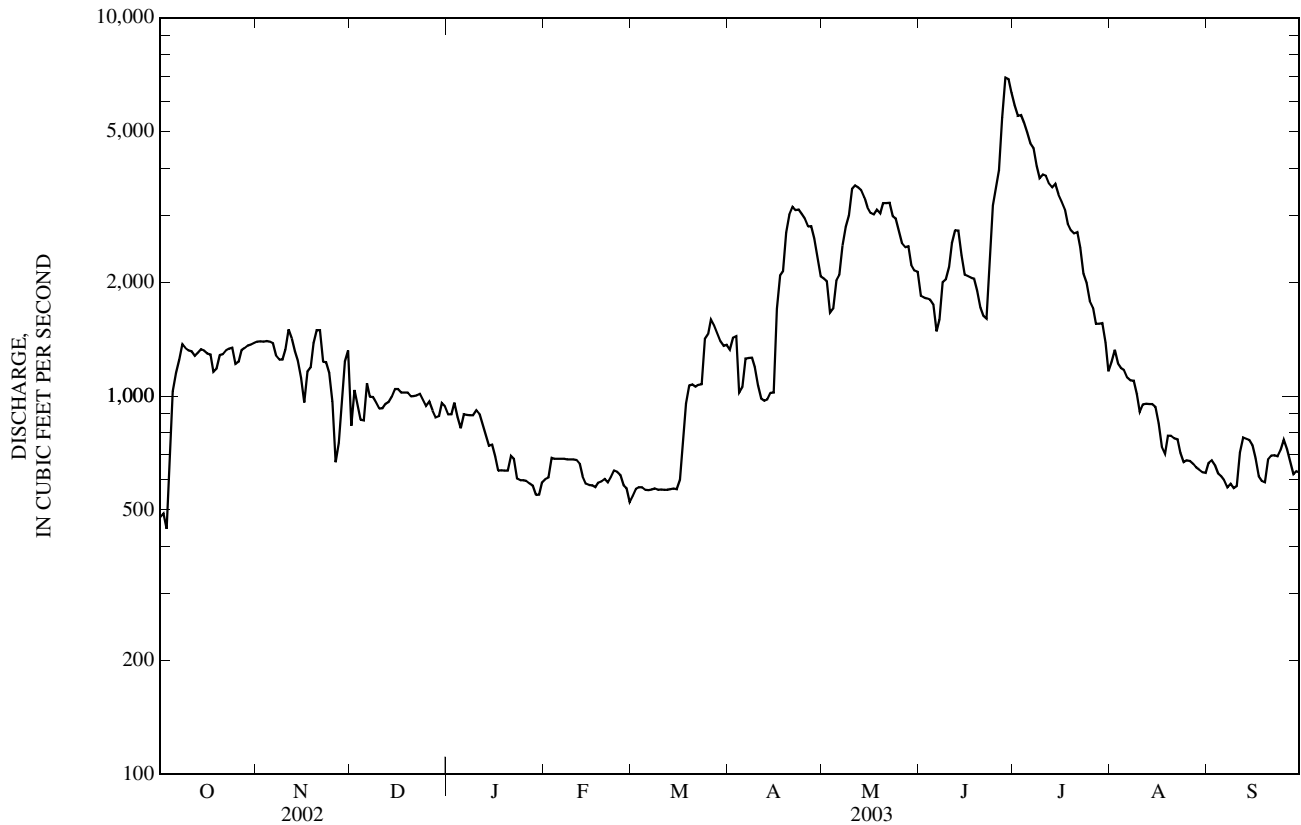
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1969 - 2003, BY WATER YEAR (WY)

MEAN	1,239	1,242	888	724	736	1,379	3,406	2,494	1,803	1,558	1,024	954
MAX	3,771	3,674	1,699	1,188	1,360	2,996	8,266	5,671	5,307	3,295	3,520	3,309
(WY)	(1974)	(1972)	(1999)	(1986)	(1998)	(1972)	(2001)	(1986)	(2001)	(1972)	(1972)	(1986)
MIN	215	215	199	218	255	548	882	545	447	206	120	161
(WY)	(1977)	(1977)	(1977)	(1977)	(1977)	(1981)	(1981)	(1977)	(1988)	(1988)	(1976)	(1976)

05247500 CROW WING RIVER NEAR PILLAGER, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1969 - 2003	
ANNUAL TOTAL	555,612		544,602		1,455	
ANNUAL MEAN	1,522		1,492		446	
HIGHEST ANNUAL MEAN					2,564	1972
LOWEST ANNUAL MEAN					446	1977
HIGHEST DAILY MEAN	5,070	Jul 11	6,950	Jun 28	16,900	Apr 12, 2001
LOWEST DAILY MEAN	445	Oct 3	445	Oct 3	60	Aug 10, 1976
ANNUAL SEVEN-DAY MINIMUM	672	Sep 28	559	Feb 28	68	Aug 9, 1976
MAXIMUM PEAK FLOW			7,340	Jun 28	a17,500	Apr 12, 2001
MAXIMUM PEAK STAGE			7.67	Jun 28	a12.11	Apr 12, 2001
INSTANTANEOUS LOW FLOW			b413	Oct 4	b78	Jul 17, 2001
ANNUAL RUNOFF (AC-FT)	1,102,000		1,080,000		1,054,000	
ANNUAL RUNOFF (CFSM)	0.46		0.45		0.44	
ANNUAL RUNOFF (INCHES)	6.26		6.14		5.99	
10 PERCENT EXCEEDS	2,830		3,100		2,960	
50 PERCENT EXCEEDS	1,250		1,080		993	
90 PERCENT EXCEEDS	832		591		461	

a Since stage record began, Jan. 16, 1991.
 b Result of regulation.



05267000 MISSISSIPPI RIVER NEAR ROYALTON, MN

LOCATION.--Lat 45°49'34", long 94°21'18", sec. 32, T. 39 N., R. 32 W., Morrison County, Hydrologic Unit 07010201, on left bank at upstream side of bridge on County Highway 26, 2.5 mi west of Royalton, and at mile 954 upstream from Ohio River.

DRAINAGE AREA.--11,600 mi² (approximately).

PERIOD OF RECORD.--March 1924 to Sept. 30, 1993, discharges obtained from Minnesota Power and adjusted to U.S. Geological Survey streamflow measurements; Oct. 1993 to Sept. 30, 2000, discharges flow-averaged between Mississippi River at Ft. Ripley (05261000) and Mississippi River at St. Cloud (05270700); Oct. 2000 to July, 2001, discharges obtained from Minnesota Power and adjusted to U.S. Geological Survey streamflow measurements; July 2001 to current year.

GAGE.--Water-stage recorder.

REMARKS.--Records good except those for estimated days, which are fair. Flow partly regulated by power plants and Winnibigoshish, Leech, Pokegama, Sandy, and Gull Lakes and by Pine River Reservoir.

COOPERATION.--Minnesota Power Co. in connection with a Federal Energy Regulatory Commission project.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2,960	4,930	3,560	3,510	e2,410	e1,930	3,780	4,900	4,920	12,400	3,990	1,720
2	2,990	5,170	e3,200	e3,550	e2,450	e1,940	3,410	4,790	4,850	11,200	3,750	1,700
3	2,780	4,900	e3,300	e3,750	e2,450	e1,950	3,920	4,630	4,520	11,600	3,730	1,750
4	3,300	4,880	3,460	e3,700	e2,450	e1,970	3,660	3,870	4,560	12,500	3,830	1,880
5	3,880	4,580	3,530	3,410	e2,450	e1,960	2,900	4,370	4,420	11,700	3,820	1,730
6	4,410	4,790	3,190	3,370	e2,430	e1,930	3,280	4,590	4,180	10,800	3,760	1,590
7	5,290	4,740	3,720	3,400	e2,440	e1,930	3,720	4,630	3,970	10,600	3,620	1,840
8	5,740	4,550	e3,600	3,410	e2,420	e1,930	3,450	5,300	4,140	10,200	3,600	2,320
9	6,420	4,440	e3,400	e3,420	e2,420	e1,930	3,510	5,700	4,510	9,550	3,370	1,750
10	5,400	4,550	3,710	e3,490	e2,390	e1,930	3,380	7,170	4,330	9,440	3,160	1,660
11	5,820	4,690	3,880	e3,440	e2,340	e1,930	3,280	8,910	5,210	9,770	3,010	1,670
12	7,410	4,760	3,630	e3,300	e2,300	e1,930	3,250	8,960	5,160	9,990	2,740	1,980
13	5,860	4,580	4,020	e3,180	e2,270	e1,990	2,760	9,020	5,310	10,100	2,930	2,060
14	5,730	4,600	3,910	e3,080	e2,250	e2,030	3,220	8,860	5,300	10,000	2,740	2,050
15	6,490	4,520	3,840	e3,030	e2,100	e2,050	2,960	8,140	4,510	9,890	2,710	2,010
16	6,110	4,220	e3,590	e2,940	e2,050	e2,170	4,020	7,530	4,250	9,310	2,730	1,930
17	6,150	3,870	e3,500	e2,840	e2,200	e2,480	5,670	7,490	4,420	9,060	2,580	1,850
18	5,990	4,370	e3,580	e2,770	e2,350	e2,730	5,090	6,790	4,390	8,410	2,350	1,990
19	5,440	4,280	e3,660	e2,700	e2,400	e2,850	6,490	7,680	4,120	7,920	2,220	2,160
20	5,800	4,680	e3,590	e2,650	e2,400	e3,040	7,350	7,890	3,820	7,240	2,120	1,730
21	5,770	4,720	e3,650	e2,570	e2,350	e3,140	8,630	8,140	3,540	6,800	2,110	1,980
22	5,780	4,500	e3,500	e2,530	e2,200	3,400	8,540	8,420	3,580	6,740	2,040	1,970
23	5,510	4,250	e3,300	e2,500	e2,150	3,350	8,840	8,280	7,170	6,040	1,900	1,950
24	5,460	3,840	e3,500	e2,470	e2,100	3,670	8,490	7,760	9,830	5,430	1,870	1,950
25	5,430	3,850	e3,800	e2,450	e2,010	4,310	7,780	7,510	11,600	5,250	2,020	1,920
26	5,040	3,480	e3,600	e2,410	e1,970	4,230	7,330	7,140	12,600	5,140	2,000	1,900
27	5,050	3,110	e3,550	e2,380	e1,950	4,130	6,860	6,530	13,200	4,680	1,840	1,880
28	5,040	2,930	3,500	e2,380	e1,930	3,820	6,420	6,250	13,700	4,490	1,730	1,870
29	5,170	3,480	3,520	e2,380	---	3,710	5,910	6,070	14,300	4,380	1,880	1,790
30	5,330	3,690	e3,550	e2,380	---	3,440	5,260	5,630	13,300	4,230	1,920	1,700
31	5,130	---	e3,440	e2,380	---	3,440	---	5,450	---	3,880	1,820	---
TOTAL	162,680	129,950	110,780	91,770	63,630	83,240	153,160	208,400	193,710	258,740	83,890	56,280
MEAN	5,248	4,332	3,574	2,960	2,272	2,685	5,105	6,723	6,457	8,346	2,706	1,876
MAX	7,410	5,170	4,020	3,750	2,450	4,310	8,840	9,020	14,300	12,500	3,990	2,320
MIN	2,780	2,930	3,190	2,380	1,930	1,930	2,760	3,870	3,540	3,880	1,730	1,590
AC-FT	322,700	257,800	219,700	182,000	126,200	165,100	303,800	413,400	384,200	513,200	166,400	111,600
CFSM	0.45	0.37	0.31	0.26	0.20	0.23	0.44	0.58	0.56	0.72	0.23	0.16
IN.	0.52	0.42	0.36	0.29	0.20	0.27	0.49	0.67	0.62	0.83	0.27	0.18

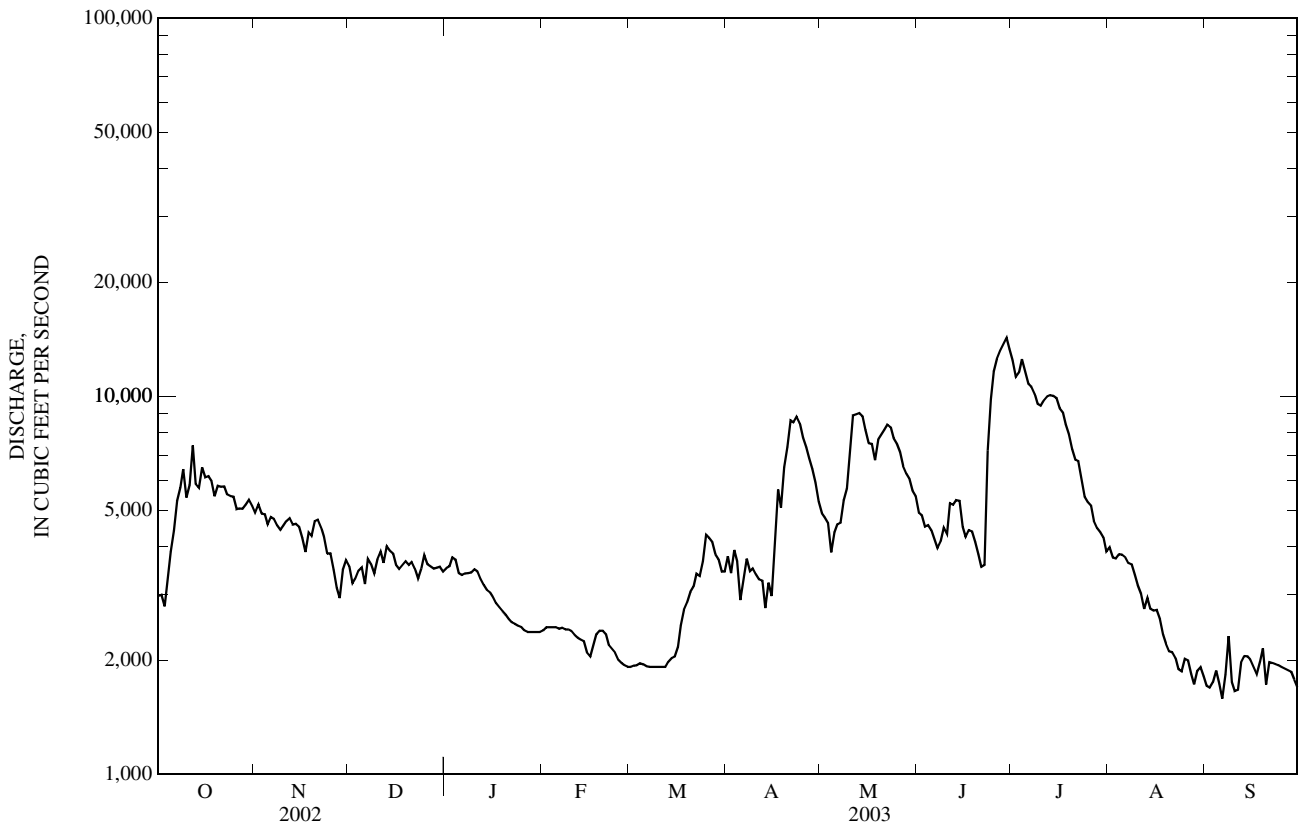
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1924 - 2003, BY WATER YEAR (WY)

MEAN	4,200	4,069	3,201	2,808	2,688	3,882	9,312	8,735	6,545	5,083	3,747	3,569
MAX	12,930	14,640	7,297	5,713	5,480	12,290	25,430	24,600	18,160	15,250	15,230	12,940
(WY)	(1966)	(1972)	(1997)	(1966)	(1997)	(1966)	(1997)	(1950)	(1965)	(1993)	(1953)	(1986)
MIN	632	618	627	534	758	968	1,924	1,663	1,071	648	449	535
(WY)	(1937)	(1937)	(1935)	(1935)	(1937)	(1940)	(1931)	(1977)	(1988)	(1988)	(1934)	(1934)

05267000 MISSISSIPPI RIVER NEAR ROYALTON, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1924 - 2003	
ANNUAL TOTAL	1,990,870		1,596,230			
ANNUAL MEAN	5,454		4,373		4,846	
HIGHEST ANNUAL MEAN					9,555	1966
LOWEST ANNUAL MEAN					1,213	1934
HIGHEST DAILY MEAN	16,900	Jul 12	14,300	Jun 29	38,200	Apr 8, 1997
LOWEST DAILY MEAN	2,360	Jun 17	1,590	Sep 6	254	Nov 25, 1936
ANNUAL SEVEN-DAY MINIMUM	2,610	Jun 12	1,740	Aug 31	358	Sep 3, 1936
MAXIMUM PEAK FLOW			a14,500	Jun 29		
MAXIMUM PEAK STAGE			a13.01	Jun 29		
INSTANTANEOUS LOW FLOW			b1,520	Sep 30		
ANNUAL RUNOFF (AC-FT)	3,949,000		3,166,000		3,511,000	
ANNUAL RUNOFF (CFSM)	0.47		0.38		0.42	
ANNUAL RUNOFF (INCHES)	6.38		5.12		5.68	
10 PERCENT EXCEEDS	9,670		8,140		9,860	
50 PERCENT EXCEEDS	4,600		3,660		3,560	
90 PERCENT EXCEEDS	3,200		1,950		1,350	

- a Due in part to regulation.
- b Due to regulation.
- e Estimated.



05270500 SAUK RIVER NEAR ST. CLOUD, MN

LOCATION.--Lat 45°33'35", long 94°14'00", in SW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 8, T. 124 N., R. 28 W., Stearns County, Hydrologic Unit 07010203, on right bank 0.5 mi northwest of Waite Park, 3 mi west of St. Cloud, and 5 mi upstream from mouth.

DRAINAGE AREA.--1,030 mi².

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 September 1981, October 1990 to current year. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORD--WSP 895: Drainage area. WSP 1308: 1912(M), 1932 (M). WSP 1508: 1937(m).

GAGE.--Water-stage recorder. Datum of gage is 1,034.63 ft above sea level (NGVD of 1929). Prior to Nov. 22, 1934, nonrecording gage on highway bridge 1 mi downstream at datum 6.77 ft lower.

REMARKS.--Records good except those for estimated daily discharge, which are fair to poor. Flow may be influenced by regulation from power plant and small lakes upstream from gage.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	357	604	314	e145	e131	e141	322	772	561	913	595	142
2	344	599	e244	e144	e132	e141	296	727	526	940	557	140
3	336	583	e209	e143	e133	e139	273	701	502	1,120	526	141
4	443	586	e201	e143	e129	e138	280	654	475	1,250	498	132
5	513	578	e196	e141	e126	e134	283	633	444	1,380	484	124
6	540	583	e187	e142	e120	e131	271	648	440	1,450	473	122
7	589	570	e183	e143	e114	e128	250	630	440	1,480	455	121
8	594	556	e177	e144	e113	e131	246	606	445	1,480	436	119
9	613	534	e174	e144	e111	e136	248	644	444	1,450	422	112
10	622	526	e175	e146	e110	e141	244	683	495	1,410	407	120
11	626	514	e176	e147	e112	e149	235	753	497	1,370	392	198
12	652	505	e174	e152	e115	e155	224	786	505	1,340	371	250
13	644	490	e174	e159	e119	e161	220	801	510	1,290	362	220
14	620	478	e175	e166	e123	e168	230	850	488	1,270	349	212
15	613	461	e177	e173	e125	e182	218	885	467	1,250	331	203
16	593	447	e177	e170	e127	e202	377	906	446	1,190	304	193
17	590	437	e174	e164	e130	e231	507	899	428	1,140	278	184
18	605	426	e171	e158	e135	e245	582	885	403	1,080	263	199
19	605	425	e169	e155	e137	e253	754	953	369	1,050	256	213
20	573	413	e167	e153	e139	e262	881	995	348	1,100	244	190
21	564	408	e164	e150	e139	e274	965	953	323	1,080	236	183
22	554	402	e161	e147	e139	e291	1,050	940	326	1,010	214	190
23	558	401	e159	e144	e140	312	1,110	930	333	958	197	186
24	566	388	e158	e140	e140	321	1,110	917	416	912	186	182
25	558	362	e156	e137	e141	332	1,070	888	685	860	180	182
26	567	354	e153	e134	e141	349	1,030	842	768	813	174	164
27	562	326	e152	e133	e141	370	1,000	795	812	778	166	168
28	567	306	e149	e133	e139	387	933	756	856	726	156	159
29	576	306	e148	e133	---	375	862	699	902	677	159	153
30	586	305	e146	e132	---	354	809	664	909	625	148	149
31	599	---	e146	e131	---	336	---	592	---	615	145	---
TOTAL	17,329	13,873	5,486	4,546	3,601	7,069	16,880	24,387	15,563	34,007	9,964	5,051
MEAN	559	462	177	147	129	228	563	787	519	1,097	321	168
MAX	652	604	314	173	141	387	1,110	995	909	1,480	595	250
MIN	336	305	146	131	110	128	218	592	323	615	145	112
AC-FT	34,370	27,520	10,880	9,020	7,140	14,020	33,480	48,370	30,870	67,450	19,760	10,020
CFSM	0.54	0.45	0.17	0.14	0.12	0.22	0.55	0.76	0.50	1.07	0.31	0.16
IN.	0.63	0.50	0.20	0.16	0.13	0.26	0.61	0.88	0.56	1.23	0.36	0.18

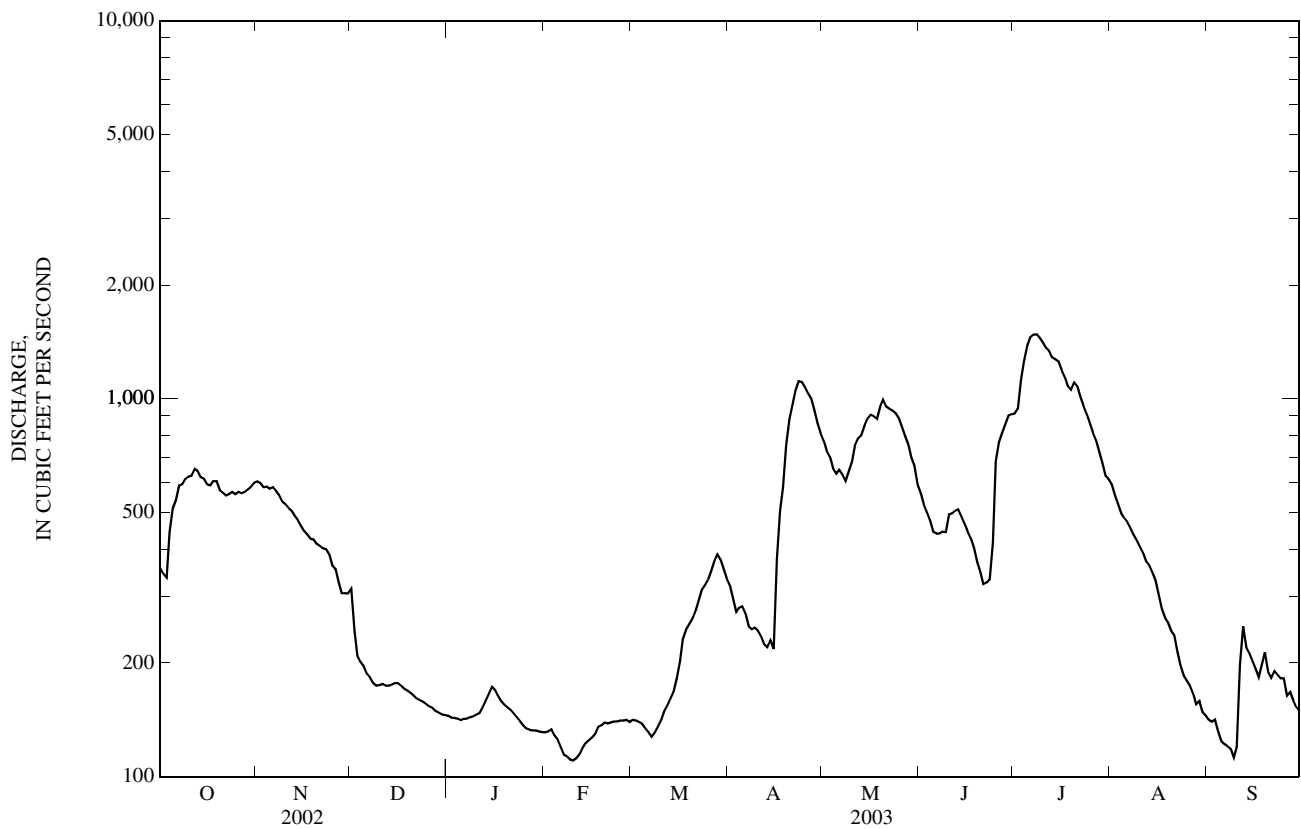
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 2003, BY WATER YEAR (WY)

MEAN	176	186	137	102	110	311	844	533	419	339	218	186
MAX	1,154	1,091	528	336	568	1,380	2,997	1,862	1,333	1,262	1,250	1,136
(WY)	(1996)	(1972)	(1972)	(1980)	(1966)	(1966)	(1997)	(2001)	(1957)	(1993)	(1972)	(1957)
MIN	6.22	6.18	5.15	3.25	7.61	28.7	16.5	7.84	15.9	10.6	10.5	10.7
(WY)	(1934)	(1934)	(1935)	(1935)	(1935)	(1940)	(1934)	(1934)	(1934)	(1934)	(1933)	(1933)

05270500 SAUK RIVER NEAR ST. CLOUD, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1909 - 2003	
ANNUAL TOTAL	179,312		157,756		a312	
ANNUAL MEAN	491		432		732	
HIGHEST ANNUAL MEAN					1972	
LOWEST ANNUAL MEAN					51.0	
HIGHEST DAILY MEAN	1,620	Aug 7	1,480	Jul 7	7,940	Apr 14, 1965
LOWEST DAILY MEAN	103	Jan 1	110	Feb 10	1.3	Jan 6, 1935
ANNUAL SEVEN-DAY MINIMUM	103	Feb 26	113	Feb 7	1.5	Jan 2, 1935
MAXIMUM PEAK FLOW			b1,490	Jul 7	9,100	Apr 13, 1965
MAXIMUM PEAK STAGE			4.73	Jul 8	10.68	Apr 13, 1965
INSTANTANEOUS LOW FLOW			c110	Feb 10	0.30	Nov 25, 1936
ANNUAL RUNOFF (AC-FT)	355,700		312,900		226,200	
ANNUAL RUNOFF (CFSM)	0.48		0.42		0.30	
ANNUAL RUNOFF (INCHES)	6.48		5.70		4.12	
10 PERCENT EXCEEDS	1,060		915		783	
50 PERCENT EXCEEDS	425		332		153	
90 PERCENT EXCEEDS	135		137		41	

- a Median of annual mean discharges is 310 ft³/s.
- b Gage height, 4.72 ft.
- c Daily-mean discharge.
- e Estimated.



05270700 MISSISSIPPI RIVER AT ST. CLOUD, MN

LOCATION.--Lat 45°32'50", long 94°08'44", in SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 1, T. 35 N., R. 31 W., Sherburne County, Hydrologic Unit 07010203, on left bank about 250 ft below the left downstream end of the City of St. Cloud hydropower dam and at mile 926.3 upstream from Ohio River.

DRAINAGE AREA.--13,320 mi² (approximately).

PERIOD OF RECORD.--October 1988 to current year.

GAGE.--Water-stage recorder. Datum of gage is 958.49 ft above sea level (NGVD of 1929).

REMARKS.--Records good except those for estimated daily discharge, which are fair to poor. Flow partly regulated by power plants and reservoirs.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3,780	6,010	4,030	3,690	2,740	e2,140	4,300	6,770	6,220	16,700	4,460	1,740
2	3,490	6,280	3,690	3,890	2,970	e2,120	4,200	6,650	6,230	15,000	4,550	1,690
3	3,160	5,970	3,230	3,890	e2,850	e2,120	4,630	6,390	5,700	15,300	4,420	1,890
4	4,180	5,870	e3,100	3,950	e2,800	e2,120	4,530	5,660	5,750	16,200	4,410	1,660
5	4,830	5,730	3,150	3,920	e2,750	e2,120	3,590	5,780	5,640	15,500	4,410	1,880
6	5,690	5,570	3,410	3,640	e2,650	e2,120	3,930	6,270	5,550	14,600	4,400	1,680
7	6,550	5,860	3,490	3,750	e2,580	e2,120	4,380	6,100	5,250	15,000	4,250	1,720
8	6,930	5,520	3,590	3,980	e2,570	e2,120	4,210	6,610	5,410	14,100	4,080	2,270
9	7,330	5,450	3,340	3,770	e2,570	e2,120	3,980	7,380	5,620	13,200	3,920	1,710
10	7,420	5,580	3,920	3,570	e2,570	e2,110	4,120	8,620	5,990	12,700	3,710	1,780
11	6,870	5,450	4,230	3,620	e2,560	e2,140	3,910	10,900	6,680	12,500	3,590	2,280
12	8,210	5,800	4,330	e3,400	e2,510	e2,190	3,850	11,000	6,690	12,900	2,950	2,420
13	7,420	5,460	4,320	e3,350	e2,490	e2,240	3,420	11,200	6,850	12,500	3,210	2,540
14	6,560	5,580	4,450	e3,400	e2,480	e2,340	3,730	11,400	6,540	12,700	3,320	2,340
15	7,400	5,240	4,360	e3,400	e2,450	e2,550	3,690	10,600	5,920	12,400	3,060	2,310
16	6,970	5,260	4,140	3,460	e2,440	e2,750	5,280	9,810	5,280	11,600	3,080	2,270
17	7,050	4,520	3,900	3,290	e2,430	e3,050	7,020	9,470	5,400	10,900	3,040	1,930
18	7,130	5,150	4,530	3,210	e2,400	e3,250	7,060	8,830	5,390	10,100	2,670	2,380
19	6,340	5,180	4,510	3,100	e2,380	e3,350	8,940	9,820	4,750	9,510	2,540	2,480
20	6,830	5,310	4,200	3,150	e2,360	e3,450	10,600	10,100	4,570	8,990	2,330	2,050
21	6,920	5,510	4,000	3,230	e2,340	3,580	12,300	10,200	4,170	8,420	2,420	2,060
22	6,580	5,310	3,910	e2,900	e2,320	3,590	12,100	10,800	4,260	8,020	2,150	2,420
23	6,460	5,090	3,620	e3,200	e2,300	3,750	12,700	10,700	6,900	7,490	1,870	2,240
24	6,520	4,510	3,710	e2,850	e2,270	4,110	12,100	9,990	10,300	6,870	2,000	2,200
25	6,440	4,330	4,070	e2,900	e2,240	4,620	11,200	9,600	14,300	6,340	2,070	2,150
26	6,050	3,980	4,020	e2,850	e2,210	5,060	10,400	9,140	16,600	6,430	2,020	1,950
27	6,050	3,690	3,730	e2,800	e2,200	5,180	9,580	8,330	18,100	5,890	1,970	2,130
28	6,070	3,430	4,030	2,660	e2,180	4,470	9,060	7,910	18,900	5,830	1,890	2,040
29	6,490	3,880	4,000	e2,650	---	4,390	8,220	7,530	19,600	5,150	1,770	2,060
30	6,330	3,880	3,950	e2,700	---	4,070	7,450	7,190	18,400	5,160	1,790	1,650
31	6,310	---	3,750	2,690	---	e3,980	---	6,600	---	4,900	1,960	---
TOTAL	194,360	154,400	120,710	102,830	69,610	95,320	204,480	267,350	246,960	332,900	94,310	61,920
MEAN	6,270	5,147	3,894	3,317	2,486	3,075	6,816	8,624	8,232	10,740	3,042	2,064
MAX	8,210	6,280	4,530	3,980	2,970	5,180	12,700	11,400	19,600	16,700	4,550	2,540
MIN	3,160	3,430	3,100	2,650	2,180	2,110	3,420	5,660	4,170	4,900	1,770	1,650
AC-FT	385,500	306,300	239,400	204,000	138,100	189,100	405,600	530,300	489,800	660,300	187,100	122,800
CFSM	0.47	0.39	0.29	0.25	0.19	0.23	0.51	0.65	0.62	0.81	0.23	0.15
IN.	0.54	0.43	0.34	0.29	0.19	0.27	0.57	0.75	0.69	0.93	0.26	0.17

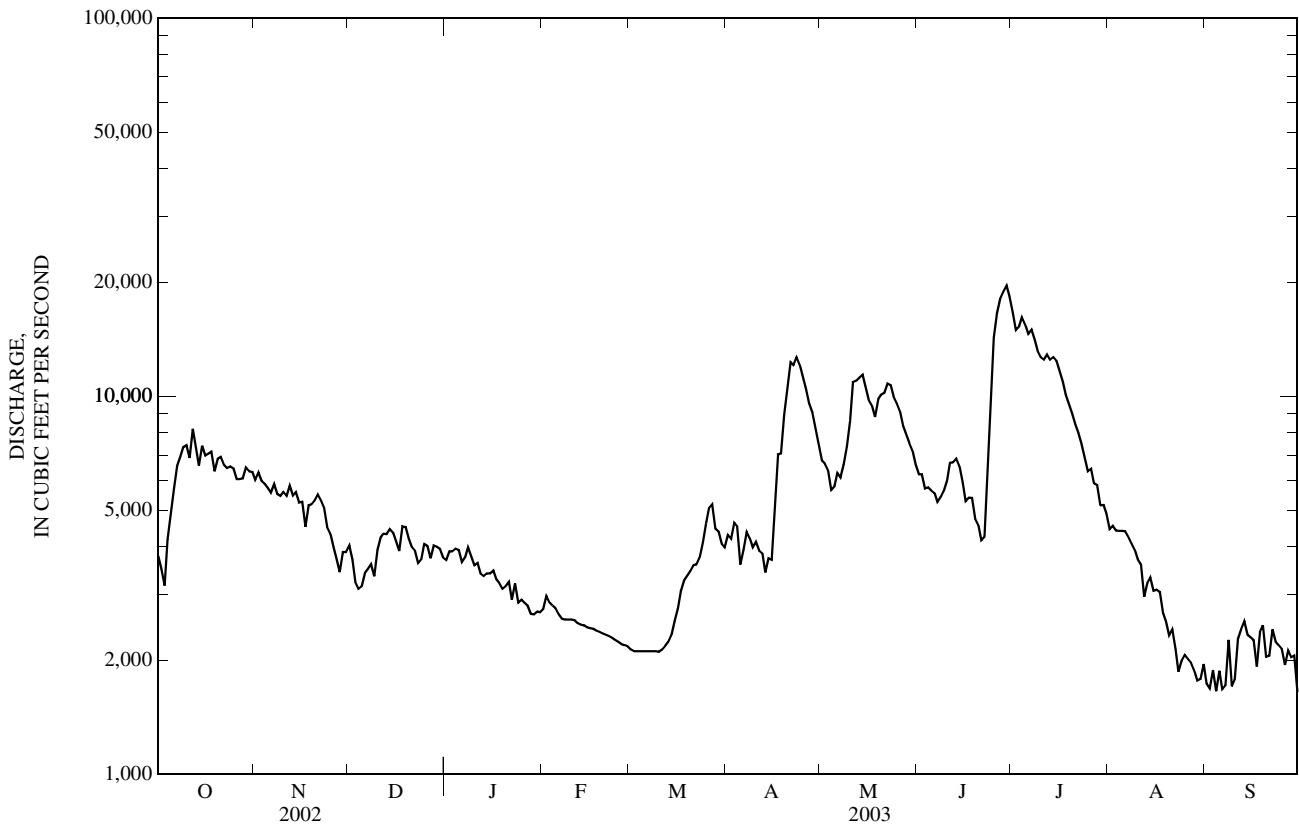
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1988 - 2003, BY WATER YEAR (WY)

MEAN	5,745	5,967	4,772	4,065	3,900	6,168	13,580	11,820	8,436	8,639	4,892	4,662
MAX	15,680	9,675	7,434	5,616	5,796	10,600	29,710	22,020	20,310	16,830	9,687	9,763
(WY)	(1996)	(1996)	(1997)	(1997)	(1997)	(1995)	(2001)	(2001)	(2001)	(1993)	(1999)	(1999)
MIN	3,106	2,953	2,310	1,927	1,815	3,075	6,134	5,653	3,743	3,930	1,535	2,064
(WY)	(1993)	(1989)	(1991)	(1991)	(1990)	(2003)	(2000)	(1998)	(1992)	(1989)	(1989)	(2003)

05270700 MISSISSIPPI RIVER AT ST. CLOUD, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1988 - 2003	
ANNUAL TOTAL	2,373,770		1,945,150		6,881	
ANNUAL MEAN	6,503		5,329		4,615	
HIGHEST ANNUAL MEAN					9,947 2001	
LOWEST ANNUAL MEAN					4,615 1990	
HIGHEST DAILY MEAN	21,100	Jul 12	19,600	Jun 29	45,100	Apr 9, 1997
LOWEST DAILY MEAN	2,610	Jun 18	1,650	Sep 30	1,010	Aug 24, 1989
ANNUAL SEVEN-DAY MINIMUM	3,170	Jun 13	1,750	Sep 1	1,250	Aug 13, 1989
MAXIMUM PEAK FLOW			a20,900	Jun 29	46,900	Apr 8, 1997
MAXIMUM PEAK STAGE			a7.88	Jun 29	11.44	Apr 8, 1997
INSTANTANEOUS LOW FLOW			b576	Apr 17	b484	Oct 18, 1992
ANNUAL RUNOFF (AC-FT)	4,708,000		3,858,000		4,985,000	
ANNUAL RUNOFF (CFSM)	0.49		0.40		0.52	
ANNUAL RUNOFF (INCHES)	6.63		5.43		7.02	
10 PERCENT EXCEEDS	11,500		10,500		12,700	
50 PERCENT EXCEEDS	5,560		4,200		5,520	
90 PERCENT EXCEEDS	3,480		2,140		2,740	

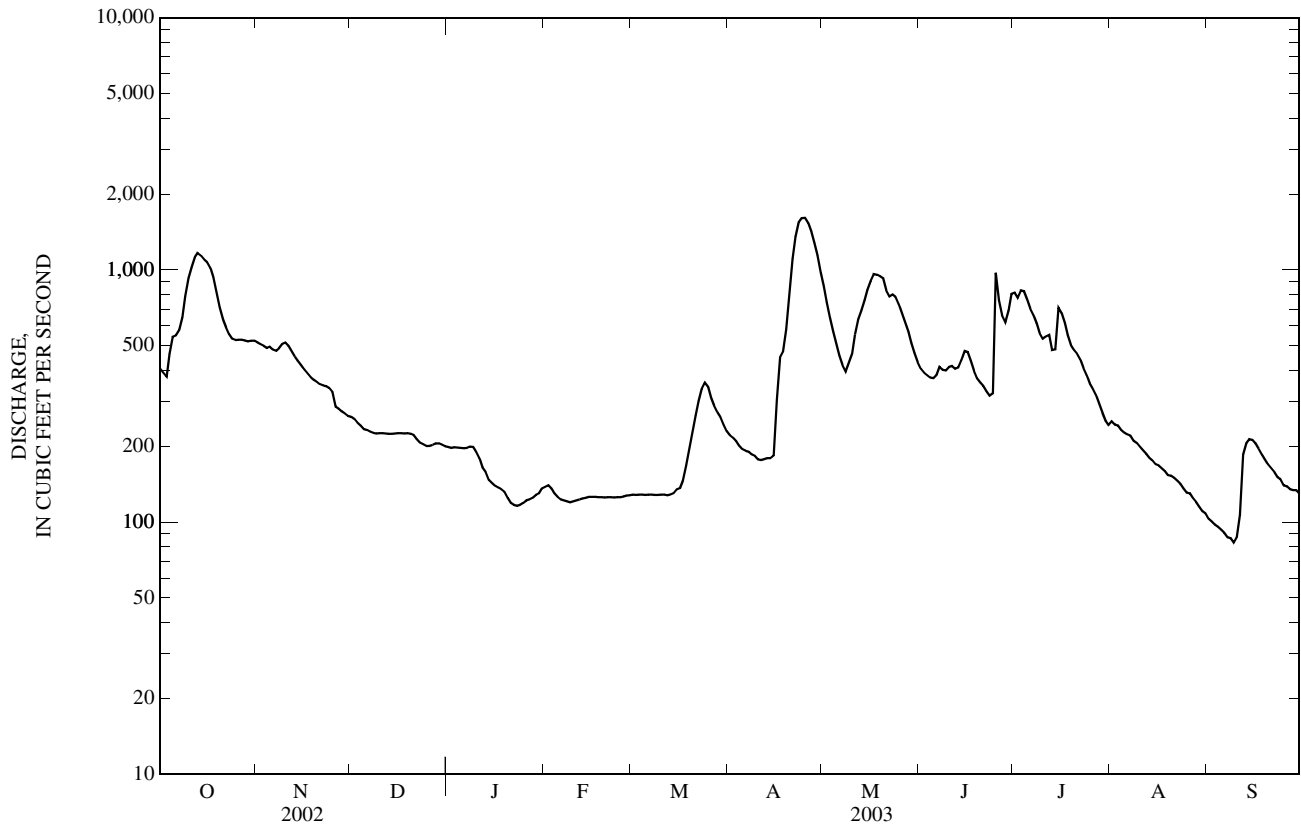
- a Due in part to regulation.
- b Due to regulation.
- c Estimated.



05275000 ELK RIVER NEAR BIG LAKE, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1911 - 2003	
ANNUAL TOTAL	176,117		135,172			
ANNUAL MEAN	483		370		a278	
HIGHEST ANNUAL MEAN					669 1986	
LOWEST ANNUAL MEAN					88.0 1935	
HIGHEST DAILY MEAN	2,220	Jul 17	1,610	Apr 24, 25	7,170	Apr 16, 1965
LOWEST DAILY MEAN	84	Mar 23	83	Sep 9	4.0	Aug 1, 1934
ANNUAL SEVEN-DAY MINIMUM	87	Mar 21	89	Sep 4	4.5	Jul 27, 1934
MAXIMUM PEAK FLOW			1,620	Apr 24	7,360	Apr 16, 1965
MAXIMUM PEAK STAGE			4.94	Apr 24	10.86	Apr 16, 1965
INSTANTANEOUS LOW FLOW			81	Sep 9	3.6	Jul 31, 1934
ANNUAL RUNOFF (AC-FT)	349,300		268,100		201,100	
ANNUAL RUNOFF (CFSM)	0.86		0.66		0.50	
ANNUAL RUNOFF (INCHES)	11.72		9.00		6.75	
10 PERCENT EXCEEDS	1,050		786		579	
50 PERCENT EXCEEDS	403		243		170	
90 PERCENT EXCEEDS	95		126		72	

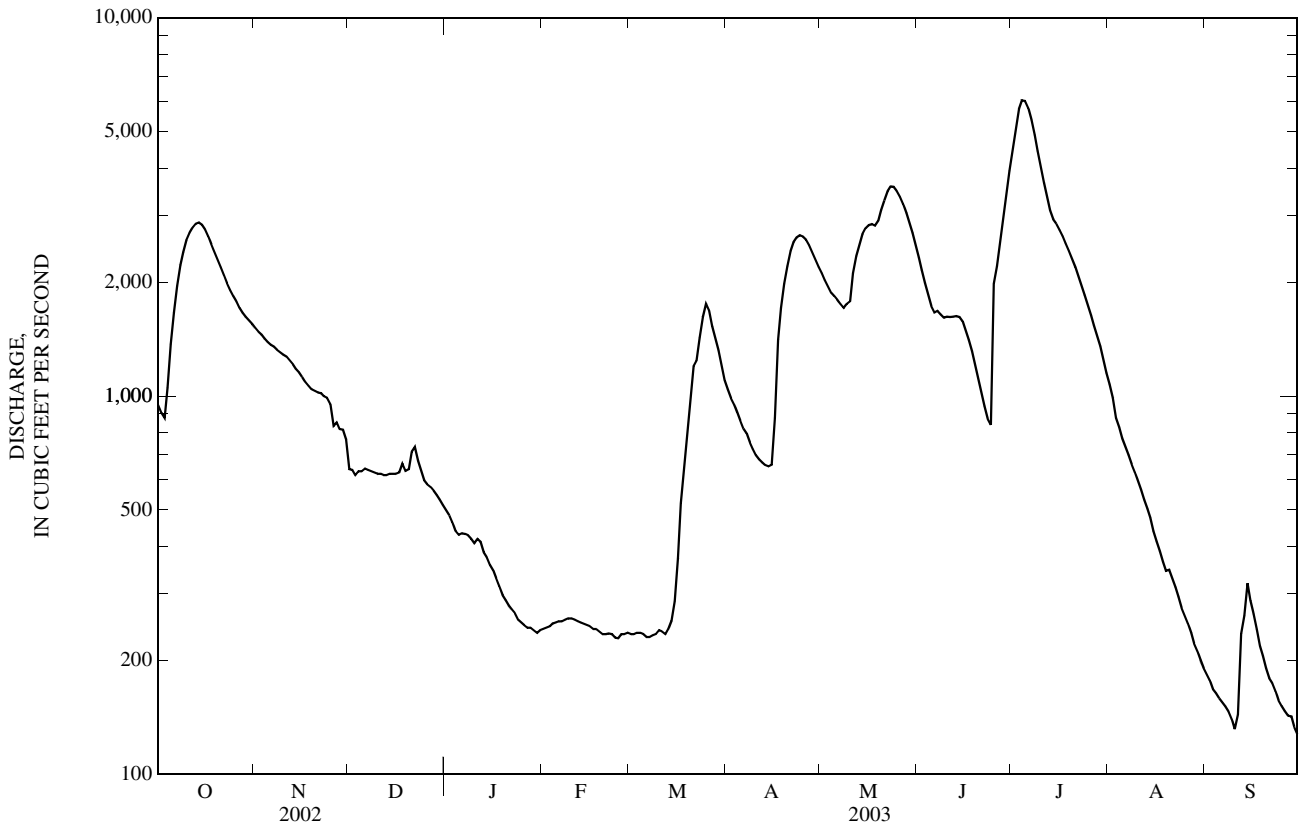
a Median of annual mean discharges is 260 ft³/s.
 e Estimated.



05280000 CROW RIVER AT ROCKFORD, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1906 - 2003	
ANNUAL TOTAL	689,191		454,442		a831	
ANNUAL MEAN	1,888		1,245		2,754	
HIGHEST ANNUAL MEAN					64.5 1931	
LOWEST ANNUAL MEAN					22,100 Apr 16, 1965	
HIGHEST DAILY MEAN	11,900	Jun 30	6,050	Jul 4	3.8 Aug 4, 1934	
LOWEST DAILY MEAN	148	Feb 26	128	Sep 30	4.0 Jul 31, 1934	
ANNUAL SEVEN-DAY MINIMUM	149	Feb 26	143	Sep 24	b19.27 Apr 16, 1965	
MAXIMUM PEAK FLOW			6,080	Jul 4	d1.8 Nov 15, 1936	
MAXIMUM PEAK STAGE			9.39	Jul 4		
INSTANTANEOUS LOW FLOW			c125	Sep 30		
ANNUAL RUNOFF (AC-FT)	1,367,000		901,400		602,100	
ANNUAL RUNOFF (CFSM)	0.72		0.47		0.31	
ANNUAL RUNOFF (INCHES)	9.71		6.40		4.28	
10 PERCENT EXCEEDS	4,430		2,780		2,320	
50 PERCENT EXCEEDS	1,350		852		285	
90 PERCENT EXCEEDS	159		234		41	

- a Median of annual mean discharges is 640 ft³/s.
- b From floodmark.
- c Falling stage.
- d Result of ice jam upstream.
- e Estimated.



05284000 MILLE LACS LAKE AT COVE BAY NEAR ONAMIA, MN

LOCATION.--Lat 46°06'36", long 93°37'08", in NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 21, T.42 N., R.26 W., Mille Lacs County, Hydrologic Unit 07010207, in Minnesota Department of Natural Resources boathouse at Cove Bay boatlanding, 3.6 mi northeast of Onamia.

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). Published as "at Wealthwood" prior to October 1939, and as "at Garrison" October 1939 to September 1987 (gauge heights collected at Wealthwood October 1939 to September 1941, but converted to gauge datum at Garrison for publication).

GAGE.--Water-stage recorder. Datum of gage is 1,240.40 ft above sea level (NGVD of 1929, levels by Minnesota Department of Natural Resources). Gage readings have been converted to elevations above sea level. Prior to Oct. 1, 1941, nonrecording gage at Wealthwood, 17 mi north of present site, at various datums; gage readings were converted to elevations (adjustment of 1912). Oct. 1, 1941 to Sept. 30, 1958, water-stage recorder at Garrison, 16 mi northwest of present site at datum 1,240.50 ft (adjustment of 1912). To convert these readings to NGVD of 1929, subtract 0.10 ft. Oct. 1, 1958 to Sept. 30, 1987, water-stage recorder at Garrison at present datum.

REMARKS.--Records fair to poor. Water level affected by fixed-crest spillway constructed in 1953 at outlet of Ogechie Lake, 2.7 mi downstream from outlet of Mille Lacs Lake, with crest at elevation 1,250.50 ft. Water level subject to fluctuation caused by seiches.

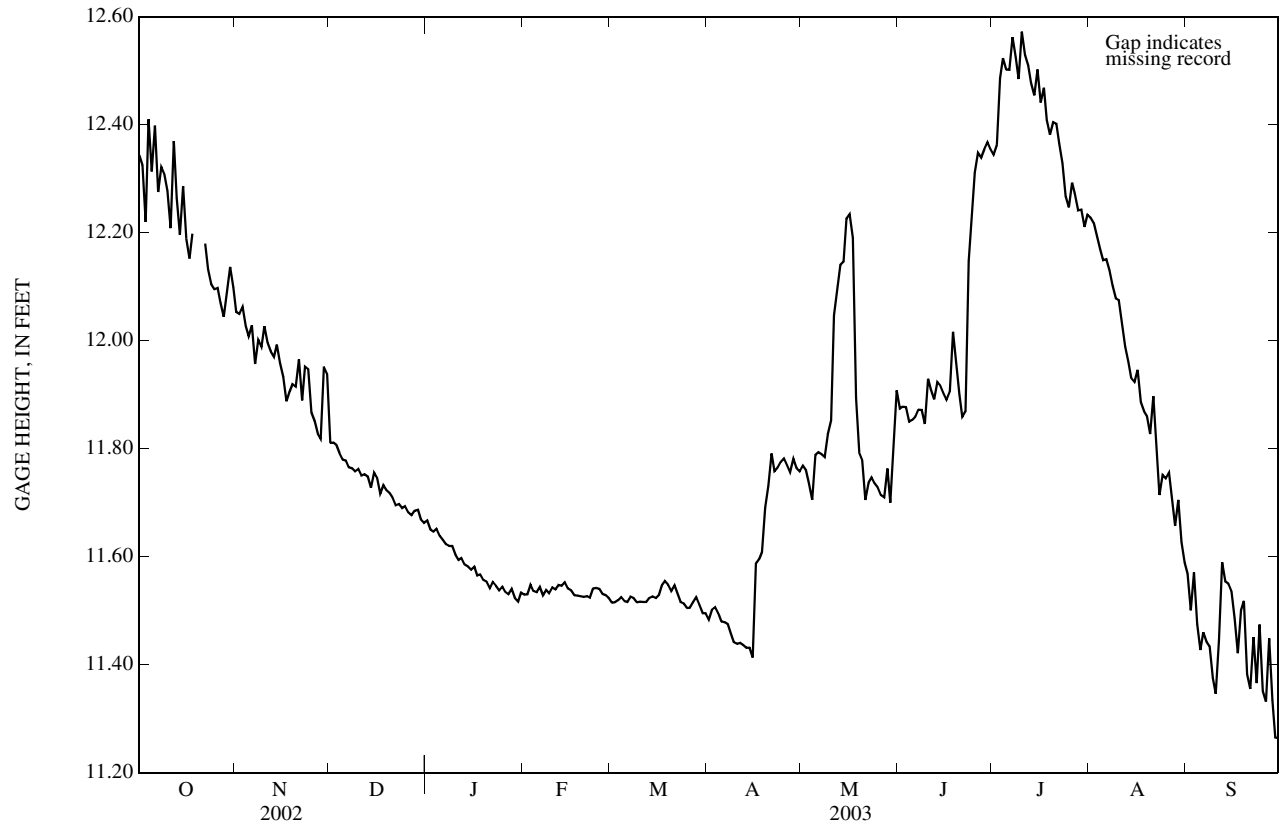
EXTREMES FOR PERIOD OF RECORD.--Maximum gage-height, 13.64 ft, July 21, 2002, affected by seiche action; maximum daily, 13.03 ft, Aug. 22, 1972; minimum gage-height observed, 5.34 ft (present datum) Oct. 16-19, 1936.

EXTREMES FOR CURRENT YEAR.--Maximum gage-height, 12.98 ft, July 2, affected by seiche action; maximum daily, 12.57 ft, July 10; minimum gage height, 11.06 ft, Sept. 29, affected by seiche action; minimum daily, 11.26 ft, falling stage, Sept. 30.

GAGE HEIGHT, FEET
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	12.34	12.05	11.81	11.67	11.53	11.52	11.48	11.77	11.87	12.34	12.23	11.57
2	12.33	12.05	11.81	11.65	11.53	11.52	11.50	11.76	11.88	12.36	12.22	11.50
3	12.22	12.06	11.81	11.65	11.55	11.52	11.51	11.74	11.88	12.49	12.19	11.57
4	12.41	12.03	11.79	11.65	11.54	11.53	11.50	11.71	11.85	12.52	12.17	11.48
5	12.31	12.01	11.78	11.64	11.53	11.52	11.48	11.79	11.85	12.50	12.15	11.43
6	12.40	12.03	11.78	11.63	11.54	11.52	11.48	11.79	11.86	12.50	12.15	11.46
7	12.28	11.96	11.77	11.62	11.53	11.53	11.48	11.79	11.87	12.56	12.13	11.44
8	12.32	12.00	11.76	11.62	11.54	11.52	11.46	11.78	11.87	12.52	12.10	11.43
9	12.31	11.99	11.76	11.62	11.53	11.52	11.44	11.83	11.85	12.48	12.08	11.38
10	12.28	12.03	11.76	11.60	11.54	11.52	11.44	11.85	11.93	12.57	12.07	11.35
11	12.21	12.00	11.75	11.59	11.54	11.52	11.44	12.05	11.91	12.53	12.03	11.44
12	12.37	11.98	11.75	11.60	11.55	11.52	11.44	12.10	11.89	12.51	11.99	11.59
13	12.26	11.97	11.75	11.59	11.55	11.52	11.43	12.14	11.92	12.48	11.96	11.55
14	12.20	11.99	11.73	11.58	11.55	11.53	11.43	12.15	11.92	12.45	11.93	11.55
15	12.29	11.96	11.76	11.58	11.54	11.52	11.41	12.23	11.90	12.50	11.92	11.54
16	12.19	11.93	11.75	11.58	11.54	11.53	11.59	12.23	11.89	12.44	11.95	11.49
17	12.15	11.89	11.72	11.57	11.53	11.55	11.59	12.19	11.91	12.47	11.89	11.42
18	12.20	11.91	11.73	11.57	11.53	11.55	11.61	11.89	12.02	12.41	11.87	11.50
19	---	11.92	11.72	11.56	11.53	11.55	11.69	11.79	11.95	12.38	11.86	11.52
20	---	11.91	11.72	11.55	11.53	11.54	11.73	11.78	11.90	12.40	11.83	11.38
21	---	11.97	11.71	11.54	11.53	11.55	11.79	11.71	11.86	12.40	11.90	11.36
22	12.18	11.89	11.70	11.55	11.52	11.53	11.76	11.74	11.87	12.36	11.80	11.45
23	12.13	11.95	11.70	11.55	11.54	11.52	11.76	11.75	12.15	12.33	11.71	11.37
24	12.10	11.95	11.69	11.54	11.54	11.51	11.78	11.74	12.24	12.27	11.75	11.47
25	12.10	11.87	11.69	11.54	11.54	11.50	11.78	11.73	12.31	12.25	11.75	11.35
26	12.10	11.85	11.68	11.54	11.53	11.51	11.77	11.71	12.35	12.29	11.76	11.33
27	12.07	11.83	11.68	11.53	11.53	11.52	11.76	11.71	12.34	12.27	11.70	11.45
28	12.04	11.82	11.69	11.54	11.52	11.53	11.78	11.76	12.35	12.24	11.66	11.34
29	12.09	11.95	11.69	11.52	---	11.51	11.76	11.70	12.37	12.24	11.71	11.27
30	12.14	11.94	11.67	11.52	---	11.50	11.76	11.81	12.36	12.21	11.63	11.26
31	12.10	---	11.66	11.53	---	11.50	---	11.91	---	12.23	11.59	---
MEAN	---	11.96	11.73	11.58	11.54	11.52	11.59	11.86	12.00	12.40	11.93	11.44
MAX	---	12.06	11.81	11.67	11.55	11.55	11.79	12.23	12.37	12.57	12.23	11.59
MIN	---	11.82	11.66	11.52	11.52	11.50	11.41	11.70	11.85	12.21	11.59	11.26

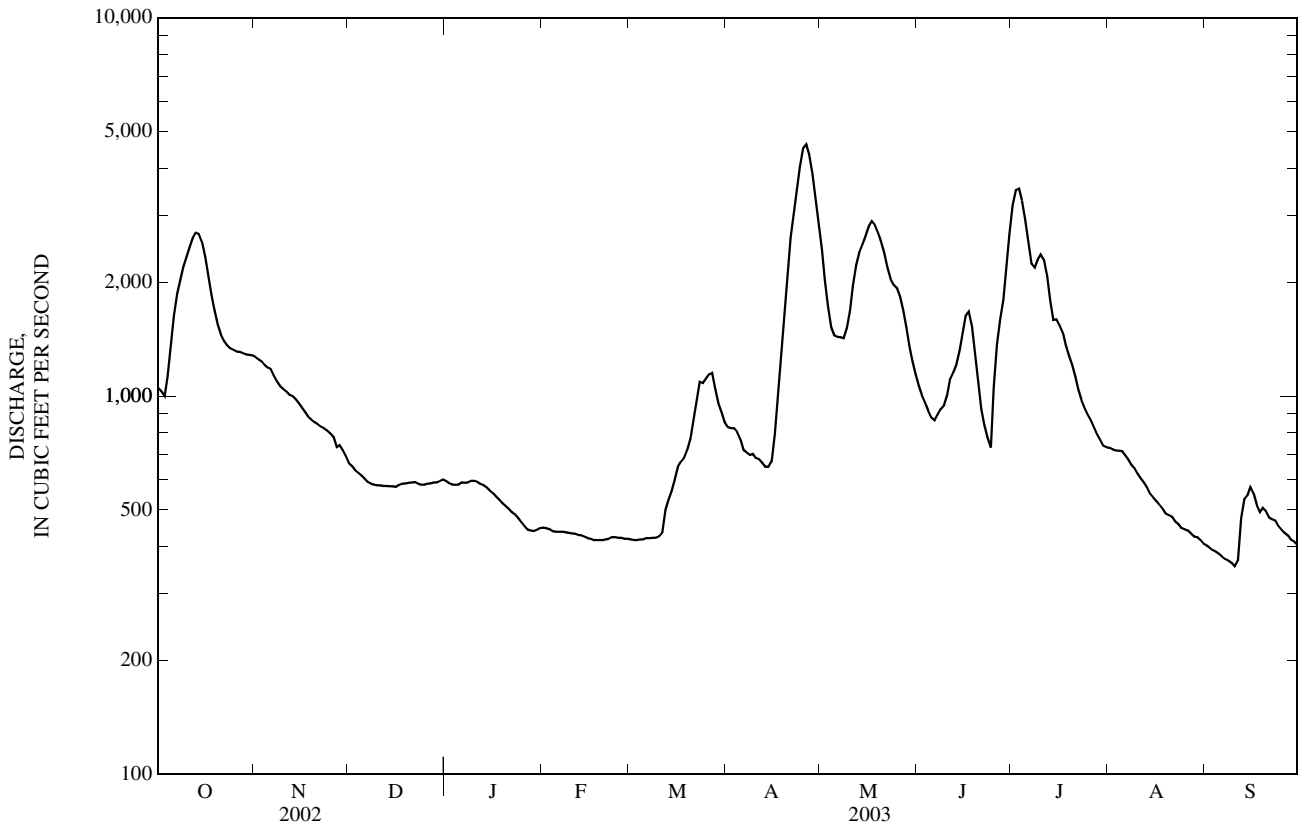
05284000 MILLE LACS LAKE AT COVE BAY NEAR ONAMIA, MN—Continued



05286000 RUM RIVER NEAR ST. FRANCIS, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1929 - 2003	
ANNUAL TOTAL	430,848		387,548		640	
ANNUAL MEAN	1,180		1,062		66.1	
HIGHEST ANNUAL MEAN					1,512	1986
LOWEST ANNUAL MEAN					66.1	1934
HIGHEST DAILY MEAN	6,110	Apr 17	4,620	Apr 26	10,000	Apr 13, 1969
LOWEST DAILY MEAN	146	Mar 15	354	Sep 10	30	Aug 3, 1934
ANNUAL SEVEN-DAY MINIMUM	216	Mar 14	368	Sep 5	31	Aug 1, 1934
MAXIMUM PEAK FLOW			4,660	Apr 26	a10,100	Apr 20, 1965
MAXIMUM PEAK STAGE			7.70	Apr 26	11.63	Apr 13, 1969
INSTANTANEOUS LOW FLOW			352	Sep 10	29	Aug 18, 1934
ANNUAL RUNOFF (AC-FT)	854,600		768,700		463,600	
ANNUAL RUNOFF (CFSM)	0.87		0.78		0.47	
ANNUAL RUNOFF (INCHES)	11.78		10.60		6.39	
10 PERCENT EXCEEDS	2,370		2,290		1,410	
50 PERCENT EXCEEDS	1,020		730		380	
90 PERCENT EXCEEDS	239		422		118	

a Also occurred Apr. 13, 1969.
 e Estimated.



05287890 ELM CREEK NEAR CHAMPLIN, MN

LOCATION.--Lat 45°09'48", long 93°26'11", in NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 35, T.120 N., R.22 W., Hennepin County, Hydrologic Unit 07010206, on left bank, 33 ft downstream from bridge on Elm Creek Road, 2.5 mi southwest of Champlin.

DRAINAGE AREA.--86.0 mi².

PERIOD OF RECORD.--October 1978 to current year.

REVISED RECORD.--WDR-MN-02-1: Maximum discharge; 1982, 85, 86, 94, 96, 97, and 99.

GAGE.--Water-stage recorder. Datum of gage is 850.70 ft above sea level (NGVD of 1929). Prior to March 16, 1979, nonrecording gage at present site and datum.

REMARKS.--Records good except those for estimated daily discharges, which are poor.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	54	94	e17	e5.4	e2.0	e0.82	46	74	e62	538	11	1.9
2	51	91	e15	e5.2	e1.7	e0.82	45	64	e52	471	10	1.9
3	48	90	e13	e5.0	e1.5	e0.83	42	54	e44	422	9.0	2.1
4	63	88	e12	e5.0	e1.4	e0.84	38	44	e40	377	8.2	2.0
5	91	85	e12	e5.0	e1.4	e0.83	33	45	e42	337	7.7	e1.9
6	128	83	e11	e4.9	e1.4	e0.80	33	47	39	301	7.4	1.9
7	174	81	e9.5	e4.9	e1.4	e0.78	30	46	43	264	6.9	e1.9
8	215	79	e8.8	e4.7	e1.6	e0.76	26	e42	40	227	6.2	e1.6
9	247	77	e9.0	e4.5	e1.8	e0.74	22	e64	39	186	5.7	1.4
10	261	75	e9.6	e3.7	e2.0	e0.76	21	e81	40	156	4.9	1.4
11	256	71	e9.8	e3.6	e2.4	e0.78	19	e123	38	135	4.5	1.9
12	249	64	e9.6	e3.3	e2.5	e0.82	17	e154	36	117	4.0	7.4
13	234	59	e9.6	e3.2	e2.5	e0.82	16	e171	35	99	3.9	e7.9
14	223	54	e9.6	e3.1	e1.5	e1.0	15	e205	34	87	3.7	e5.0
15	205	48	e9.4	e3.0	e1.3	e8.0	15	e212	30	80	3.1	e3.6
16	184	42	e9.4	e2.9	e1.3	e35	41	e203	26	71	3.1	e3.0
17	164	38	e9.4	e2.8	e1.2	55	85	e188	22	63	2.9	e2.8
18	149	35	e9.6	e2.7	e1.1	60	95	e159	20	55	2.7	e2.8
19	132	33	e9.8	e2.6	e1.0	64	127	e159	17	48	2.7	e3.2
20	118	30	e8.8	e2.3	e1.0	83	165	e221	14	42	3.1	e2.9
21	105	28	e8.6	e1.8	e1.0	94	206	e243	14	37	3.0	e2.6
22	98	e26	e8.6	e1.4	e0.99	96	219	e271	15	34	2.7	e2.2
23	93	e24	e8.8	e1.3	e0.98	93	214	e273	11	30	2.2	e1.9
24	87	e23	e8.8	e1.3	e0.93	86	193	e245	9.8	26	2.2	e1.7
25	87	e21	e8.4	e1.4	e0.87	78	162	e204	163	23	2.2	e1.6
26	95	e20	e7.8	e1.4	e0.86	70	141	e160	391	21	2.3	1.6
27	101	e19	e7.4	e1.4	e0.85	61	125	e134	543	19	2.1	1.7
28	104	e18	e6.8	e1.4	e0.84	57	111	e115	637	17	2.2	1.6
29	103	e18	e6.8	e1.4	---	54	99	e99	651	15	2.2	1.4
30	100	e17	e6.8	e1.4	---	51	86	e85	612	13	2.0	1.5
31	96	---	e6.9	e1.5	---	48	---	e73	---	12	1.9	---
TOTAL	4,315	1,531	297.6	93.5	39.32	1,104.40	2,487	4,258	3,759.8	4,323	135.7	76.3
MEAN	139	51.0	9.60	3.02	1.40	35.6	82.9	137	125	139	4.38	2.54
MAX	261	94	17	5.4	2.5	96	219	273	651	538	11	7.9
MIN	48	17	6.8	1.3	0.84	0.74	15	42	9.8	12	1.9	1.4
AC-FT	8,560	3,040	590	185	78	2,190	4,930	8,450	7,460	8,570	269	151
CFSM	1.62	0.59	0.11	0.04	0.02	0.41	0.96	1.60	1.46	1.62	0.05	0.03
IN.	1.87	0.66	0.13	0.04	0.02	0.48	1.08	1.84	1.63	1.87	0.06	0.03

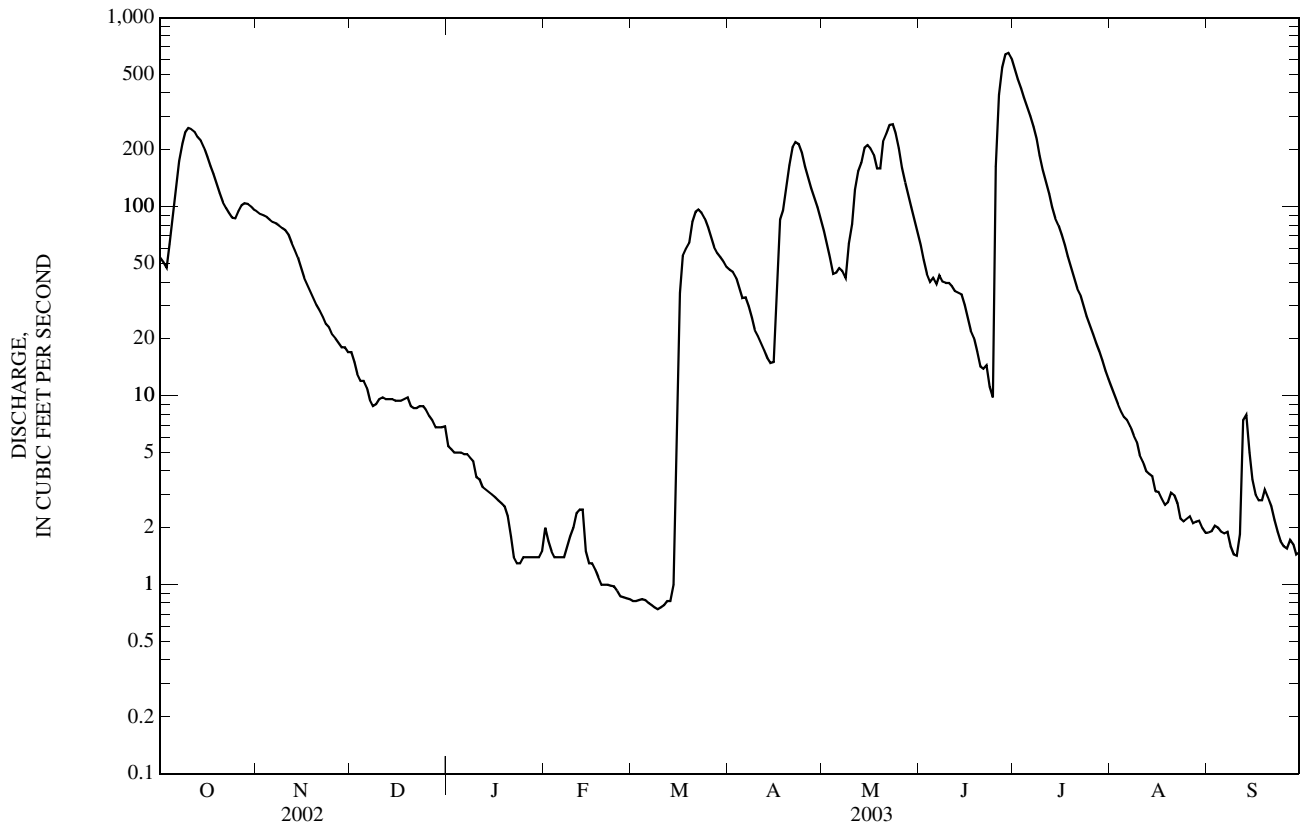
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1979 - 2003, BY WATER YEAR (WY)

MEAN	31.7	21.9	11.5	5.35	9.69	63.6	108	73.0	48.9	42.0	33.0	29.4
MAX	240	67.4	41.3	22.0	99.1	185	414	203	156	157	151	170
(WY)	(1986)	(1994)	(1992)	(1992)	(1984)	(1985)	(2001)	(2002)	(2002)	(1993)	(2002)	(1991)
MIN	1.13	1.03	0.92	0.74	0.91	3.86	5.31	3.54	1.34	0.76	1.44	1.08
(WY)	(1990)	(1990)	(1990)	(1991)	(1990)	(2001)	(1987)	(2000)	(1988)	(1988)	(1989)	(1988)

05287890 ELM CREEK NEAR CHAMPLIN, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1979 - 2003	
ANNUAL TOTAL	35,224.46		22,420.62		39.9	
ANNUAL MEAN	96.5		61.4		82.2	
HIGHEST ANNUAL MEAN					4.54	
LOWEST ANNUAL MEAN					815	
HIGHEST DAILY MEAN	531	May 11	651	Jun 29	Apr 25, 2001	
LOWEST DAILY MEAN	0.84	Feb 11	0.74	Mar 9	0.31	
ANNUAL SEVEN-DAY MINIMUM	0.86	Feb 8	0.78	Mar 6	0.35	
MAXIMUM PEAK FLOW			695		875	
MAXIMUM PEAK STAGE			9.69		10.02	
INSTANTANEOUS LOW FLOW					0.29	
ANNUAL RUNOFF (AC-FT)	69,870		44,470		28,900	
ANNUAL RUNOFF (CFSM)	1.12		0.71		0.46	
ANNUAL RUNOFF (INCHES)	15.24		9.70		6.30	
10 PERCENT EXCEEDS	237		185		111	
50 PERCENT EXCEEDS	71		18		12	
90 PERCENT EXCEEDS	3.0		1.4		1.9	

e Estimated.



UPPER MISSISSIPPI RIVER MAIN STEM--Continued
05287890 ELM CREEK NEAR CHAMPLIN, MN—Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--February 1988 to current year.

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Time	Sample type	Gage height, feet (00065)	Instantaneous discharge, cfs (00061)	Barometric pressure, mm Hg (00025)	Dissolved oxygen, mg/L (00300)	Dissolved oxygen, percent of saturation (00301)	pH, water, unfltrd field, std units (00400)	Specific conductance, wat unf 25 degC (00095)	Temperature, air, deg C (00020)	Temperature, water, deg C (00010)	Chloride, water, fltrd, mg/L (00940)
OCT 30...	1030	Environmental	6.24	100	748	9.3	74	7.7	438	5.0	4.5	30.8
NOV 14...	1030	Environmental	4.95	52	745	11.0	81	7.7	456	-2.0	1.6	34.2
DEC 31...	1010	Environmental	3.84	7.0	743	11.1	78	7.7	686	6.0	-0.2	42.2
JAN 16...	0930	Environmental	3.62	6.9	749	8.9	62	7.4	734	-8.0	-0.2	32.0
FEB 13...	1055	Environmental	3.38	2.5	746	9.2	64	7.6	709	1.0	-0.2	21.8
MAR 21...	1030	Environmental	5.72	92	734	10.2	73	7.5	424	2.0	0.2	57.7
APR 07...	1100	Environmental	4.42	30	750	11.7	87	7.8	512	7.0	2.0	54.5
APR 16-18	0123	Composite (time)	7.58	--	--	--	--	8.1	557	--	--	68.6
MAY 05...	1320	Environmental	4.78	44	730	8.8	82	7.8	574	10.0	10.1	56.0
MAY 11-12	0100	Composite (time)	7.08	--	--	--	--	7.2	526	--	--	59.8
JUN 20...	0920	Environmental	3.92	15	742	7.0	76	7.8	569	26.0	18.0	41.3
JUN 25-27	0100	Composite (time)	--	--	--	--	--	7.4	312	--	--	28.5
JUL 21...	0940	Environmental	4.60	37	739	5.2	61	7.3	451	22.0	21.1	30.1
AUG 04...	1220	Environmental	3.71	8.2	742	6.5	70	7.9	523	21.0	17.9	27.1
SEP 25...	1130	Environmental	3.42	3.5	745	7.6	69	7.7	660	12.0	9.5	19.2

Date	Residue total at 105 deg. C, suspended, mg/L (00530)	Residue volatile, suspended, mg/L (00535)	Ammonia + org-N, water, unfltrd mg/L as N (00625)	Ammonia water, fltrd, mg/L as N (00608)	Nitrite + nitrate water fltrd, mg/L as N (00631)	Nitrite water, fltrd, mg/L as N (00613)	Phosphorus, water, fltrd, mg/L (00666)	Phosphorus, water, unfltrd mg/L (00665)	COD, high level, water, unfltrd mg/L (00340)
OCT 30...	<10	<10	0.83	<0.04	0.32	0.009	0.05	0.06	20
NOV 14...	<10	<10	1.0	E.03	0.18	E.005	E.04	0.06	30
DEC 31...	<10	<10	0.99	0.19	0.13	E.004	E.03	0.09	20
JAN 16...	<10	<10	0.91	0.21	0.08	<0.008	E.02	0.06	20
FEB 13...	<10	<10	0.75	0.41	0.07	<0.008	E.03	E.04	--
MAR 21...	16	<10	4.0	1.51	1.54	0.086	0.35	0.51	60
APR 07...	15	<10	1.9	0.56	0.39	0.021	0.05	0.17	40
APR 16-18	24	--	1.7	<0.04	0.80	0.030	0.08	0.18	50
MAY 05...	<10	<10	1.4	0.09	E.04	E.006	0.07	0.14	40
MAY 11-12	29	--	1.4	E.04	0.49	0.013	0.08	0.16	50
JUN 20...	<10	<10	1.3	0.07	0.10	E.007	0.20	0.27	50
JUN 25-27	128	--	1.8	E.03	1.33	0.075	0.22	0.45	60
JUL 21...	14	<10	1.4	E.04	0.17	0.034	0.22	0.34	40
AUG 04...	<10	<10	1.1	<0.04	<0.06	<0.008	0.17	0.23	60
SEP 25...	<10	<10	0.53	0.04	E.04	E.004	0.05	0.11	20

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05288500 MISSISSIPPI RIVER NEAR ANOKA, MN

LOCATION.--Lat 45°07'36", long 93°17'48", in SW¹/₄ sec. 12, T.119 N., R.21 W., Hennepin County, Hydrologic Unit 07010206, on right bank 0.4 mi downstream from Coon Creek, 1.3 mi downstream from Coon Rapids dam at Coon Rapids, 6.5 mi downstream from Anoka, and at mile 864.8 upstream from Ohio River.

DRAINAGE AREA.--19,100 mi², approximately.

PERIOD OF RECORD.--June 1931 to current year. Prior to October 1931 published as "at Coon Rapids, near Anoka."

GAGE.--Water-stage recorder. Datum of gage is 804.53 ft above sea level (NGVD of 1929). Prior to June 14, 1932, at site 1.2 mi upstream at different datum.

REMARKS.--Records good except those for estimated days, which are fair. Flow slightly regulated by six reservoirs on headwaters; total usable capacity, 1,640,600 acre-ft. Diurnal regulation caused by Coon Rapids dam 1.3 mi. above station.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8,290	11,500	6,110	5,760	e3,800	3,530	7,020	14,400	11,900	28,600	7,960	2,910
2	7,790	11,200	6,910	5,590	e3,800	3,290	7,070	13,100	11,100	27,800	7,460	2,670
3	7,450	11,400	5,910	5,830	e3,600	3,220	6,840	12,200	10,700	27,500	7,330	2,550
4	8,410	10,800	5,740	5,690	e3,400	e3,100	7,030	11,500	10,100	28,000	7,050	2,700
5	9,960	10,800	e5,300	6,280	e3,300	e3,000	6,730	10,700	9,790	28,400	7,020	2,560
6	11,200	10,500	e5,800	5,790	e3,400	e3,050	5,820	10,800	9,780	26,800	6,890	2,710
7	12,700	10,500	e6,400	5,600	e3,500	e3,100	6,010	11,200	9,670	25,200	6,760	2,500
8	14,000	10,500	6,110	5,830	e3,600	3,160	6,390	11,000	9,340	24,600	6,520	2,510
9	15,000	10,100	e5,400	5,950	e3,700	3,030	6,220	12,000	9,390	23,300	6,290	3,040
10	16,100	10,000	e6,100	5,280	e3,700	3,440	5,950	13,000	9,880	22,000	6,040	2,570
11	15,600	10,100	e6,600	e4,400	e3,700	3,670	6,040	15,800	10,200	20,800	5,760	2,690
12	16,300	9,950	6,980	e4,500	e3,700	3,180	5,820	18,100	11,100	20,500	5,550	4,200
13	17,600	10,100	6,740	e4,600	e3,600	3,120	5,740	18,500	11,100	19,900	4,890	3,920
14	16,400	9,660	6,890	e4,650	e3,600	3,300	5,350	19,100	11,200	19,500	5,060	4,000
15	15,900	9,620	7,100	e4,700	e3,600	3,490	5,600	19,300	11,100	19,900	5,080	3,830
16	16,100	9,280	6,340	e4,600	e3,600	4,210	6,600	18,700	10,300	19,000	4,700	3,720
17	15,300	9,100	6,240	e4,600	e3,600	5,010	9,500	18,200	9,810	17,900	4,610	3,600
18	15,200	8,520	7,040	e4,500	e3,700	5,670	12,100	17,900	9,680	16,900	4,520	3,290
19	14,500	8,980	7,110	e4,400	e3,700	6,450	13,000	17,700	9,160	15,900	4,090	3,590
20	13,500	8,880	6,900	e4,400	e3,700	7,020	15,900	19,100	8,200	15,200	3,990	3,670
21	13,800	9,100	6,190	e4,300	e3,800	7,490	18,100	19,100	7,650	14,300	3,680	3,240
22	13,900	9,160	6,250	e4,100	e3,800	7,530	20,100	19,000	7,050	13,400	3,680	3,140
23	13,000	8,900	5,470	e3,900	e3,700	7,910	21,200	19,200	7,200	12,900	3,430	3,460
24	12,800	8,820	5,500	e3,800	e3,200	8,730	22,000	18,900	10,100	12,000	3,190	3,310
25	12,500	7,910	5,940	e4,000	e3,000	9,080	22,100	18,000	20,100	11,000	3,120	3,150
26	12,300	7,280	6,170	e4,100	e3,100	9,110	21,500	17,300	23,100	10,500	3,200	3,140
27	11,800	6,900	6,070	e4,000	e3,700	9,120	20,500	16,400	25,000	10,200	3,050	2,920
28	11,800	6,720	6,090	e4,000	4,080	8,960	19,100	15,300	26,600	9,460	3,070	3,050
29	11,600	6,860	6,210	e4,000	---	8,020	17,500	14,400	28,200	9,180	2,910	2,960
30	12,000	6,890	6,270	e3,900	---	7,690	16,000	13,700	29,200	8,410	2,800	2,980
31	11,700	---	5,700	e3,900	---	7,240	---	12,700	---	8,290	2,750	---
TOTAL	404,500	280,030	193,580	146,950	100,680	167,920	348,830	486,300	387,700	567,340	152,450	94,580
MEAN	13,050	9,334	6,245	4,740	3,596	5,417	11,630	15,690	12,920	18,300	4,918	3,153
MAX	17,600	11,500	7,110	6,280	4,080	9,120	22,100	19,300	29,200	28,600	7,960	4,200
MIN	7,450	6,720	5,300	3,800	3,000	3,000	5,350	10,700	7,050	8,290	2,750	2,500
AC-FT	802,300	555,400	384,000	291,500	199,700	333,100	691,900	964,600	769,000	1,125,000	302,400	187,600
CFSM	0.68	0.49	0.33	0.25	0.19	0.28	0.61	0.82	0.68	0.96	0.26	0.17
IN.	0.79	0.55	0.38	0.29	0.20	0.33	0.68	0.95	0.76	1.10	0.30	0.18

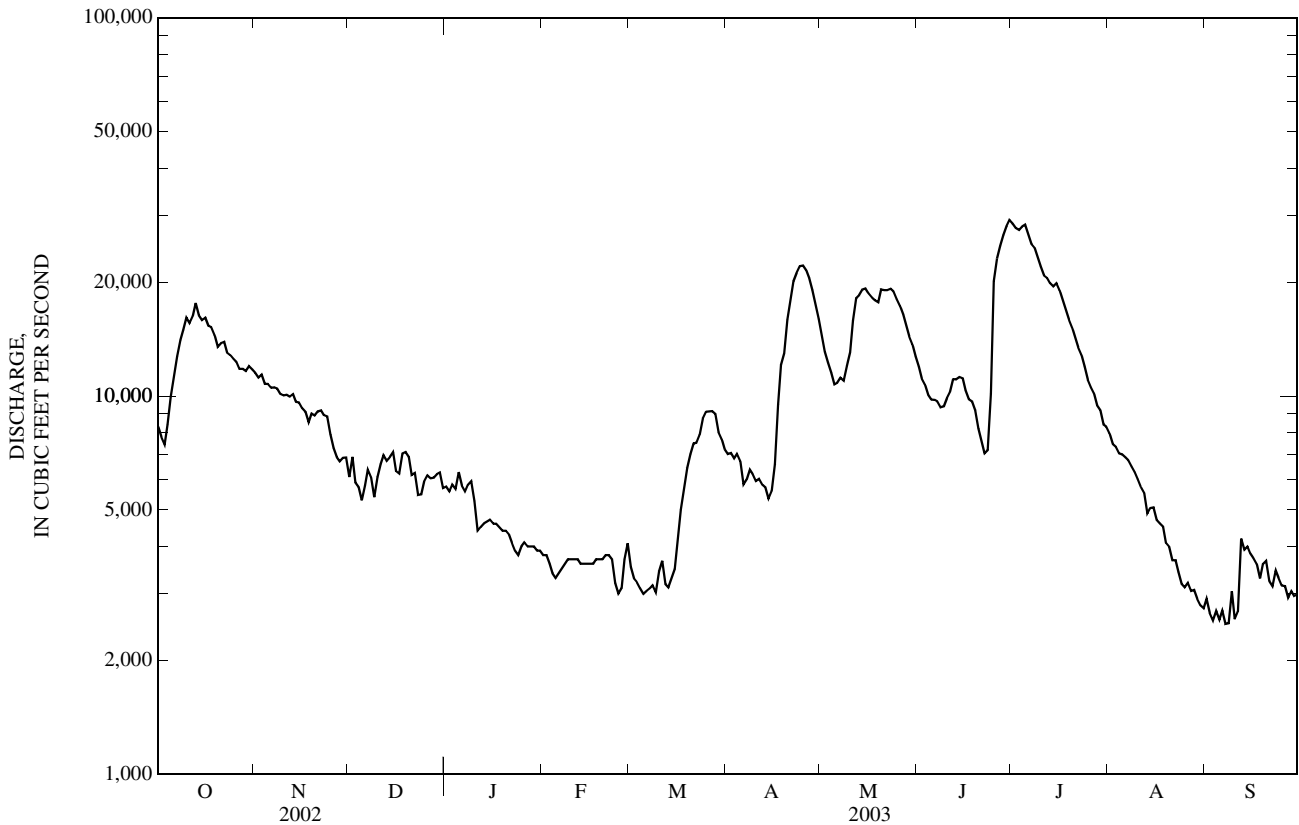
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 2003, BY WATER YEAR (WY)

MEAN	6,531	6,420	4,957	4,315	4,216	7,327	17,780	15,130	11,590	9,093	6,198	5,882
MAX	21,250	22,800	10,800	8,304	9,948	23,410	43,690	39,760	29,910	27,240	22,490	23,570
(WY)	(1987)	(1972)	(1972)	(1986)	(1966)	(1966)	(1997)	(1986)	(1943)	(1993)	(1972)	(1986)
MIN	1,128	1,152	1,006	935	1,079	1,602	3,575	2,796	1,646	1,022	715	888
(WY)	(1937)	(1937)	(1935)	(1935)	(1933)	(1940)	(1959)	(1934)	(1934)	(1934)	(1934)	(1934)

05288500 MISSISSIPPI RIVER NEAR ANOKA, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1931 - 2003	
ANNUAL TOTAL	4,125,110		3,330,860			
ANNUAL MEAN	11,300		9,126		8,318	
HIGHEST ANNUAL MEAN					17,750	1986
LOWEST ANNUAL MEAN					1,603	1934
HIGHEST DAILY MEAN	30,100	Jul 13	29,200	Jun 30	90,300	Apr 17, 1965
LOWEST DAILY MEAN	3,930	Mar 10	2,500	Sep 7	602	Sep 10, 1934
ANNUAL SEVEN-DAY MINIMUM	4,250	Mar 5	2,600	Sep 2	646	Aug 26, 1934
MAXIMUM PEAK FLOW			29,400	Jun 30	91,000	Apr 17, 1965
MAXIMUM PEAK STAGE			9.20	Jun 30	19.53	Apr 17, 1965
INSTANTANEOUS LOW FLOW			a2,070	Sep 10	a529	Aug 29, 1976
ANNUAL RUNOFF (AC-FT)	8,182,000		6,607,000		6,026,000	
ANNUAL RUNOFF (CFSM)	0.59		0.48		0.44	
ANNUAL RUNOFF (INCHES)	8.03		6.49		5.92	
10 PERCENT EXCEEDS	19,400		18,800		17,900	
50 PERCENT EXCEEDS	9,940		7,030		5,800	
90 PERCENT EXCEEDS	4,630		3,200		2,200	

a Due in part to regulation.
 e Estimated.



05288705 SHINGLE CREEK AT QUEEN AVE. IN MINNEAPOLIS, MN

LOCATION.-- Lat 45°03'00", long 93°18'36", in NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 11, T.118 N., R.21 W., Hennepin County, Hydrologic Unit 07010206, at bridge over Shingle Creek at intersection of Queen Avenue North and 52nd Avenue North in Minneapolis.

DRAINAGE AREA.-- 28.2 mi².

PERIOD OF RECORD.-- May 1996 to September 1999, May 2001 to current year.

GAGE.-- Water-stage recorder. Elevation of gage is 850 ft above sea level (from topographic map).

REMARKS.-- Records fair except those for estimated daily discharges, which are poor.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	13	15	7.2	4.8	e2.0	e16	12	13	17	102	8.8	e6.5
2	11	14	6.9	4.9	e2.1	e9.0	11	11	16	89	8.4	e6.8
3	10	13	6.3	4.8	e2.1	e5.0	11	10	14	102	11	e7.0
4	76	13	6.0	4.9	e2.0	e4.0	11	12	13	82	9.1	e7.6
5	72	12	5.9	4.8	e1.9	e3.6	9.4	26	14	65	9.1	7.7
6	80	12	5.8	4.6	e1.8	e3.4	8.5	23	27	51	8.5	7.7
7	70	12	5.9	4.9	e1.8	e3.5	9.0	16	38	40	5.4	7.5
8	64	11	5.4	5.2	e1.9	e3.7	10	14	32	33	5.4	7.1
9	53	11	5.3	4.7	e2.0	e3.6	9.5	51	25	35	5.5	7.3
10	58	10	5.7	4.1	e2.1	e4.0	7.7	48	e36	36	5.5	9.8
11	50	9.3	6.4	4.1	e2.2	e5.0	6.8	95	e33	38	7.2	14
12	52	8.8	7.7	4.2	e2.2	6.9	5.4	80	e35	38	4.4	61
13	45	8.7	8.9	4.0	e2.2	18	4.1	71	e29	33	3.6	38
14	40	8.4	8.6	4.1	e2.1	43	4.2	76	21	35	4.3	26
15	34	7.8	7.8	4.1	e2.1	60	7.2	64	14	49	4.6	18
16	29	7.5	6.7	4.1	e2.1	65	73	56	11	40	4.7	12
17	26	7.6	6.4	e4.1	e3.0	55	74	48	9.2	32	4.2	11
18	26	8.0	13	e4.2	e5.2	42	63	42	9.9	27	4.0	15
19	23	8.1	10	e4.1	e11	31	60	77	8.1	22	4.1	12
20	21	7.5	8.6	e3.5	e30	28	57	80	7.0	21	12	9.6
21	21	7.4	6.3	e2.8	e25	27	50	72	6.2	18	8.7	9.3
22	19	7.2	7.1	e2.2	e21	21	41	65	5.9	16	5.0	8.5
23	17	7.4	6.0	e1.6	e18	14	36	55	13	14	4.3	6.8
24	15	5.7	5.5	e1.6	e15	14	28	47	13	12	5.1	16
25	15	6.9	5.3	e1.7	e13	12	24	40	e230	12	5.1	13
26	14	7.0	5.1	e1.7	e13	10	22	35	171	11	5.0	10
27	12	6.8	5.2	e1.7	e14	14	21	31	155	9.8	4.9	5.8
28	13	6.8	5.4	e1.7	e15	23	18	27	140	8.7	e8.5	4.2
29	14	7.4	5.2	e1.8	---	21	17	23	125	7.6	e8.1	3.7
30	16	6.0	5.4	e1.8	---	20	14	24	112	6.8	e7.7	3.2
31	18	---	4.8	e1.9	---	15	---	20	---	9.0	e7.2	---
TOTAL	1,027	273.3	205.8	108.7	215.8	600.7	724.8	1,352	1,380.3	1,094.9	199.4	372.1
MEAN	33.1	9.11	6.64	3.51	7.71	19.4	24.2	43.6	46.0	35.3	6.43	12.4
MAX	80	15	13	5.2	30	65	74	95	230	102	12	61
MIN	10	5.7	4.8	1.6	1.8	3.4	4.1	10	5.9	6.8	3.6	3.2
AC-FT	2,040	542	408	216	428	1,190	1,440	2,680	2,740	2,170	396	738
CFSM	1.17	0.32	0.24	0.12	0.27	0.69	0.86	1.55	1.63	1.25	0.23	0.44
IN.	1.35	0.36	0.27	0.14	0.28	0.79	0.96	1.78	1.82	1.44	0.26	0.49

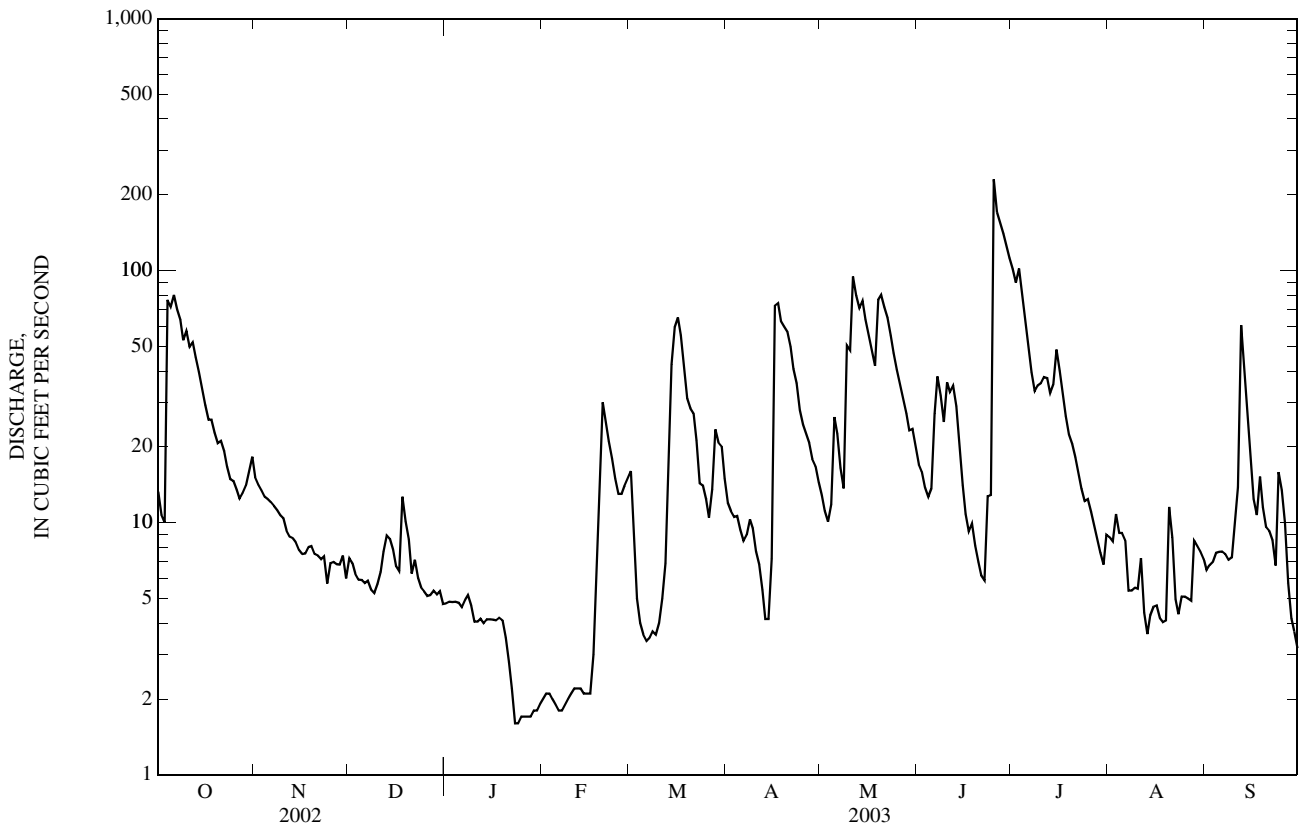
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1996 - 2003, BY WATER YEAR (WY)

MEAN	13.9	13.1	7.25	4.08	6.36	16.7	28.8	34.2	32.3	30.0	21.7	13.0
MAX	33.1	28.2	9.21	7.25	8.03	24.3	32.1	56.6	55.4	58.5	56.2	32.4
(WY)	(2003)	(1997)	(1997)	(1997)	(1998)	(1997)	(1998)	(2002)	(2002)	(2002)	(2002)	(2002)
MIN	4.46	5.22	3.99	2.49	3.97	12.4	24.2	13.3	7.47	7.92	5.04	2.92
(WY)	(2002)	(1998)	(1998)	(2002)	(2002)	(2002)	(2003)	(1997)	(1997)	(1996)	(1996)	(1996)

05288705 SHINGLE CREEK AT QUEEN AVE. IN MINNEAPOLIS, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1996 - 2003	
ANNUAL TOTAL	10,925.0		7,554.8			
ANNUAL MEAN	29.9		20.7		20.1	
HIGHEST ANNUAL MEAN					27.9	2002
LOWEST ANNUAL MEAN					12.1	1998
HIGHEST DAILY MEAN	135	May 9	230	Jun 25	230	Jun 25, 2003
LOWEST DAILY MEAN	1.7	Jan 29	a1.6	Jan 23	b0.13	Oct 13, 1996
ANNUAL SEVEN-DAY MINIMUM	1.8	Jan 29	1.7	Jan 23	0.14	Oct 8, 1996
MAXIMUM PEAK FLOW			c230	Jun 25	230	Jun 25, 2003
MAXIMUM PEAK STAGE			14.21	Jun 25	14.21	Jun 25, 2003
INSTANTANEOUS LOW FLOW			a1.6	Jan 23	b0.11	Oct 11, 1996
ANNUAL RUNOFF (AC-FT)	21,670		14,980		14,550	
ANNUAL RUNOFF (CFSM)	1.06		0.73		0.71	
ANNUAL RUNOFF (INCHES)	14.41		9.97		9.68	
10 PERCENT EXCEEDS	75		55		53	
50 PERCENT EXCEEDS	21		10		9.9	
90 PERCENT EXCEEDS	2.6		3.7		2.8	

- a Daily mean, backwater from ice.
- b Minimum observed.
- c Maximum daily.
- e Estimated.



05288705 SHINGLE CREEK AT QUEEN AVE. IN MINNEAPOLIS, MN—Continued
(National Water-Quality Assessment Program)

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1996 to current year.

PERIOD OF DAILY RECORD:

WATER TEMPERATURES.-- May 1996 to September 30, 1998.

SPECIFIC CONDUCTANCE.-- May 1996 to September 30, 1998.

REVISED RECORDS.--WDR MN-96-1: Specific conductance.

REMARKS. -- Additional water quality data for this site are available at: URL <http://water/usgs.gov/mn/nwis/qw>.

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Time	Sample type	Instantaneous discharge, cfs (00061)	Barometric pressure, mm Hg (00025)	Dissolved oxygen, mg/L (00300)	Dissolved oxygen, percent of saturation (00301)	pH, water, unfltrd field, std units (00400)	Specific conductance, wat unf uS/cm 25 degC (00095)	Temperature, air, deg C (00020)	Temperature, water, deg C (00010)	Alkalinity, wat flt inc tit field, mg/L as CaCO3 (39086)	Bicarbonate, wat flt incrm. titr., field, mg/L (00453)
OCT												
09...	0930	Environmental	53	748	8.4	74	7.3	486	5.0	8.2	122	149
NOV												
14...	0945	Environmental	8.6	742	10.7	80	7.6	1,160	-1.0	1.9	256	312
DEC												
30...	0925	Environmental	5.1	729	11.0	79	7.5	1,330	7.0	0.8	282	344
30...	0930	Replicate	--	--	--	--	--	--	--	--	--	--
JAN												
13...	1135	Environmental	3.5	750	12.6	90	7.6	1,630	-12.0	0.3	339	414
FEB												
11...	1010	Blank	--	--	--	--	--	--	--	--	--	--
11...	1015	Environmental	2.2	734	7.1	51	7.3	1,810	-5.0	0.0	302	370
APR												
10...	1010	Environmental	7.3	744	12.1	103	7.9	1,040	14.0	7.5	204	249
MAY												
08...	1000	Environmental	14	743	7.6	78	7.4	977	17.0	15.3	189	231
08...	1005	Spike	--	--	--	--	--	--	--	--	--	--
JUN												
18...	0940	Environmental	11	738	4.2	51	7.5	1,070	25.0	23.5	231	282
JUL												
23...	0935	Environmental	14	747	5.2	59	7.3	992	20.0	19.9	201	245
23...	0940	Replicate	--	--	--	--	--	--	--	--	--	--
AUG												
05...	1005	Environmental	8.0	742	5.2	61	7.1	1,140	20.0	21.0	230	281
SEP												
23...	1130	Environmental	6.4	738	7.0	69	7.3	1,050	16.0	12.5	250	305

05288705 SHINGLE CREEK AT QUEEN AVE. IN MINNEAPOLIS, MN—Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Carbonate, wat flt incrm. titr., field, mg/L (00452)	Chloride, water, fltrd, mg/L (00940)	Sulfate water, fltrd, mg/L (00945)	Ammonia + org-N, water, unfltrd mg/L as N (00625)	Ammonia water, fltrd, mg/L as N (00608)	Nitrite + nitrate water fltrd, mg/L as N (00631)	Nitrite water, fltrd, mg/L as N (00613)	Ortho-phosphate, water, fltrd, mg/L as P (00671)	Phosphorus, water, unfltrd mg/L (00665)	2,6-Diethyl-aniline water fltrd 0.7u GF ug/L (82660)	CIAT, water, fltrd, ug/L (04040)	Acetochlor, water, fltrd, ug/L (49260)	Alachlor, water, fltrd, ug/L (46342)
OCT 09...	0.0	57.0	25.7	0.70	0.06	0.24	0.012	<0.02	0.058	<0.006	E.009	<0.006	<0.004
NOV 14...	0.0	161	107	0.83	0.18	0.65	0.023	<0.02	0.078	--	--	--	--
DEC 30...	0.0	191	122	0.77	0.30	0.80	0.017	<0.02	0.043	--	--	--	--
DEC 30...	--	187	120	0.69	0.30	0.79	0.017	<0.02	0.042	--	--	--	--
JAN 13...	0.0	228	146	0.81	0.32	1.02	0.016	<0.020	0.036	--	--	--	--
FEB 11...	--	--	--	--	--	--	--	--	--	--	--	--	--
FEB 11...	0.0	325	122	1.2	0.64	0.79	0.018	<0.02	0.040	<0.006	<0.006	<0.006	<0.004
APR 10...	0.0	156	89.1	0.56	0.04	0.14	E.007	<0.02	0.095	<0.006	E.006	<0.006	<0.004
MAY 08...	0.0	150	63.4	1.3	0.07	0.18	0.013	<0.02	0.121	<0.006	E.013	0.046	<0.004
MAY 08...	--	--	--	--	--	--	--	--	--	0.110	E.063	0.163	0.095
JUN 18...	0.0	152	67.5	1.3	0.23	0.25	0.047	<0.02	0.107	<0.006	E.028	0.013	<0.004
JUL 23...	0.0	133	80.1	0.85	0.05	0.50	0.044	<0.02	0.087	<0.006	E.009	<0.006	<0.004
JUL 23...	--	--	--	--	--	--	--	--	--	<0.006	E.009	<0.006	<0.004
AUG 05...	0.0	169	85.4	0.82	<0.04	0.46	0.013	0.07	0.151	<0.006	E.005	<0.006	<0.004
SEP 23...	0.0	154	56.7	0.47	0.12	0.13	0.019	<0.02	0.050	<0.006	<0.006	<0.006	<0.004

Date	alpha-HCH, water, fltrd, ug/L (34253)	Atrazine, water, fltrd, ug/L (39632)	Azin-phos-methyl, water, fltrd 0.7u GF ug/L (82686)	Ben-flur-alin, water, fltrd 0.7u GF ug/L (82673)	Butyl-ate, water, fltrd, ug/L (04028)	Car-baryl, water, fltrd 0.7u GF ug/L (82680)	Carbo-furan, water, fltrd 0.7u GF ug/L (82674)	Chlor-pyri-fos water, fltrd, ug/L (38933)	cis-Per-methrin water fltrd 0.7u GF ug/L (82687)	Cyana-zine, water, fltrd, ug/L (04041)	DCPA, water fltrd 0.7u GF ug/L (82682)	Desulf-inyl fipro-nil, water, fltrd, ug/L (62170)	Diazi-non, water, fltrd, ug/L (39572)
OCT 09...	<0.005	0.028	<0.050	<0.010	<0.002	<0.041	<0.020	<0.005	<0.006	<0.018	<0.003	<0.004	0.007
NOV 14...	--	--	--	--	--	--	--	--	--	--	--	--	--
DEC 30...	--	--	--	--	--	--	--	--	--	--	--	--	--
DEC 30...	--	--	--	--	--	--	--	--	--	--	--	--	--
JAN 13...	--	--	--	--	--	--	--	--	--	--	--	--	--
FEB 11...	--	--	--	--	--	--	--	--	--	--	--	--	--
FEB 11...	<0.005	<0.007	<0.050	<0.010	<0.002	<0.041	<0.020	<0.005	<0.006	<0.018	<0.003	<0.004	<0.005
APR 10...	<0.005	0.016	<0.050	<0.010	<0.002	E.018	<0.020	<0.005	<0.006	<0.018	<0.003	<0.004	<0.005
MAY 08...	<0.005	0.060	<0.050	<0.010	<0.002	E.020	<0.020	<0.005	<0.006	<0.018	<0.003	<0.004	0.021
MAY 08...	0.096	0.172	E.163	0.095	0.129	E.164	E.162	0.088	0.071	0.138	0.106	<0.004	0.131
JUN 18...	<0.005	0.108	<0.050	<0.010	<0.002	E.058	<0.020	<0.005	<0.006	<0.018	E.002	<0.004	0.039
JUL 23...	<0.005	0.024	<0.050	<0.010	<0.002	E.019	<0.020	<0.005	<0.006	<0.018	<0.003	<0.004	0.009
JUL 23...	<0.005	0.025	<0.050	<0.010	<0.002	E.021	<0.020	<0.005	<0.006	<0.018	<0.003	<0.004	0.010
AUG 05...	<0.005	0.009	<0.050	<0.010	<0.002	E.011	<0.020	<0.005	<0.006	<0.018	<0.003	<0.004	0.015
SEP 23...	<0.005	<0.007	<0.050	<0.010	<0.002	E.015	<0.020	<0.005	<0.006	<0.018	<0.003	<0.004	0.011

05288705 SHINGLE CREEK AT QUEEN AVE. IN MINNEAPOLIS, MN—Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Dieldrin, water, fltrd, ug/L (39381)	Disulfoton, water, fltrd, 0.7u GF ug/L (82677)	EPTC, water, fltrd, 0.7u GF ug/L (82668)	Ethalfuralin, water, fltrd, 0.7u GF ug/L (82663)	Ethoprop, water, fltrd, 0.7u GF ug/L (82672)	Desulfinylfipronil amide, wat flt ug/L (62169)	Fipronil sulfide water, fltrd, ug/L (62167)	Fipronil sulfone water, fltrd, ug/L (62168)	Fipronil, water, fltrd, ug/L (62166)	Fonofos water, fltrd, ug/L (04095)	Lindane water, fltrd, ug/L (39341)	Linuron water fltrd, 0.7u GF ug/L (82666)	Malathion, water, fltrd, ug/L (39532)
OCT 09...	<0.005	<0.02	<0.002	<0.009	<0.005	<0.009	<0.005	<0.005	<0.007	<0.003	<0.004	<0.035	<0.027
NOV 14...	--	--	--	--	--	--	--	--	--	--	--	--	--
DEC 30...	--	--	--	--	--	--	--	--	--	--	--	--	--
DEC 30...	--	--	--	--	--	--	--	--	--	--	--	--	--
JAN 13...	--	--	--	--	--	--	--	--	--	--	--	--	--
FEB 11...	--	--	--	--	--	--	--	--	--	--	--	--	--
FEB 11...	<0.005	<0.02	<0.002	<0.009	<0.005	<0.009	<0.005	<0.005	<0.007	<0.003	<0.004	<0.035	<0.027
APR 10...	<0.005	<0.02	<0.002	<0.009	<0.005	<0.009	<0.005	<0.005	<0.007	<0.003	<0.004	<0.035	<0.027
MAY 08...	<0.005	<0.02	<0.045	<0.009	<0.005	<0.009	<0.005	<0.005	<0.007	<0.003	<0.004	<0.035	<0.027
MAY 08...	0.106	0.07	0.109	0.129	0.145	<0.009	<0.005	<0.005	<0.007	0.075	0.105	0.095	0.143
JUN 18...	<0.005	<0.02	<0.020	<0.009	<0.005	<0.009	<0.005	<0.005	<0.007	<0.003	<0.004	<0.035	<0.027
JUL 23...	<0.005	<0.02	<0.020	<0.009	<0.005	<0.009	<0.005	<0.005	<0.007	<0.003	<0.004	<0.035	<0.027
JUL 23...	<0.005	<0.02	<0.010	<0.009	<0.005	<0.009	<0.005	<0.005	<0.007	<0.003	<0.004	<0.035	<0.027
AUG 05...	<0.005	<0.02	<0.002	<0.009	<0.005	<0.009	<0.005	<0.005	<0.007	<0.003	<0.004	<0.035	E.008
SEP 23...	<0.005	<0.02	<0.002	<0.009	<0.005	<0.009	<0.005	<0.005	<0.007	<0.003	<0.004	<0.035	<0.027

Date	Methyl parathion, water, fltrd, 0.7u GF ug/L (82667)	Metolachlor, water, fltrd, ug/L (39415)	Metribuzin, water, fltrd, ug/L (82630)	Molinate, water, fltrd, 0.7u GF ug/L (82671)	Napropamide, water, fltrd, 0.7u GF ug/L (82684)	p,p'-DDE, water, fltrd, ug/L (34653)	Parathion, water, fltrd, ug/L (39542)	Pebulate, water, fltrd, 0.7u GF ug/L (82669)	Pendimethalin, water, fltrd, 0.7u GF ug/L (82683)	Phorate water fltrd, 0.7u GF ug/L (82664)	Prometon, water, fltrd, ug/L (04037)	Pronamide, water, fltrd, 0.7u GF ug/L (82676)	Propachlor, water, fltrd, ug/L (04024)
OCT 09...	<0.006	E.006	<0.006	<0.002	<0.007	<0.003	<0.010	<0.004	<0.022	<0.011	0.04	<0.004	<0.010
NOV 14...	--	--	--	--	--	--	--	--	--	--	--	--	--
DEC 30...	--	--	--	--	--	--	--	--	--	--	--	--	--
DEC 30...	--	--	--	--	--	--	--	--	--	--	--	--	--
JAN 13...	--	--	--	--	--	--	--	--	--	--	--	--	--
FEB 11...	--	--	--	--	--	--	--	--	--	--	--	--	--
FEB 11...	<0.006	<0.013	<0.006	<0.002	<0.007	<0.003	<0.010	<0.004	<0.022	<0.011	0.02	<0.004	<0.010
APR 10...	<0.006	<0.013	<0.006	<0.002	<0.007	<0.003	<0.010	<0.004	<0.022	<0.011	0.02	<0.004	<0.010
MAY 08...	<0.006	0.023	<0.006	<0.002	<0.007	<0.003	<0.010	<0.004	<0.022	<0.011	0.03	<0.004	<0.010
MAY 08...	0.116	0.141	0.138	0.105	0.120	0.064	0.135	0.098	0.134	0.107	0.17	0.126	0.126
JUN 18...	<0.006	E.007	<0.006	<0.002	<0.007	<0.003	<0.010	<0.004	<0.022	<0.011	0.03	<0.004	<0.010
JUL 23...	<0.006	<0.013	<0.006	<0.002	<0.007	<0.003	<0.010	<0.004	<0.022	<0.011	0.03	<0.004	<0.010
JUL 23...	<0.006	E.004	<0.006	<0.002	<0.007	<0.003	<0.010	<0.004	<0.022	<0.011	0.03	<0.004	<0.010
AUG 05...	<0.006	0.014	<0.006	<0.002	<0.007	<0.003	<0.010	<0.004	<0.022	<0.011	0.04	<0.004	<0.010
SEP 23...	<0.006	<0.013	<0.006	<0.002	<0.007	<0.003	<0.010	<0.004	<0.022	<0.011	E.01	<0.004	<0.010

05288705 SHINGLE CREEK AT QUEEN AVE. IN MINNEAPOLIS, MN—Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Pro-panil, water, fltrd 0.7u GF ug/L (82679)	Propar-gite, water, fltrd 0.7u GF ug/L (82685)	Sima-zine, water, fltrd, ug/L (04035)	Tebu-thiuron water fltrd 0.7u GF ug/L (82670)	Terba-cil, water, fltrd 0.7u GF ug/L (82665)	Terbu-fos, water, fltrd 0.7u GF ug/L (82675)	Thio-bencarb water fltrd 0.7u GF ug/L (82681)	Tri-allate, water, fltrd 0.7u GF ug/L (82678)	Tri-flur-alin, water, fltrd 0.7u GF ug/L (82661)	Sus-pended sediment concentration mg/L (80154)
OCT 09...	<0.011	<0.02	<0.005	<0.02	<0.034	<0.02	<0.005	<0.002	<0.009	8
NOV 14...	--	--	--	--	--	--	--	--	--	88
DEC 30...	--	--	--	--	--	--	--	--	--	79
JAN 30...	--	--	--	--	--	--	--	--	--	45
JAN 13...	--	--	--	--	--	--	--	--	--	62
FEB 11...	--	--	--	--	--	--	--	--	--	1
FEB 11...	<0.011	<0.02	<0.005	0.02	<0.034	<0.02	<0.005	<0.002	<0.009	59
APR 10...	<0.011	<0.02	<0.005	<0.02	<0.034	<0.02	<0.005	<0.002	<0.009	38
MAY 08...	<0.011	<0.02	<0.005	<0.02	<0.034	<0.02	<0.005	<0.002	<0.009	19
MAY 08...	0.115	0.15	0.111	E.17	E.128	0.08	0.121	0.110	0.088	--
JUN 18...	<0.011	<0.02	<0.005	0.02	<0.034	<0.02	<0.005	<0.002	<0.009	71
JUL 23...	<0.011	<0.02	<0.005	E.01	<0.034	<0.02	<0.005	<0.002	<0.009	63
JUL 23...	<0.011	<0.02	<0.005	E.01	<0.034	<0.02	<0.005	<0.002	<0.009	--
AUG 05...	<0.011	<0.02	<0.005	E.02	<0.034	<0.02	<0.005	<0.002	<0.009	79
SEP 23...	<0.011	<0.02	<0.005	E.01	<0.034	<0.02	<0.005	<0.002	<0.009	19

05291000 WHETSTONE RIVER NEAR BIG STONE CITY, SD

LOCATION.--Lat 45°17'30", long 96°29'14", in SE¼NW¼ sec. 18, T.121 N., R.46 W., Grant County, Hydrologic Unit 07020001, on right bank 20 ft downstream from former highway bridge site, 1.5 mi west of Big Stone City, S.D., and 4.5 mi upstream from Big Stone Lake.

DRAINAGE AREA.--398 mi².

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

REVISED RECORDS.--WSP 895: Drainage area. WSP 1308: 1932(M), 1935(M).

GAGE.--Water-stage recorder. Datum of gage is 996.96 ft in sea level (NGVD of 1912). Mar. 8, 1910 to Nov. 30, 1912, nonrecording gage 2 mi downstream at different datum. Mar. 18, 1931 to May 3, 1939, nonrecording gage, at site 20 ft upstream at present datum. May 4, 1939 to Nov. 8, 1952, water-stage recorder at site 80 ft down-stream at present datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair to poor.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage known, about 26 ft in June 1919, present site and datum, from information by local resident, discharge 29,000 ft³/s, from dam break.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 230 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Mar 17	1000	*e325	*5.19	No other peak greater than base discharge.			

Minimum discharge (daily), e1.6 ft³/s, Sept. 9.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.7	14	e13	e9.1	e7.4	e4.5	e37	28	21	32	6.4	e2.3
2	5.2	12	11	e9.0	e7.5	e4.4	e37	27	20	26	6.2	e2.3
3	5.3	12	e11	e8.9	e7.3	e4.3	e36	26	19	22	5.9	e2.2
4	11	12	e11	e8.8	e7.2	e4.2	e36	24	19	20	5.8	e2.1
5	13	12	e10	e8.6	e6.9	e4.2	e34	26	19	18	5.5	e2.0
6	12	12	e10	e8.5	e6.7	e4.1	e31	27	20	16	5.4	e2.0
7	11	12	e10	e8.4	e6.6	e4.1	e28	27	22	14	5.4	e1.9
8	9.7	12	e10	e8.4	e6.4	e4.0	e26	30	34	12	5.0	e1.8
9	9.0	11	e11	e8.4	e6.2	e3.9	e24	41	33	13	e4.9	e1.6
10	9.5	13	e12	e8.4	e6.0	e3.9	e22	53	32	12	e4.9	e1.8
11	9.1	13	e12	e8.4	e5.8	e3.8	e21	99	31	11	e4.6	e2.0
12	8.9	12	e11	e8.2	e5.6	e3.8	e20	101	28	10	e3.7	e1.9
13	7.6	12	e11	e8.0	e5.5	e3.8	e20	79	25	8.8	e3.2	e1.7
14	7.1	12	e11	e7.8	e5.5	e19	e20	76	24	8.1	e2.9	e1.9
15	8.4	12	e11	e7.5	e5.4	e73	e21	75	21	7.5	e2.7	e2.1
16	8.6	13	e11	e7.3	e5.4	e174	e24	87	18	7.0	e2.5	e2.0
17	8.7	12	e11	e7.1	e5.4	e325	e30	77	16	7.4	e2.2	e1.9
18	9.4	11	e11	e6.9	e5.4	e231	e41	61	14	8.6	e2.1	e2.6
19	9.0	12	e11	e6.8	e5.5	e143	e55	67	13	7.3	e2.2	e3.4
20	9.0	12	e11	e6.6	e5.8	e87	70	54	10	13	e2.3	e3.1
21	9.5	12	e11	e6.4	e5.8	e73	85	44	8.6	20	e2.5	e3.9
22	9.7	12	e10	e6.1	e5.6	e69	72	40	8.9	28	e2.7	e4.1
23	9.6	12	e10	e5.8	e5.3	e73	57	38	8.6	33	e2.5	e4.4
24	9.7	11	e10	e5.6	e5.1	e66	48	36	9.4	25	e2.1	e3.9
25	9.7	12	e9.6	e5.5	e5.0	e61	41	35	18	20	e1.8	e3.4
26	9.1	11	e9.3	e5.6	e4.8	e57	36	33	116	15	e1.7	e2.8
27	9.5	11	e9.3	e6.0	e4.7	e53	33	32	195	12	e1.7	e2.6
28	11	11	e9.6	e6.4	e4.6	e48	31	31	122	10	e2.5	e2.5
29	9.5	11	e9.6	e6.6	---	e43	27	28	63	8.6	e2.7	e2.9
30	9.7	10	e9.4	e6.9	---	e39	28	25	43	7.2	e2.4	2.9
31	11	---	e9.3	e7.2	---	e38	---	24	---	6.4	e2.3	---
TOTAL	285.2	356	327.1	229.2	164.4	1,725.0	1,091	1,451	1,031.5	458.9	108.7	76.0
MEAN	9.20	11.9	10.6	7.39	5.87	55.6	36.4	46.8	34.4	14.8	3.51	2.53
MAX	13	14	13	9.1	7.5	325	85	101	195	33	6.4	4.4
MIN	5.2	10	9.3	5.5	4.6	3.8	20	24	8.6	6.4	1.7	1.6
AC-FT	566	706	649	455	326	3,420	2,160	2,880	2,050	910	216	151
CFSM	0.02	0.03	0.03	0.02	0.01	0.14	0.09	0.12	0.09	0.04	0.01	0.01
IN.	0.03	0.03	0.03	0.02	0.02	0.16	0.10	0.14	0.10	0.04	0.01	0.01

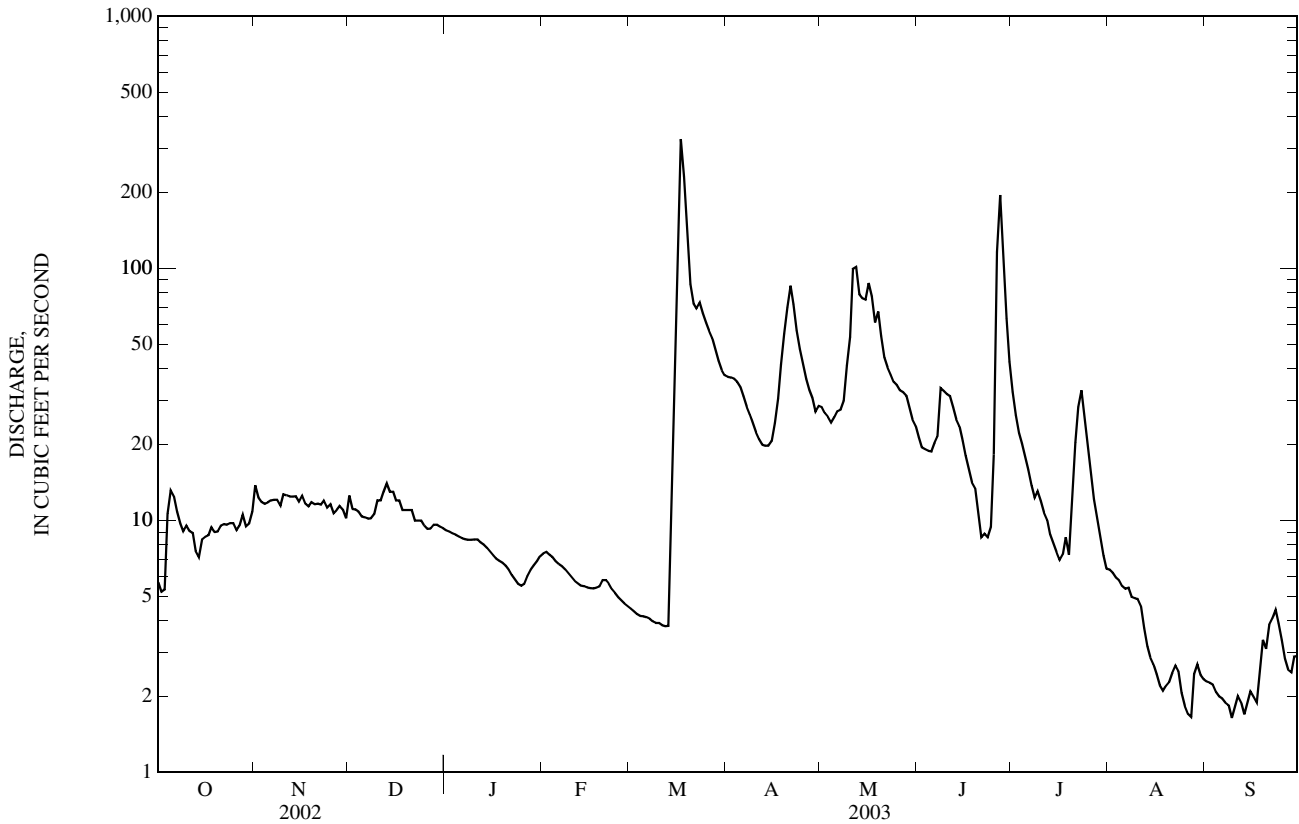
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1910 - 2003, BY WATER YEAR (WY)

MEAN	14.7	14.8	10.0	6.63	15.2	155	222	92.9	78.7	56.8	19.4	10.3
MAX	280	122	56.0	36.3	168	612	1,677	491	478	885	327	77.0
(WY)	(1996)	(1996)	(1999)	(1994)	(1998)	(1978)	(1997)	(1972)	(1984)	(1993)	(1991)	(1995)
MIN	0.60	0.40	0.20	0.000	0.000	2.85	3.63	0.77	1.42	0.035	0.000	0.36
(WY)	(1932)	(1935)	(1935)	(1934)	(1934)	(1969)	(1934)	(1934)	(1936)	(1934)	(1934)	(1935)

05291000 WHETSTONE RIVER NEAR BIG STONE CITY, SD—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1910 - 2003	
ANNUAL TOTAL	14,740.2		7,304.0		a59.6	
ANNUAL MEAN	40.4		20.0		232	
HIGHEST ANNUAL MEAN					1.52	
LOWEST ANNUAL MEAN					1934	
HIGHEST DAILY MEAN	1,080	Mar 30	325	Mar 17	8,090	Apr 8, 2001
LOWEST DAILY MEAN	4.3	Sep 24	1.6	Sep 9	b0.00	Sep 13, 1931
ANNUAL SEVEN-DAY MINIMUM	4.6	Sep 19	1.8	Sep 7	0.00	Jul 31, 1933
MAXIMUM PEAK FLOW			c325	Mar 17	9,930	Apr 8, 2001
MAXIMUM PEAK STAGE			d5.19	Mar 17	15.93	Apr 8, 2001
INSTANTANEOUS LOW FLOW			f1.6	Sep 9	b0.00	Sep 13, 1931
ANNUAL RUNOFF (AC-FT)	29,240		14,490		43,210	
ANNUAL RUNOFF (CFSM)	0.10		0.050		0.15	
ANNUAL RUNOFF (INCHES)	1.38		0.68		2.04	
10 PERCENT EXCEEDS	89		43		110	
50 PERCENT EXCEEDS	18		10		9.0	
90 PERCENT EXCEEDS	8.3		2.7		1.5	

- a Median of annual mean discharges is 44 ft³/s.
- b Many days, several years.
- c Estimated, maximum daily.
- d Backwater from ice.
- e Estimated.
- f Minimum daily discharge, backwater from beaver dam.



05292000 MINNESOTA RIVER AT ORTONVILLE, MN

LOCATION.--Lat 45°17'44", long 96°26'38", in NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 16, T.121 N., R.46 W., Big Stone County, Hydrologic Unit 07020001, on left bank 400 ft downstream from bridge on U.S. Highway 12 and 1,300 ft downstream from dam at outlet of Big Stone Lake, at Ortonville.

DRAINAGE AREA.--1,160 mi² (approximately).

PERIOD OF RECORD.--February 1938 to current year.

REVISED RECORDS.--WSP 895: 1939. WSP 1508: 1942 (yearly mean).

GAGE.--Water-stage recorder. Datum of gage is 956.38 ft above sea level (NGVD of 1929). Prior to Mar. 31, 1939, nonrecording gage on downstream side of dam 1,300 ft upstream at datum 1.31 ft higher.

REMARKS.--Records good. Affected by regulation of Big Stone Lake.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.5	32	42	45	42	43	29	28	224	561	36	33
2	2.2	32	42	45	43	44	29	28	157	518	36	33
3	1.7	32	42	45	43	43	29	27	111	530	36	32
4	3.7	30	42	45	42	43	29	27	111	445	36	31
5	0.88	31	42	44	43	43	29	29	62	351	36	31
6	1.2	30	43	44	43	43	29	29	22	316	37	30
7	1.0	70	42	44	43	43	29	29	22	299	37	30
8	1.3	60	42	41	43	43	29	28	22	296	37	29
9	16	59	44	38	43	43	29	30	23	300	37	29
10	28	62	44	65	43	44	28	30	25	301	35	26
11	28	56	44	38	44	44	28	32	24	297	35	27
12	30	55	44	38	44	44	28	28	24	292	35	27
13	29	53	44	39	44	44	27	28	24	247	36	26
14	30	52	44	40	44	45	28	38	24	142	36	25
15	38	52	44	40	44	47	28	28	24	78	37	24
16	40	52	44	40	44	43	28	27	24	26	38	23
17	40	52	44	40	43	118	28	27	24	28	38	23
18	41	52	44	40	44	251	28	26	25	29	39	23
19	39	54	43	40	44	219	29	30	24	30	39	21
20	39	55	43	40	44	184	29	25	24	34	40	20
21	37	54	43	40	44	129	28	24	24	34	40	20
22	37	47	43	41	43	97	27	28	21	151	39	21
23	36	49	43	42	43	98	27	24	21	124	38	21
24	37	45	43	43	43	98	27	25	128	31	38	21
25	36	44	43	43	43	64	27	25	806	33	38	19
26	36	44	43	43	43	33	27	25	921	35	37	19
27	36	44	43	43	43	31	29	26	852	35	35	18
28	35	44	43	43	43	29	28	65	874	36	35	18
29	35	45	43	42	---	29	27	151	819	37	34	18
30	33	46	43	42	---	29	27	228	641	37	33	17
31	41	---	43	42	---	29	---	228	---	37	33	---
TOTAL	811.48	1,433	1,336	1,315	1,212	2,137	844	1,423	6,127	5,710	1,136	735
MEAN	26.2	47.8	43.1	42.4	43.3	68.9	28.1	45.9	204	184	36.6	24.5
MAX	41	70	44	65	44	251	29	228	921	561	40	33
MIN	0.88	30	42	38	42	29	27	24	21	26	33	17
AC-FT	1,610	2,840	2,650	2,610	2,400	4,240	1,670	2,820	12,150	11,330	2,250	1,460
CFSM	0.02	0.04	0.04	0.04	0.04	0.06	0.02	0.04	0.18	0.16	0.03	0.02
IN.	0.03	0.05	0.04	0.04	0.04	0.07	0.03	0.05	0.20	0.18	0.04	0.02

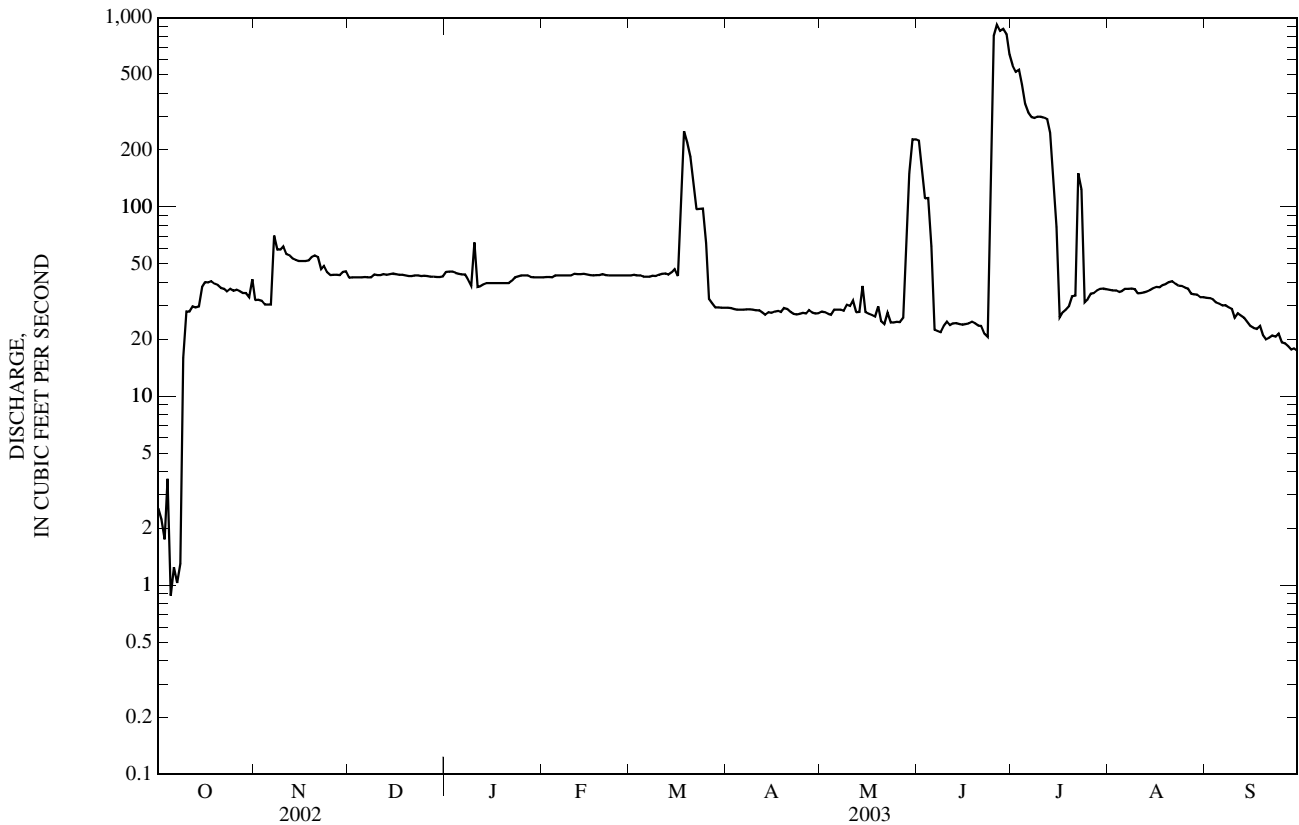
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1938 - 2003, BY WATER YEAR (WY)

MEAN	31.5	24.6	22.9	22.7	34.3	199	521	276	188	153	74.0	34.4
MAX	441	269	194	164	273	1,519	4,109	904	1,034	1,781	1,299	250
(WY)	(1996)	(1996)	(1943)	(1943)	(1998)	(1994)	(1997)	(2001)	(1962)	(1993)	(1993)	(1942)
MIN	0.20	0.20	0.20	0.17	0.16	1.14	1.27	0.91	1.30	1.11	0.25	0.18
(WY)	(1939)	(1939)	(1939)	(1940)	(1940)	(1941)	(1941)	(1941)	(1977)	(1977)	(1959)	(1988)

05292000 MINNESOTA RIVER AT ORTONVILLE, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1938 - 2003	
ANNUAL TOTAL	28,129.58		24,219.48			
ANNUAL MEAN	77.1		66.4		a133	
HIGHEST ANNUAL MEAN					514	1997
LOWEST ANNUAL MEAN					2.39	1977
HIGHEST DAILY MEAN	1,590	Mar 30	921	Jun 26	5,010	Apr 10, 1997
LOWEST DAILY MEAN	0.88	Oct 5	0.88	Oct 5	0.00	Dec 13, 1940
ANNUAL SEVEN-DAY MINIMUM	1.7	Oct 2	1.7	Oct 2	0.08	Sep 12, 1988
MAXIMUM PEAK FLOW			1,020	Jun 26	5,070	Apr 10, 1997
MAXIMUM PEAK STAGE			5.37	Jun 26	12.92	Apr 13, 1952
INSTANTANEOUS LOW FLOW			b0.59	Oct 5	0.00	Dec 13, 1940
ANNUAL RUNOFF (AC-FT)	55,800		48,040		96,430	
ANNUAL RUNOFF (CFSM)	0.066		0.057		0.11	
ANNUAL RUNOFF (INCHES)	0.90		0.78		1.56	
10 PERCENT EXCEEDS	257		98		348	
50 PERCENT EXCEEDS	27		38		22	
90 PERCENT EXCEEDS	5.6		24		1.2	

a Median of annual mean discharges is 88 ft³/s.
 b Due in part to regulation.



05292704 NORTH FORK YELLOW BANK RIVER NEAR ODESSA, MN

LOCATION.--Lat 45°11'21", long 96°24'54", in NW¹/₄ NW¹/₄ SW¹/₄ sec.22, T.120 N., R.46 W., Lac qui Parle County, Hydrologic Unit 07020001, on left bank at upstream side of County Highway #7 bridge, 11.0 mi east-southeast of Milbank, SD, 6.4 mi southwest of Odessa, and 2.9 mi upstream from mouth.

DRAINAGE AREA.--208 mi².

PERIOD OF RECORD.--May 1991 to September 30, 2003 (discontinued).

GAGE.--Water-stage recorder and crest-stage gage. Elevation of gage is 1,020 ft above NGVD of 1929, from topographic map.

REMARKS.--Records good except those for estimated daily discharges, which are poor. Satellite data-collection platform at station.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0.88	3.9	e4.3	e4.5	e0.12	0.00	19	13	10	1.7	0.16	0.01
2	0.82	4.0	e4.0	e4.5	e0.10	0.00	19	13	10	1.5	0.12	0.01
3	0.92	3.8	e4.0	e5.0	e0.08	0.00	18	12	9.2	1.2	0.11	0.01
4	1.9	3.7	e4.0	e5.0	e0.06	0.00	17	12	7.8	1.1	0.12	0.01
5	2.3	3.7	e4.0	e4.5	e0.08	0.00	15	13	7.4	1.1	0.12	0.01
6	2.1	3.7	e4.5	e4.5	e0.06	0.00	13	13	7.6	0.93	0.12	0.01
7	1.8	3.8	e4.3	e5.0	e0.06	0.00	13	14	7.9	0.80	0.09	0.01
8	1.8	3.7	e4.4	e4.5	e0.05	0.00	12	15	7.4	0.65	0.08	0.01
9	1.6	3.7	e5.0	e4.0	e0.05	0.00	12	18	8.2	0.86	0.08	0.01
10	1.9	3.7	e4.5	e2.0	e0.05	0.00	11	20	8.8	0.83	0.11	0.15
11	1.9	4.0	e4.5	e1.0	e0.04	0.00	11	35	8.4	0.77	0.19	0.11
12	1.7	4.0	e4.8	e0.79	e0.04	e0.00	11	30	7.8	0.78	0.35	0.05
13	1.5	4.1	e5.0	e0.79	e0.03	e0.01	11	27	7.1	0.59	0.12	0.01
14	1.3	3.9	e5.0	e0.61	e0.03	e1.0	11	28	5.8	0.54	0.09	0.01
15	1.3	e3.9	e5.5	e0.58	e0.02	e10	11	28	5.3	0.55	0.07	0.01
16	1.4	e4.0	e5.5	e0.40	e0.02	e75	12	28	4.8	0.47	0.07	0.01
17	2.0	e4.0	e5.5	e0.40	e0.02	e100	14	25	3.9	0.47	0.06	0.02
18	2.0	e4.0	e7.0	e0.32	e0.02	e80	13	23	3.5	0.45	0.05	0.14
19	1.7	4.0	e6.0	e0.32	e0.03	e65	19	22	2.9	0.35	0.04	0.06
20	1.6	4.2	e5.5	e0.22	e0.04	e50	24	20	2.6	0.88	0.06	0.04
21	2.3	4.5	e5.0	e0.22	e0.02	e48	31	21	2.3	1.1	0.03	0.06
22	2.1	4.5	e4.0	e0.22	e0.01	e43	24	19	2.3	0.80	0.01	0.04
23	2.2	e4.2	e3.5	e0.14	e0.01	e40	22	18	2.3	0.73	0.02	0.01
24	2.9	e4.1	e3.5	e0.14	e0.00	e38	19	18	2.9	0.53	0.01	0.01
25	3.0	e4.0	e3.5	e0.12	e0.00	e33	17	18	3.7	0.49	0.02	0.01
26	2.6	e3.9	e3.8	e0.08	e0.00	e31	15	18	3.5	0.40	0.02	0.01
27	2.8	e3.9	e4.0	e0.12	e0.00	30	14	16	2.5	0.25	0.01	0.01
28	3.0	e3.9	e4.5	e0.10	e0.00	29	13	15	2.2	0.23	0.05	0.01
29	2.9	e5.0	e5.0	e0.08	---	25	13	15	2.1	0.21	0.04	0.01
30	e3.1	e4.5	e5.0	e0.09	---	21	13	14	2.3	0.18	0.01	0.01
31	3.6	---	e4.8	e0.10	---	20	---	11	---	0.18	0.01	---
TOTAL	62.92	120.3	143.9	50.34	1.04	739.01	467	592	162.5	21.62	2.44	0.88
MEAN	2.03	4.01	4.64	1.62	0.037	23.8	15.6	19.1	5.42	0.70	0.079	0.029
MAX	3.6	5.0	7.0	5.0	0.12	100	31	35	10	1.7	0.35	0.15
MIN	0.82	3.7	3.5	0.08	0.00	0.00	11	11	2.1	0.18	0.01	0.01
AC-FT	125	239	285	100	2.1	1,470	926	1,170	322	43	4.8	1.7

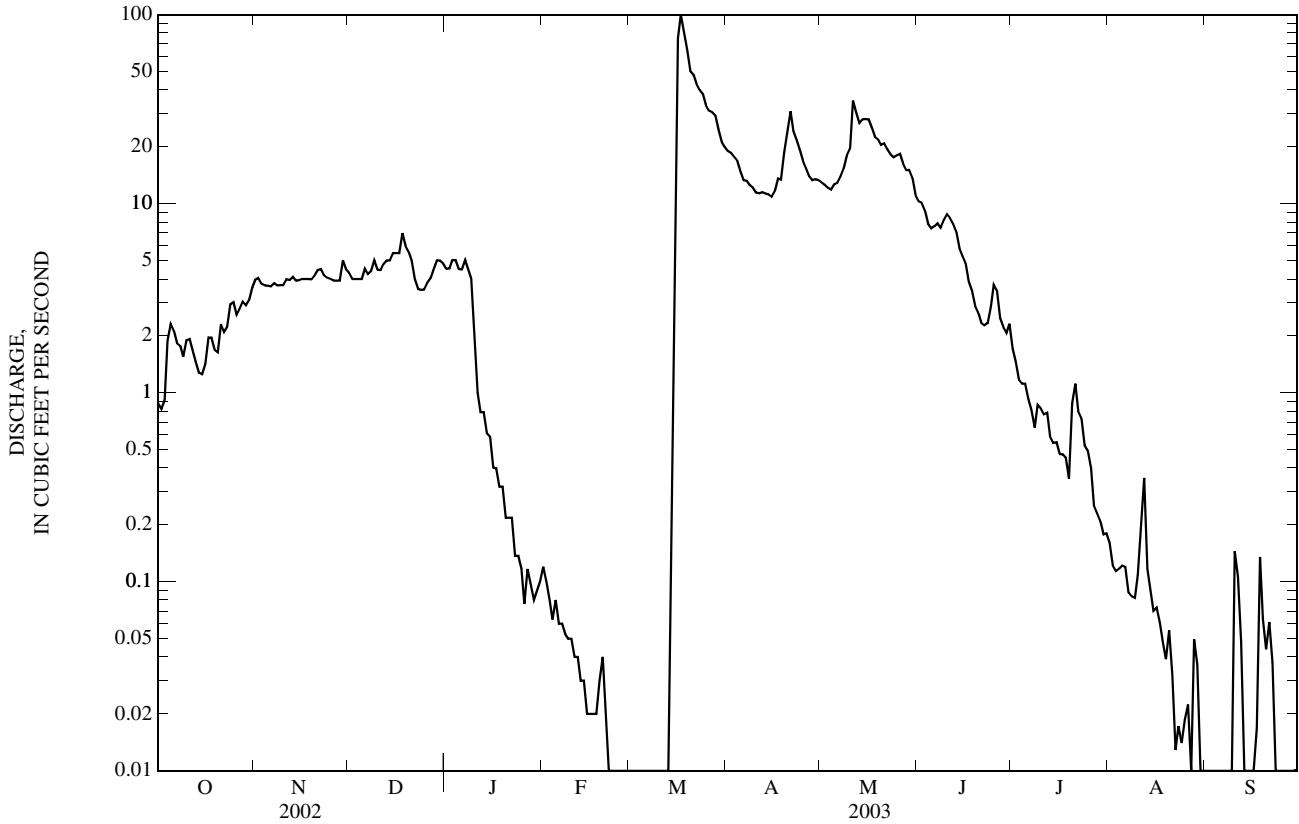
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1992 - 2003, BY WATER YEAR (WY)

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
MEAN	40.0	24.6	12.7	7.41	35.8	149	275	85.1	76.6	101	21.3	14.5
MAX	342	122	32.7	19.5	166	422	977	267	212	501	107	72.5
(WY)	(1996)	(1996)	(1996)	(1996)	(1996)	(1997)	(1997)	(1995)	(1992)	(1993)	(1995)	(1995)
MIN	0.94	2.42	0.57	0.34	0.037	9.73	12.7	9.14	5.42	0.70	0.079	0.029
(WY)	(2001)	(2001)	(2001)	(2001)	(2003)	(2001)	(2000)	(1992)	(2003)	(2003)	(2003)	(2003)

05292704 NORTH FORK YELLOW BANK RIVER NEAR ODESSA, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1992 - 2003	
ANNUAL TOTAL	9,667.41		2,363.95		^a 70.2	
ANNUAL MEAN	26.5		6.48		134	
HIGHEST ANNUAL MEAN					6.48	
LOWEST ANNUAL MEAN					1997	
HIGHEST DAILY MEAN	1,100	Mar 31	100	Mar 17	5,000	Apr 8, 2001
LOWEST DAILY MEAN	0.51	Sep 23	0.00	Feb24-Mar.11	0.00	Feb 24, 2003
ANNUAL SEVEN-DAY MINIMUM	0.56	Sep 18	0.00	Feb 24	0.00	Feb 24, 2003
MAXIMUM PEAK FLOW			150	Mar 17	^b 6,840	Apr 8, 2001
MAXIMUM PEAK STAGE			^c 6.83	Mar 17	^c 18.02	Mar 29, 1997
ANNUAL RUNOFF (AC-FT)	19,180		4,690		50,860	
10 PERCENT EXCEEDS	60		19		140	
50 PERCENT EXCEEDS	4.8		2.3		14	
90 PERCENT EXCEEDS	0.86		0.01		1.7	

- a Median of annual mean discharges, 72 ft³/s.
- b Gage height, 16.72 ft, backwater from ice.
- c Backwater from ice.
- e Estimated.



05293000 YELLOW BANK RIVER NEAR ODESSA, MN

LOCATION.--Lat 45°13'37", long 96°21'12", in SW¼SW¼ sec. 6, T. 120 N., R. 45 W., Lac qui Parle County, Hydrologic Unit 07020001, on left bank 1,200 ft upstream from highway bridge, 2.5 mi southwest of Odessa, and 4.5 mi upstream from mouth.

DRAINAGE AREA.--459 mi².

PERIOD OF RECORD.--October 1939 to September 1999, October 1999 to March 2001 (peak flow only), April 2001 to current year.

REVISED RECORDS.--WSP 1388: 1947(M), 1950. WDR MN-95-1: Sept. 5 (Q). WRIR 97-4249: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 953.34 ft above sea level (U.S. Army Corps of Engineers benchmark, NGVD of 1929). Prior to Aug. 28, 1940, nonrecording gage at site 150 ft upstream at same datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair to poor.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 300 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)
No peak greater than base discharge.			

Minimum discharge, 0.28 ft³/s, Sept. 8, gage height, 1.37 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.6	10	e8.9	e8.0	e4.4	e3.4	35	32	e25	6.6	2.1	0.78
2	6.0	10	e8.3	e7.9	e4.8	e3.4	36	30	e23	5.9	1.9	0.63
3	5.5	11	e7.8	e7.7	e4.8	e3.3	34	29	e22	5.3	1.8	0.50
4	6.9	10	e7.4	e7.6	e4.7	e3.3	32	30	e21	5.3	1.7	0.46
5	6.1	9.6	e7.2	e7.5	e4.6	e3.3	29	30	e19	4.5	1.7	0.43
6	5.5	9.9	e7.1	e7.5	e4.5	e3.3	26	30	e18	4.2	1.9	0.47
7	5.3	10	e7.1	e7.7	e4.4	e3.2	24	30	e17	3.8	1.8	0.40
8	4.6	10	e7.2	e8.0	e4.4	e3.2	24	37	e20	3.5	1.7	0.32
9	4.2	10	e7.3	e7.8	e4.3	e3.1	23	46	e19	3.7	1.6	0.29
10	4.6	10	e7.5	e7.2	e4.2	e3.1	21	49	e19	3.4	2.1	0.61
11	5.8	10	e7.8	e6.7	e4.1	e3.0	20	61	19	3.2	1.6	0.75
12	6.7	10	e8.0	e6.2	e4.1	e3.0	20	72	19	3.1	1.5	0.69
13	5.7	10	e8.0	e5.5	e4.0	e3.1	20	69	18	2.9	1.1	0.77
14	6.4	11	e8.3	e5.3	e4.0	e12	19	78	e17	2.8	0.94	0.90
15	7.0	10	e8.5	e5.3	e3.9	e38	19	77	e15	2.5	0.81	1.1
16	6.7	9.4	e8.7	e5.2	e3.9	e109	22	73	e13	2.9	0.67	0.96
17	7.5	9.8	e9.1	e5.0	e3.9	e299	28	70	e12	2.9	0.63	0.85
18	8.4	10	e9.9	e4.9	e4.0	e253	32	64	e11	3.4	0.54	1.1
19	9.5	9.8	e10	e4.7	e4.0	e184	44	59	e9.8	3.0	0.57	1.2
20	9.3	9.9	e10	e4.5	e4.2	e140	57	53	e8.6	5.5	0.60	0.93
21	9.2	10	e10	e4.1	e4.2	e109	80	51	e7.8	5.0	0.69	0.84
22	8.9	10	e9.8	e3.8	e4.1	e92	80	48	e7.7	4.7	0.97	1.00
23	9.9	10	e9.6	e3.7	e3.9	e84	71	45	7.9	4.4	1.0	1.3
24	10	10	e8.8	e3.6	e3.8	e80	61	44	8.2	3.8	0.70	1.5
25	9.3	e9.1	e7.8	e3.6	e3.7	e73	52	44	8.7	3.1	0.68	1.6
26	9.6	e9.2	e7.4	e3.5	e3.6	e66	46	43	7.3	2.9	0.57	1.5
27	9.3	e8.5	e7.5	e3.5	e3.5	e58	41	40	6.6	2.8	0.55	1.7
28	9.3	e8.6	e7.9	e3.6	e3.5	54	36	37	6.0	2.6	0.82	1.7
29	9.9	e8.1	e8.3	e3.7	---	47	35	33	6.1	2.4	0.92	1.9
30	10	e7.0	e8.3	e3.9	---	41	33	31	6.9	2.4	0.83	1.5
31	9.9	---	e8.2	e4.1	---	36	---	28	---	2.2	0.78	---
TOTAL	233.6	290.9	257.7	171.3	115.5	1,816.7	1,100	1,463	418.6	114.7	35.77	28.68
MEAN	7.54	9.70	8.31	5.53	4.12	58.6	36.7	47.2	14.0	3.70	1.15	0.96
MAX	10	11	10	8.0	4.8	299	80	78	25	6.6	2.1	1.9
MIN	4.2	7.0	7.1	3.5	3.5	3.0	19	28	6.0	2.2	0.54	0.29
AC-FT	463	577	511	340	229	3,600	2,180	2,900	830	228	71	57
CFSM	0.02	0.02	0.02	0.01	0.01	0.13	0.08	0.10	0.03	0.01	0.00	0.00
IN.	0.02	0.02	0.02	0.01	0.01	0.15	0.09	0.12	0.03	0.01	0.00	0.00

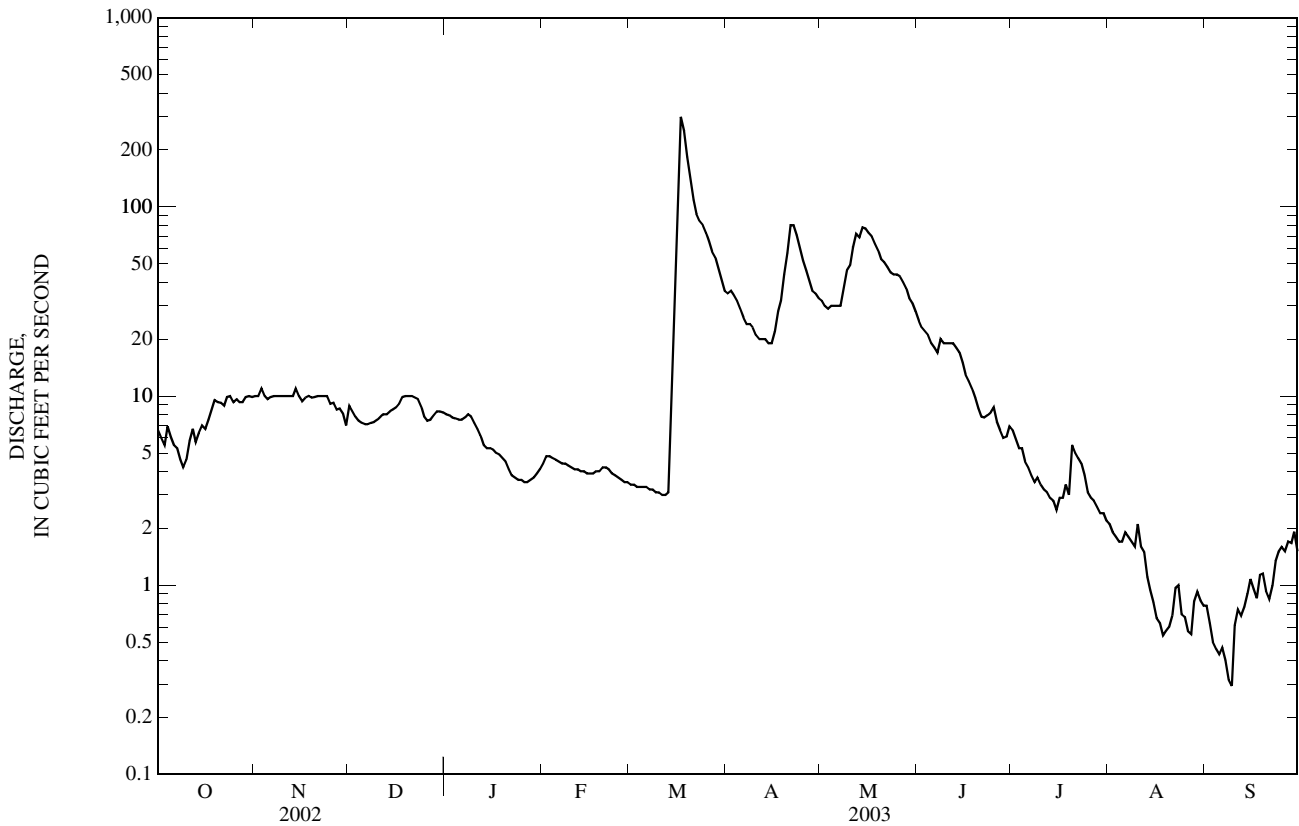
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1940 - 2003, BY WATER YEAR (WY)

MEAN	25.2	24.6	13.1	7.94	17.4	171	263	110	104	63.8	29.3	16.7
MAX	588	256	86.3	68.0	147	693	1,614	652	577	741	281	273
(WY)	(1996)	(1996)	(1996)	(1994)	(1998)	(1996)	(1997)	(1972)	(1992)	(1993)	(1991)	(1985)
MIN	0.31	0.44	0.32	0.090	0.001	1.59	9.13	2.94	1.83	0.27	0.088	0.083
(WY)	(1941)	(1977)	(1977)	(1977)	(1977)	(1965)	(1981)	(1981)	(1976)	(1976)	(1976)	(1976)

05293000 YELLOW BANK RIVER NEAR ODESSA, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1940 - 2003	
ANNUAL TOTAL	15,114.3		6,046.45			
ANNUAL MEAN	41.4		16.6		a70.7	
HIGHEST ANNUAL MEAN					237	1996
LOWEST ANNUAL MEAN					3.98	1981
HIGHEST DAILY MEAN	1,300	Mar 31	299	Mar 17	6,640	Apr 9, 1969
LOWEST DAILY MEAN	2.6	Sep 21	0.29	Sep 9	b0.00	Jan 26, 1940
ANNUAL SEVEN-DAY MINIMUM	2.8	Sep 18	0.41	Sep 3	0.00	Jan 26, 1940
MAXIMUM PEAK FLOW			c299	Mar 17	6,970	Apr 9, 1969
MAXIMUM PEAK STAGE			d5.15	Mar 17	19.07	Apr 9, 1969
INSTANTANEOUS LOW FLOW			0.28	Sep 8	b0.00	Jan 26, 1940
ANNUAL RUNOFF (AC-FT)	29,980		11,990		51,190	
ANNUAL RUNOFF (CFSM)	0.090		0.036		0.15	
ANNUAL RUNOFF (INCHES)	1.22		0.49		2.09	
10 PERCENT EXCEEDS	95		44		150	
50 PERCENT EXCEEDS	10		7.4		12	
90 PERCENT EXCEEDS	4.7		1.0		1.0	

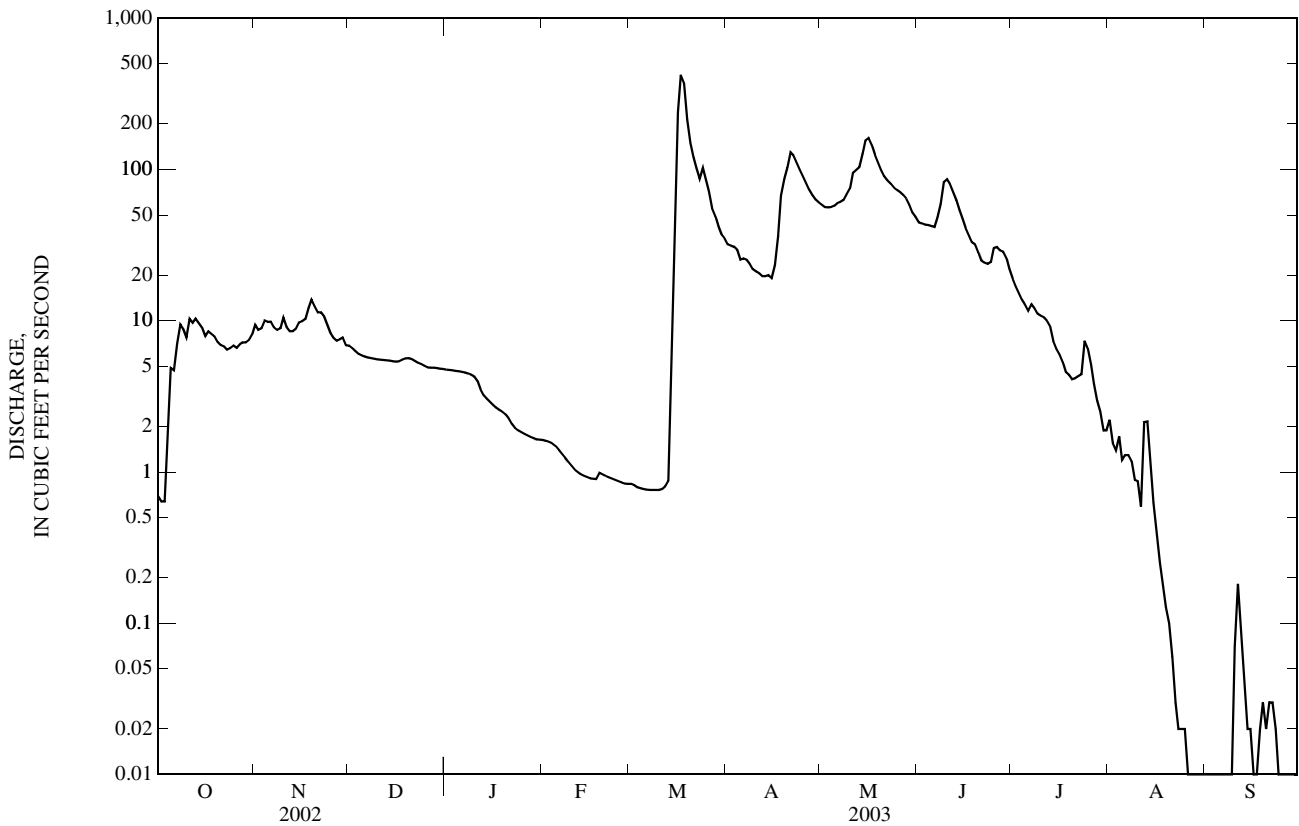
- a Median of annual mean discharges is 53 ft³/s.
- b Many days, several years.
- c Estimated daily discharge. Maximum discharge probably higher.
- d Backwater from ice.
- e Estimated.



05299650 LAC QUI PARLE RIVER NEAR PROVIDENCE, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 2001 - 2003	
ANNUAL TOTAL	18,824.54		8,783.35		37.8	
ANNUAL MEAN	51.6		24.1		24.1	
HIGHEST ANNUAL MEAN					51.5	2002
LOWEST ANNUAL MEAN					24.1	2003
HIGHEST DAILY MEAN	518	Apr 3	423	Mar 17	2,100	Apr 14, 2001
LOWEST DAILY MEAN	0.64	Oct 2	<0.01	Aug 27	<0.01	Aug 27, 2003
ANNUAL SEVEN-DAY MINIMUM	0.73	Sep 27	<0.01	Aug 27	<0.01	Aug 27, 2003
MAXIMUM PEAK FLOW			a423	Mar 17	2,140	Apr 14, 2001
MAXIMUM PEAK STAGE			b12.71	Mar 17	18.29	Apr 14, 2001
INSTANTANEOUS LOW FLOW			c<0.01	Aug 27	d<0.01	Aug 27, 2003
ANNUAL RUNOFF (AC-FT)	37,340		17,420		27,380	
ANNUAL RUNOFF (CFSM)	0.14		0.064		0.10	
ANNUAL RUNOFF (INCHES)	1.87		0.87		1.37	
10 PERCENT EXCEEDS	183		74		119	
50 PERCENT EXCEEDS	9.9		6.4		8.4	
90 PERCENT EXCEEDS	1.6		0.04		0.86	

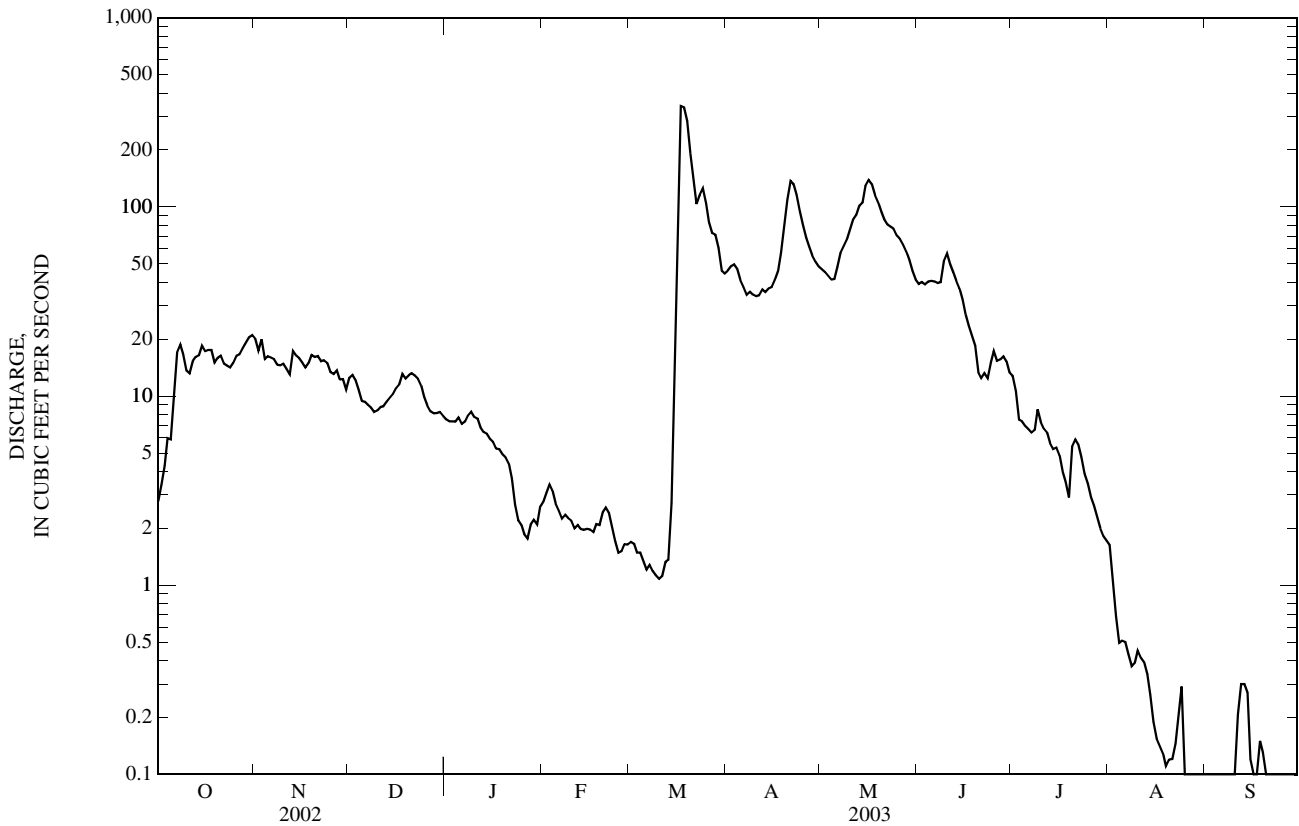
- a Estimated daily discharge, backwater from ice.
- b Backwater from ice.
- c Many days.
- d Many days in 2003.
- e Estimated.
- < Actual value is known to be less than the value shown



05299800 WEST BRANCH LAC QUI PARLE RIVER AT DAWSON, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 2001 - 2003	
ANNUAL TOTAL	16,962.44		8,869.21		36.4	
ANNUAL MEAN	46.5		24.3		24.3	
HIGHEST ANNUAL MEAN					48.5	2002
LOWEST ANNUAL MEAN					24.3	2003
HIGHEST DAILY MEAN	723	Apr 1	342	Mar 17	5,050	Apr 13, 2001
LOWEST DAILY MEAN	0.68	Aug 3	a <0.10	Aug 25	b <0.10	Aug 25, 2003
ANNUAL SEVEN-DAY MINIMUM	1.7	Aug 1	a <0.10	Aug 25	b <0.10	Aug 25, 2003
MAXIMUM PEAK FLOW			393	Mar 17	5,150	Apr 13, 2001
MAXIMUM PEAK STAGE			33.65	Mar 17	41.03	Apr 13, 2001
INSTANTANEOUS LOW FLOW			c0.02	Sep 4	c0.02	Sep 4, 2003
ANNUAL RUNOFF (AC-FT)	33,640		17,590		26,380	
ANNUAL RUNOFF (CFSM)	0.098		0.051		0.077	
ANNUAL RUNOFF (INCHES)	1.33		0.70		1.04	
10 PERCENT EXCEEDS	130		70		101	
50 PERCENT EXCEEDS	16		9.4		15	
90 PERCENT EXCEEDS	4.1		0.14		1.4	

- a Many days.
- b Many days in 2003.
- c Minimum observed, measurement of flow.
- e Estimated.
- < Actual value is known to be less than the value shown



05300000 LAC QUI PARLE RIVER NEAR LAC QUI PARLE, MN

LOCATION.--Lat 44°59'42", long 95°55'09", in SW¹/₄SW¹/₄ sec. 27, T.118 N., R.42 W., Lac qui Parle County, Hydrologic Unit 07020003, on right bank 70 ft downstream from highway bridge and 0.5 mi southwest of city of Lac qui Parle.

DRAINAGE AREA.--960 mi².

PERIOD OF RECORD.--April 1910 to November 1914; March 1931 to September 1999 (winter records incomplete prior to 1934), October 1999 to March 2001 (peak flow only), April 2001 to current year. Published as "at Lac qui Parle," 1910-14.

REVISED RECORDS.--WSP 1308: 1912(M), 1935(M).

GAGE.--Water-stage recorder. Datum of gage is 946.98 ft above sea level (NGVD of 1929, Minnesota Department of Transportation benchmark). Apr. 27, 1910 to Nov. 15, 1914, nonrecording gage at site 2 mi downstream at different datum. Mar. 17, 1931 to Mar. 9, 1937, nonrecording gage at site 40 ft upstream at present datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair to poor. Records for Sept. 14 to 30 are poor due to backwater from beaver dam.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.4	e27	e26	e20	e11	e4.8	97	137	118	48	6.0	0.25
2	3.8	e28	e27	e19	e11	e4.7	94	131	114	41	5.5	0.17
3	3.9	e28	e27	e19	e11	e4.5	93	128	110	37	4.8	0.09
4	13	28	e25	e19	e11	e4.4	92	126	107	33	5.2	0.07
5	22	31	e24	e19	e10	e4.4	87	129	106	29	4.8	0.05
6	22	31	e24	e19	e9.3	e4.4	76	130	106	26	4.3	0.05
7	19	31	e25	e19	e8.7	e4.3	74	140	109	22	3.6	0.04
8	32	32	e25	e18	e8.3	e4.2	69	145	114	21	2.7	0.03
9	40	30	e24	e18	e8.0	e4.1	66	164	123	22	3.5	0.04
10	39	30	e24	e18	e7.7	e4.1	59	174	148	21	3.6	0.85
11	33	32	e24	e17	e7.3	e4.1	57	203	148	20	3.1	8.8
12	27	31	e24	e17	e7.1	e4.1	55	221	137	19	2.4	12
13	27	30	e23	e16	e7.0	e4.1	53	230	125	17	1.7	6.9
14	27	32	e23	e15	e7.0	e11	52	282	113	15	1.5	e4.1
15	27	e30	e23	e14	e6.9	e44	53	325	104	14	1.7	e2.6
16	30	e29	e23	e14	e6.8	e162	58	340	95	14	1.7	e1.8
17	31	e28	e22	e13	e6.6	e595	83	324	87	12	1.8	e1.4
18	29	e29	e23	e12	e6.4	e763	106	292	80	11	1.8	e1.3
19	31	29	e23	e12	e6.4	703	173	267	69	9.4	1.8	e1.4
20	29	35	e23	e11	e7.5	553	213	243	63	10	1.4	e1.7
21	29	34	e23	e10	e7.1	400	263	226	55	12	1.1	e2.5
22	29	33	e23	e9.8	e6.5	367	285	215	58	15	0.88	e2.4
23	28	32	e22	e9.6	e6.0	277	267	203	56	13	0.69	e1.6
24	27	e29	e22	e9.8	e5.7	238	238	197	56	11	0.53	e1.3
25	26	e28	e21	e10	e5.6	219	213	187	91	9.8	0.82	e1.1
26	26	e27	e20	e11	e5.3	190	193	178	80	8.2	1.2	e0.99
27	26	28	e19	e11	e5.1	168	176	170	73	8.3	0.94	e0.92
28	25	29	e20	e11	e5.0	140	161	162	67	7.5	0.63	e0.88
29	26	27	e21	e11	---	127	151	150	63	6.1	0.44	e0.86
30	27	23	e20	e11	---	113	143	137	56	5.2	0.30	e0.84
31	27	---	e20	e11	---	101	---	127	---	5.5	0.33	---
TOTAL	786.1	891	713	444.2	211.3	5,227.2	3,800	6,083	2,831	543.0	70.76	57.03
MEAN	25.4	29.7	23.0	14.3	7.55	169	127	196	94.4	17.5	2.28	1.90
MAX	40	35	27	20	11	763	285	340	148	48	6.0	12
MIN	3.8	23	19	9.6	5.0	4.1	52	126	55	5.2	0.30	0.03
AC-FT	1,560	1,770	1,410	881	419	10,370	7,540	12,070	5,620	1,080	140	113
CFSM	0.03	0.03	0.02	0.01	0.01	0.18	0.13	0.20	0.10	0.02	0.00	0.00
IN.	0.03	0.03	0.03	0.02	0.01	0.20	0.15	0.24	0.11	0.02	0.00	0.00

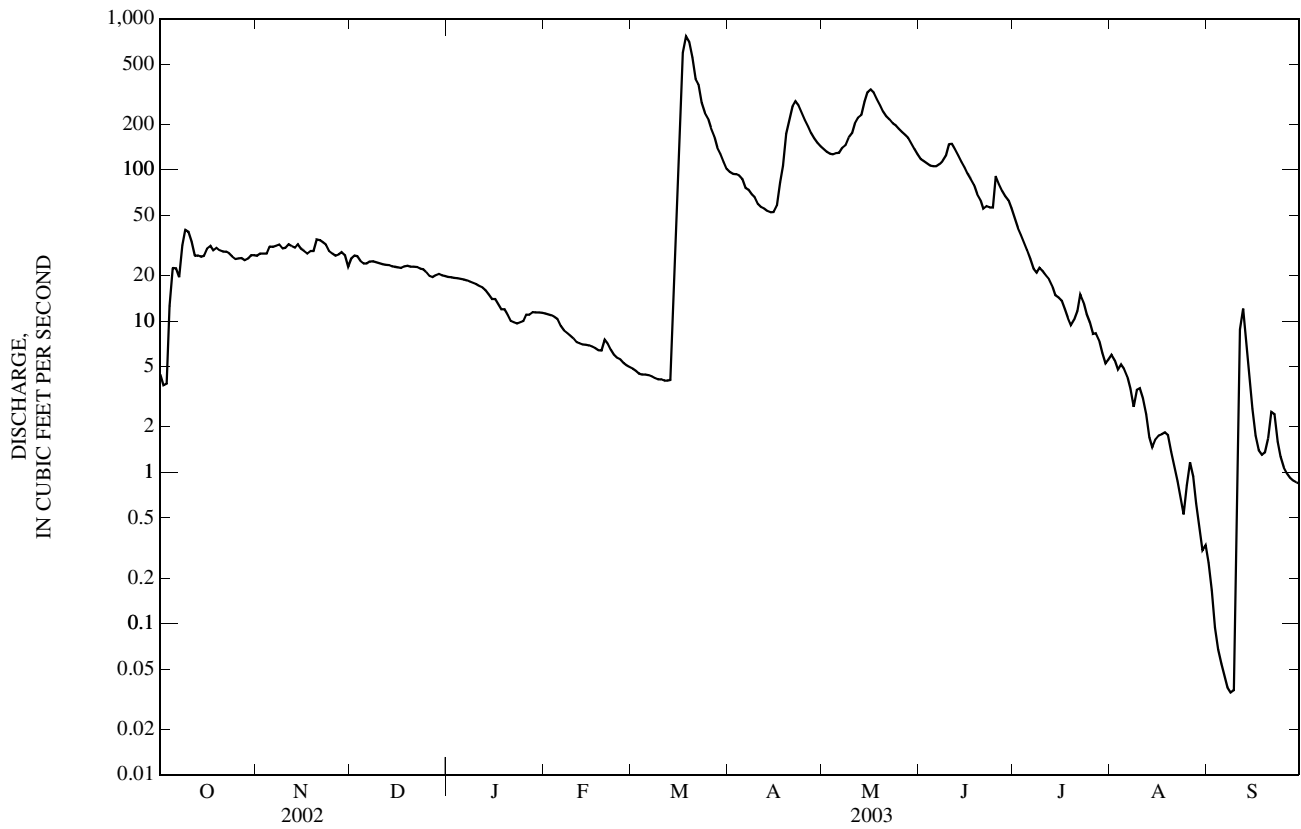
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1910 - 2003, BY WATER YEAR (WY)

MEAN	42.7	48.3	26.4	12.0	23.1	295	603	253	271	140	75.3	37.3
MAX	629	378	149	88.1	244	1,634	5,354	1,264	1,762	1,613	765	535
(WY)	(1996)	(1996)	(1996)	(1994)	(1998)	(1985)	(1997)	(1995)	(1984)	(1993)	(1953)	(1985)
MIN	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
(WY)	(1932)	(1932)	(1932)	(1932)	(1934)	(1934)	(1934)	(1934)	(1934)	(1934)	(1931)	(1931)

05300000 LAC QUI PARLE RIVER NEAR LAC QUI PARLE, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1910 - 2003	
ANNUAL TOTAL	40,956.9		21,657.59		a159	
ANNUAL MEAN	112		59.3		625	
HIGHEST ANNUAL MEAN					1993	
LOWEST ANNUAL MEAN					0.000	
HIGHEST DAILY MEAN	1,160	Apr 2	763	Mar 18	16,000	Apr 10, 1969
LOWEST DAILY MEAN	2.5	Sep 24	0.03	Sep 8	b0.00	Jul 15, 1931
ANNUAL SEVEN-DAY MINIMUM	3.0	Sep 23	0.05	Sep 3	0.00	Jul 15, 1931
MAXIMUM PEAK FLOW			c763	Mar 18	17,100	Apr 10, 1969
MAXIMUM PEAK STAGE			d9.54	Mar 17	f24.37	Apr 9, 1965
INSTANTANEOUS LOW FLOW			0.03	Sep 7	b0.00	Jul 15, 1931
ANNUAL RUNOFF (AC-FT)	81,240		42,960		115,200	
ANNUAL RUNOFF (CFSM)	0.12		0.062		0.17	
ANNUAL RUNOFF (INCHES)	1.59		0.84		2.25	
10 PERCENT EXCEEDS	350		171		365	
50 PERCENT EXCEEDS	30		23		24	
90 PERCENT EXCEEDS	15		1.7		0.50	

- a Median of annual mean discharges is 120 ft³/s.
- b Many days, several years.
- c Estimated daily-mean discharge, backwater from ice.
- d Backwater from ice.
- e Estimated.
- f From highwater mark, backwater from ice. Datum then in use.



05301000 MINNESOTA RIVER NEAR LAC QUI PARLE, MN

LOCATION.--Lat 45°01'17", long 95°52'05", in NW $\frac{1}{4}$ NE $\frac{1}{4}$ sec.24, T.118 N., R.42 W., Chippewa County, Hydrologic Unit 07020004, on left bank 200 ft downstream from highway bridge and dam, 2.4 mi northeast of city of Lac Qui Parle, and 3.5 mi west of city of Watson.

DRAINAGE AREA.--4,050 mi² (approximately).

PERIOD OF RECORD.--October 1942 to September 1994, October 1998 to present.

REVISED RECORDS.--WDR MN-91-2; 1979

GAGE.--Water-stage recorder. Datum of gage is 900.00 ft above sea level (NGVD or 1929, levels by U.S. Army Corps of Engineers). Prior to Nov. 10, 1944, at datum 0.20 ft. lower.

REMARKS.--Records good except those for estimated daily discharges, which are fair. Part of flow from 2,050 mi², of Chippewa River basin at most times diverted into Minnesota River above station. Some regulation by Big Stone Lake since Apr. 17, 1937, Lac qui Parle since Jan. 1938, Marsh Lake since Nov. 1, 1939, and Odessa Dam since May 1974.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 1997 reached a discharge of approximately 43,000 ft³/s, combination of measured flow through dam and indirect computation of flow over dam; peak stage occurred Apr. 7, 1997 (from Corps of Engineers).

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	98	446	e280	199	185	184	430	781	822	1,360	790	83
2	144	416	247	200	183	191	349	779	819	1,530	790	76
3	176	417	210	217	206	312	385	778	656	1,410	784	61
4	210	415	185	228	234	e530	429	773	423	1,210	660	62
5	188	379	186	229	236	e529	505	728	437	1,280	465	61
6	211	347	185	230	233	e524	530	639	571	1,520	323	60
7	324	348	183	230	238	489	554	555	747	1,750	296	62
8	548	347	183	227	233	426	552	598	752	1,840	294	48
9	602	347	183	220	235	427	547	758	818	1,930	292	32
10	596	366	183	e220	212	359	506	844	901	1,920	291	32
11	591	347	184	e220	190	261	411	931	900	1,860	334	29
12	605	345	183	e220	194	263	375	1,140	894	1,860	368	29
13	588	345	183	e220	193	263	376	1,310	808	1,870	366	28
14	588	345	183	e220	168	263	338	1,510	724	1,910	353	28
15	383	345	186	e206	142	263	280	1,820	720	1,960	339	29
16	142	348	232	183	144	263	280	2,030	640	1,890	336	29
17	143	349	281	157	145	407	373	1,900	477	1,780	335	27
18	262	313	330	137	142	832	592	1,690	365	1,570	335	26
19	330	284	374	137	142	1,130	656	1,650	260	1,370	334	25
20	325	284	373	137	142	1,230	812	1,630	173	1,370	265	26
21	328	289	377	137	166	1,180	1,220	1,570	137	1,370	186	25
22	326	288	379	137	186	1,050	1,400	1,270	137	1,320	186	29
23	326	298	e378	137	186	1,040	1,440	1,000	246	1,150	186	27
24	325	e289	e378	137	187	1,040	1,200	990	488	971	185	40
25	325	e289	e378	137	188	1,050	891	990	1,010	1,040	183	26
26	328	e289	e316	137	186	1,050	882	988	1,290	1,010	183	30
27	324	e289	204	136	186	1,120	878	956	1,080	961	133	31
28	325	288	202	155	186	1,230	838	881	1,080	864	83	27
29	326	282	201	186	---	1,220	783	823	1,080	713	82	29
30	404	e280	198	187	---	1,210	782	829	1,140	707	83	25
31	468	---	199	186	---	973	---	825	---	748	82	---
TOTAL	10,859	10,014	7,744	5,709	5,268	21,309	19,594	33,966	20,595	44,044	9,922	1,142
MEAN	350	334	250	184	188	687	653	1,096	686	1,421	320	38.1
MAX	605	446	379	230	238	1,230	1,440	2,030	1,290	1,960	790	83
MIN	98	280	183	136	142	184	280	555	137	707	82	25
AC-FT	21,540	19,860	15,360	11,320	10,450	42,270	38,860	67,370	40,850	87,360	19,680	2,270
CFSM	0.09	0.08	0.06	0.05	0.05	0.17	0.16	0.27	0.17	0.35	0.08	0.01
IN.	0.10	0.09	0.07	0.05	0.05	0.20	0.18	0.31	0.19	0.40	0.09	0.01

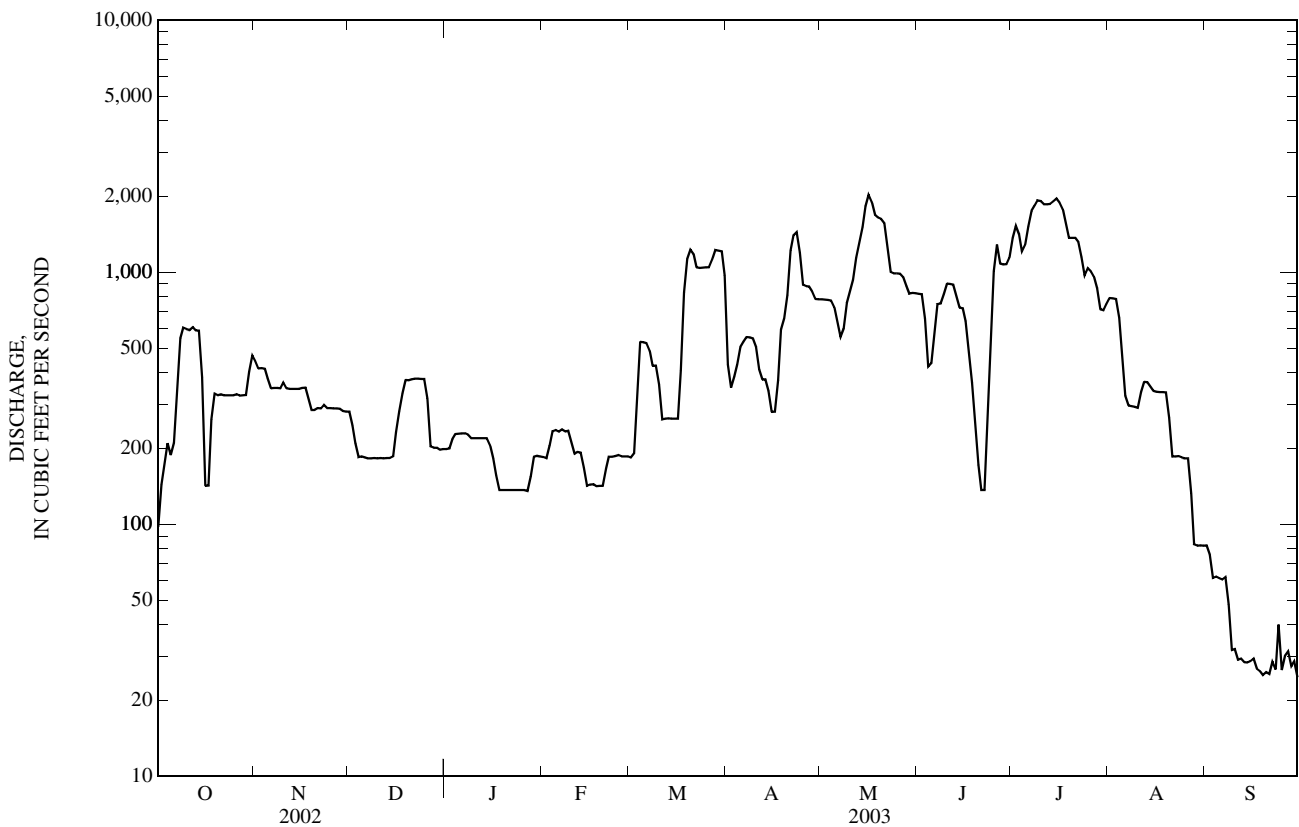
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1943 - 2003, BY WATER YEAR (WY)

MEAN	273	288	233	157	191	841	2,722	1,447	1,165	994	529	263
MAX	2,924	2,327	1,204	574	644	4,599	14,580	5,837	4,229	7,024	6,012	2,402
(WY)	(1987)	(1985)	(1985)	(1987)	(1999)	(1994)	(2001)	(2001)	(1984)	(1993)	(1993)	(1986)
MIN	4.16	0.46	0.17	0.19	0.094	46.5	151	122	29.5	14.7	11.8	5.59
(WY)	(1977)	(1977)	(1977)	(1977)	(1977)	(1956)	(1961)	(1959)	(1988)	(1988)	(1974)	(1967)

05301000 MINNESOTA RIVER NEAR LAC QUI PARLE, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1943 - 2003	
ANNUAL TOTAL	258,077		190,166			
ANNUAL MEAN	707		521		759	
HIGHEST ANNUAL MEAN					2,507	1986
LOWEST ANNUAL MEAN					75.7	1959
HIGHEST DAILY MEAN	3,150	Apr 8	2,030	May 16	29,800	Apr 14, 2001
LOWEST DAILY MEAN	41	Aug 20	25	Sep 19,21,30	a0.00	Oct 19, 1951
ANNUAL SEVEN-DAY MINIMUM	70	Sep 12	26	Sep 17	0.00	Oct 19, 1951
MAXIMUM PEAK FLOW			b2,040	May 16	30,100	Apr 14, 2001
MAXIMUM PEAK STAGE			27.22	May 16	40.05	Apr 14, 2001
INSTANTANEOUS LOW FLOW			b24	Sep 21,30	a0.00	Oct 19, 1951
ANNUAL RUNOFF (AC-FT)	511,900		377,200		549,900	
ANNUAL RUNOFF (CFSM)	0.17		0.13		0.19	
ANNUAL RUNOFF (INCHES)	2.37		1.75		2.55	
10 PERCENT EXCEEDS	1,750		1,220		1,820	
50 PERCENT EXCEEDS	465		335		236	
90 PERCENT EXCEEDS	183		135		27	

a Many days, several years.
 b Result of regulation.
 c Estimated.



05304500 CHIPPEWA RIVER NEAR MILAN, MN

LOCATION.--Lat 45°06'30", long 95°47'55", in NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 21, T.119 N., R.41 W., Chippewa County, Hydrologic Unit 07020005, on right bank 20 ft downstream from bridge on State Highway 40, 2.0 mi upstream from small tributary, and 5.5 mi east of Milan.

DRAINAGE AREA.--1,880 mi².

PERIOD OF RECORD.--March 1937 to current year.

REVISED RECORDS.--WSP 1145: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 959.69 ft above sea level (NGVD of 1929). Prior to June 15, 1942, nonrecording gage on bridge 800 ft downstream at same datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair to poor. Flow may be influenced by regulation from several small lakes upstream from gage.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 600 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Mar 25	1400	e644	(daily)	Jun 11	2200	627	2.60
Apr 21	0200	644	2.64	Jul 11	1300	*1,390	*4.03
May 16	0600	1,000	3.32				

Minimum discharge, 78 ft³/s, Mar. 9, estimated daily.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	217	288	e230	e167	e95	e81	320	496	612	1,110	649	155
2	212	288	e223	e166	e97	e80	327	490	588	1,090	620	151
3	211	296	e216	e166	e100	e80	320	480	561	1,050	593	144
4	228	288	e214	e165	e101	e79	306	478	539	1,050	567	133
5	255	295	e213	e165	e99	e79	274	481	520	1,030	546	128
6	296	297	e210	e165	e97	e79	277	502	518	1,040	527	124
7	322	294	e207	e164	e94	e79	278	508	532	1,030	510	119
8	336	294	e203	e164	e91	e79	273	515	551	1,020	490	113
9	335	294	e200	e162	e89	e78	264	547	553	1,040	471	107
10	341	297	e197	e158	e87	e78	257	621	553	1,140	449	130
11	337	294	e197	e149	e86	e78	257	694	583	1,360	441	185
12	334	291	e199	e139	e85	e78	256	759	593	1,310	407	196
13	320	287	e201	e132	e85	e79	257	782	540	1,230	384	202
14	310	289	e202	e126	e85	e81	257	845	503	1,180	356	182
15	305	274	e202	e121	e84	e86	258	924	472	1,140	331	161
16	295	286	e201	e116	e84	e97	270	988	434	1,110	310	150
17	288	252	e201	e113	e84	e111	342	944	408	1,060	294	143
18	288	289	e202	e109	e83	e126	461	904	399	1,030	279	146
19	290	286	e202	e106	e82	e145	530	895	365	998	269	140
20	294	276	e198	e103	e82	e167	598	942	334	972	254	132
21	298	269	e195	e99	e82	e193	639	947	306	956	238	130
22	315	267	e191	e97	e82	e227	629	924	293	930	225	129
23	322	261	e187	e95	e84	e278	622	900	290	903	216	124
24	323	245	e184	e93	e84	e342	607	875	410	879	209	119
25	317	e216	e180	e91	e83	e644	582	849	723	849	202	113
26	312	e211	e177	e90	e81	e678	551	820	986	820	194	107
27	306	e270	e175	e89	e81	e546	529	788	1,080	797	187	108
28	303	e283	e173	e89	e81	e423	514	754	1,060	769	179	102
29	304	e266	e171	e89	---	e336	501	715	1,070	740	177	95
30	307	e243	e169	e92	---	e328	501	673	1,100	709	164	93
31	302	---	e168	e94	---	316	---	647	---	679	160	---
TOTAL	9,223	8,286	6,088	3,874	2,448	6,151	12,057	22,687	17,476	31,021	10,898	4,061
MEAN	298	276	196	125	87.4	198	402	732	583	1,001	352	135
MAX	341	297	230	167	101	678	639	988	1,100	1,360	649	202
MIN	211	211	168	89	81	78	256	478	290	679	160	93
AC-FT	18,290	16,440	12,080	7,680	4,860	12,200	23,920	45,000	34,660	61,530	21,620	8,050
CFSM	0.16	0.15	0.10	0.07	0.05	0.11	0.21	0.39	0.31	0.53	0.19	0.07
IN.	0.18	0.16	0.12	0.08	0.05	0.12	0.24	0.45	0.35	0.61	0.22	0.08

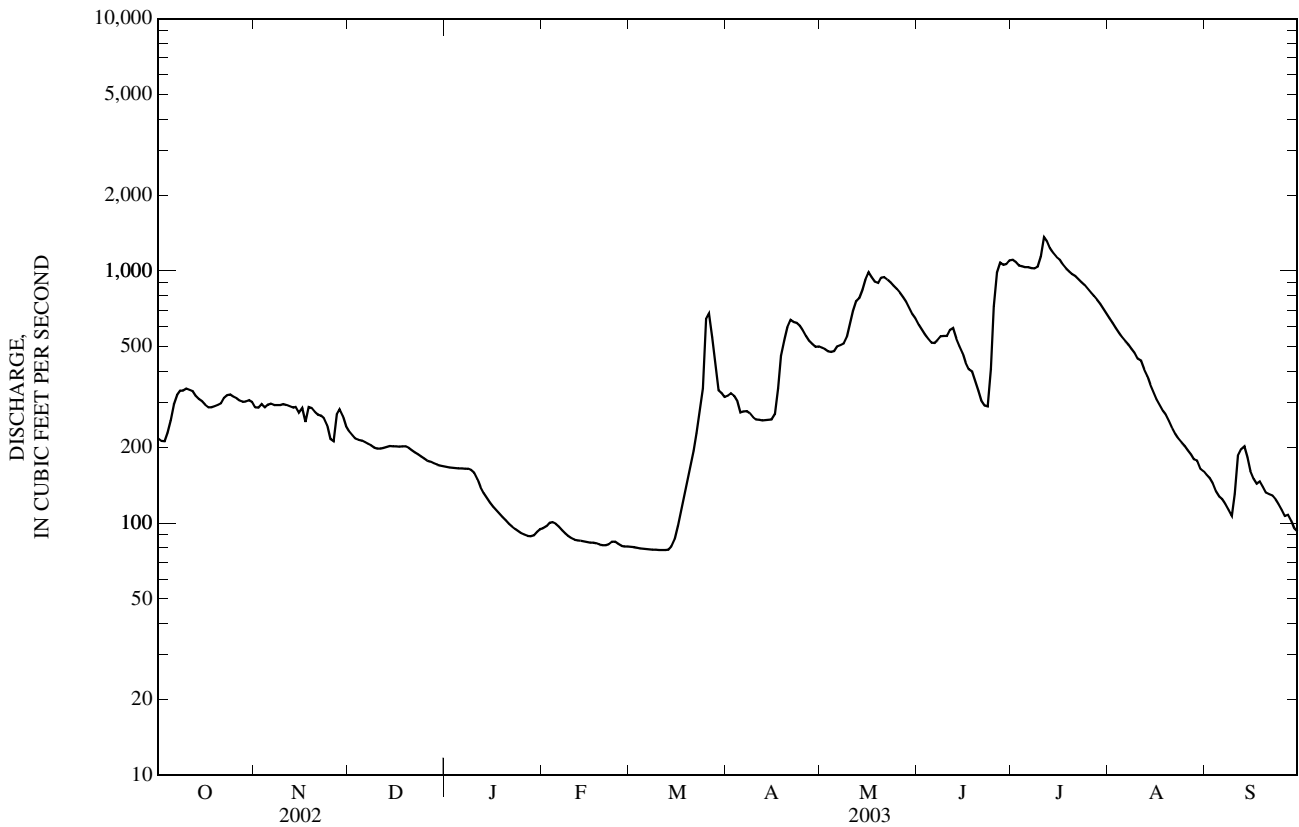
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1938 - 2003, BY WATER YEAR (WY)

	236	202	128	75.6	79.2	401	1,123	709	598	488	282	221
MEAN	236	202	128	75.6	79.2	401	1,123	709	598	488	282	221
MAX	1,996	1,318	655	425	432	2,141	6,606	2,462	2,248	2,507	2,183	2,273
(WY)	(1985)	(1985)	(1985)	(1987)	(1998)	(1985)	(1997)	(1986)	(1984)	(1995)	(1993)	(1986)
MIN	5.51	8.67	4.77	0.094	0.000	2.92	90.9	81.6	36.8	15.1	6.19	3.50
(WY)	(1977)	(1977)	(1977)	(1940)	(1940)	(1965)	(1959)	(1939)	(1940)	(1940)	(1976)	(1976)

05304500 CHIPPEWA RIVER NEAR MILAN, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1938 - 2003	
ANNUAL TOTAL	152,969		134,270			
ANNUAL MEAN	419		368		a379	
HIGHEST ANNUAL MEAN					1,307	1986
LOWEST ANNUAL MEAN					45.4	1940
HIGHEST DAILY MEAN	1,430	Jun 23	1,360	Jul 11	13,400	Apr 6, 1997
LOWEST DAILY MEAN	150	Feb 4	78	Mar 9-12	b0.00	Jan 4, 1940
ANNUAL SEVEN-DAY MINIMUM	151	Feb 1	78	Mar 6	0.00	Jan 4, 1940
MAXIMUM PEAK FLOW			c1,390	Jul 11	14,400	Apr 6, 1997
MAXIMUM PEAK STAGE			d4.37	Mar 25	f18.03	Apr 6, 1997
INSTANTANEOUS LOW FLOW			g78	Mar 9	0.00	Jan 4, 1940
ANNUAL RUNOFF (AC-FT)	303,400		266,300		274,700	
ANNUAL RUNOFF (CFSM)	0.22		0.20		0.20	
ANNUAL RUNOFF (INCHES)	3.03		2.66		2.74	
10 PERCENT EXCEEDS	898		897		993	
50 PERCENT EXCEEDS	304		277		151	
90 PERCENT EXCEEDS	164		89		17	

- a Median of annual mean discharges is 330 ft³/s.
- b Many days in 1940.
- c Gage height, 4.03 ft.
- d Backwater from ice.
- e Estimated.
- f From highwater mark.
- g Estimated daily minimum.



05311000 MINNESOTA RIVER AT MONTEVIDEO, MN

LOCATION.--Lat 44°56'00", long 95°44'00", in NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 19, T.117 N., R.40 W., Yellow Medicine County, Hydrologic Unit 07020004, on right bank 20 ft upstream from bridge on U.S. Highway 212, at Montevideo, and 480 ft downstream from Chippewa River.

DRAINAGE AREA.--6,180 mi² (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.

REVISED RECORDS.--WSP 1035: 1919(M). WSP 1085: 1935-36. WSP 1508: 1912, 1925(M), 1929(M), WDR MN-2000-1; 1995, 1996.

GAGE.--Water-stage recorder. Datum of gage is 909.12 ft above sea level (NGVD of 1929). July 22, 1909 to Feb. 4, 1932, nonrecording gage at bridge 600 ft downstream at present datum. Feb. 5, 1932 to Nov. 26, 1934, nonrecording gage at bridge 100 ft downstream at present datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair to poor. Flow regulated by Big Stone Lake since Apr. 17, 1937, Lac qui Parle since Jan. 1938, and Marsh Lake since Nov. 1, 1939.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	172	632	e427	e310	e233	e259	847	1,050	1,200	1,880	1,040	156
2	229	599	e425	e310	e233	e260	569	1,050	1,190	2,090	983	154
3	289	592	e373	e318	e249	e285	570	1,040	1,070	2,100	971	140
4	351	593	e318	e328	e282	e527	569	1,040	796	1,880	936	124
5	360	588	e281	e332	e324	e654	630	1,040	738	1,840	765	122
6	335	546	e280	e332	e324	e647	647	966	785	2,000	615	118
7	360	538	e276	e332	e324	e624	682	876	990	2,240	515	116
8	611	539	e275	e332	e322	e527	685	855	1,050	2,230	500	114
9	768	538	e273	e324	e322	e522	684	984	1,060	2,280	495	84
10	771	539	e272	e314	e322	e501	740	1,150	1,180	2,300	497	111
11	757	552	e272	e314	e291	e417	624	1,230	1,200	2,270	501	107
12	760	534	e272	e314	e261	e369	542	1,430	1,200	2,280	569	92
13	758	535	e273	e314	e259	e363	530	1,720	1,180	e2,280	571	137
14	751	533	e273	e314	e258	e363	503	1,990	1,030	e2,290	519	145
15	731	532	e275	e310	e224	e365	439	2,300	990	e2,340	492	142
16	389	e511	e301	e300	e199	e367	428	2,490	967	e2,310	484	103
17	307	e527	e365	e282	e199	e450	445	2,510	830	e2,190	481	87
18	323	e525	e456	e246	e199	915	670	2,330	731	2,090	476	84
19	500	453	e513	e197	e199	1,390	881	2,290	628	1,820	484	81
20	516	435	e539	e195	e198	1,600	936	2,280	523	1,790	468	79
21	514	435	e532	e194	e237	1,550	1,410	2,230	359	1,730	339	81
22	518	430	e530	e194	e262	1,310	1,720	2,080	328	1,660	308	78
23	515	430	e525	e194	e263	1,230	1,810	1,700	339	1,650	307	79
24	522	427	e525	e194	e260	1,240	1,740	1,600	552	1,370	305	78
25	518	e346	e523	e194	e259	1,230	1,330	1,590	1,130	1,350	305	84
26	516	e429	e521	e194	e259	1,250	1,210	1,570	1,870	1,350	304	82
27	516	e427	e450	e194	e259	1,390	1,190	1,540	1,760	1,280	296	69
28	517	e429	e310	e194	e259	1,570	1,170	1,420	1,710	1,230	191	63
29	520	e427	e310	e213	---	1,460	1,050	1,260	1,700	1,040	157	57
30	530	e427	e310	e236	---	1,480	1,020	1,220	1,700	991	156	51
31	620	---	e310	e235	---	1,430	---	1,220	---	992	156	---
TOTAL	15,844	15,048	11,585	8,254	7,280	26,545	26,271	48,051	30,786	57,143	15,186	3,018
MEAN	511	502	374	266	260	856	876	1,550	1,026	1,843	490	101
MAX	771	632	539	332	324	1,600	1,810	2,510	1,870	2,340	1,040	156
MIN	172	346	272	194	198	259	428	855	328	991	156	51
AC-FT	31,430	29,850	22,980	16,370	14,440	52,650	52,110	95,310	61,060	113,300	30,120	5,990
CFSM	0.08	0.08	0.06	0.04	0.04	0.14	0.14	0.25	0.17	0.30	0.08	0.02
IN.	0.10	0.09	0.07	0.05	0.04	0.16	0.16	0.29	0.19	0.34	0.09	0.02

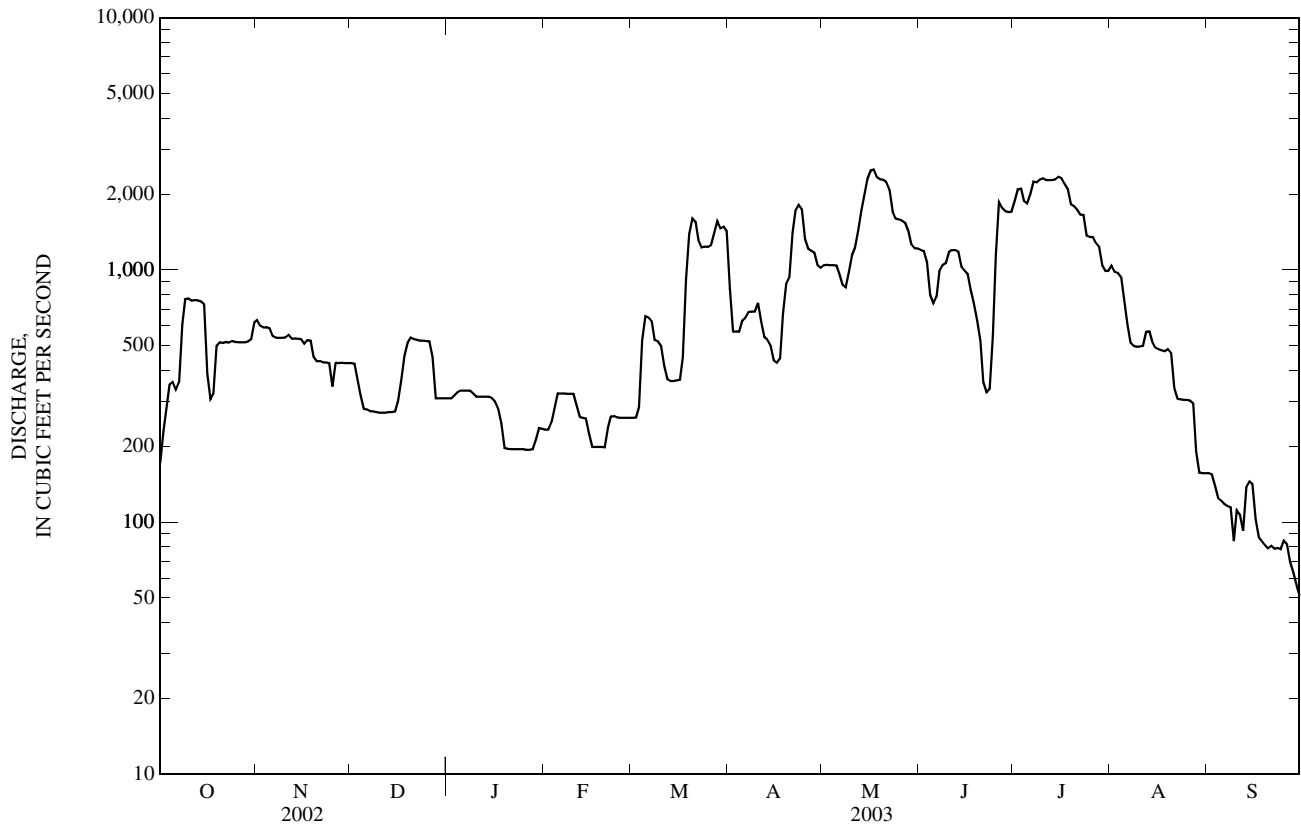
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 2003, BY WATER YEAR (WY)

MEAN	363	386	286	183	210	943	2,931	1,658	1,342	1,155	592	341
MAX	3,675	3,797	1,572	760	864	5,363	22,320	7,315	5,088	7,853	7,084	2,613
(WY)	(1996)	(1996)	(1996)	(1987)	(1998)	(1994)	(1997)	(1986)	(1984)	(1993)	(1993)	(1986)
MIN	0.76	1.61	2.35	1.57	1.06	5.06	7.82	3.13	1.40	1.89	0.60	0.57
(WY)	(1934)	(1935)	(1935)	(1934)	(1937)	(1934)	(1934)	(1934)	(1934)	(1933)	(1933)	(1933)

05311000 MINNESOTA RIVER AT MONTEVIDEO, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1909 - 2003	
ANNUAL TOTAL	330,930		265,011		a913	
ANNUAL MEAN	907		726		3,166 1997	
HIGHEST ANNUAL MEAN					4.43 1934	
LOWEST ANNUAL MEAN					46,800 Apr 7, 1997	
HIGHEST DAILY MEAN	3,600	Apr 11	2,510	May 17	47,500	Apr 6, 1997
LOWEST DAILY MEAN	172	Oct 1	51	Sep 30	b0.00	Aug 14, 1933
ANNUAL SEVEN-DAY MINIMUM	185	Sep 25	69	Sep 24	0.00	Jul 5, 1934
MAXIMUM PEAK FLOW			c2,540	May 17	23.90	Apr 6, 1997
MAXIMUM PEAK STAGE			9.16	May 17	b0.00	Aug 14, 1933
INSTANTANEOUS LOW FLOW			cd50	Sep 30		
ANNUAL RUNOFF (AC-FT)	656,400		525,600		661,500	
ANNUAL RUNOFF (CFSM)	0.15		0.12		0.15	
ANNUAL RUNOFF (INCHES)	1.99		1.60		2.01	
10 PERCENT EXCEEDS	2,200		1,710		2,320	
50 PERCENT EXCEEDS	611		517		280	
90 PERCENT EXCEEDS	292		194		34	

- a Median of annual mean discharges is 680 ft³/s.
- b Many days in 1933, 34, and 36.
- c Due in part to regulation.
- d Falling stage.
- e Estimated.



05313500 YELLOW MEDICINE RIVER NEAR GRANITE FALLS, MN

LOCATION.--Lat 44°43'18", long 95°31'07", in NW¼SW¼ sec. 35, T.115 N., R.39 W., Yellow Medicine County, Hydrologic Unit 07020004, on right bank 50 ft downstream from highway bridge, 6 mi upstream from mouth, and 8 mi south of town of Granite Falls.

DRAINAGE AREA.--664 mi².

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.

REVISED RECORDS.--WSP 1508: 1931, 1934(M), 1937(M), 1946(M), 1950(M).

GAGE.--Water-stage recorder. Datum of gage is 960.64 ft above sea level (NGVD of 1929). Mar. 16, 1931 to June 13, 1938, nonrecording gage, on bridge 50 ft upstream at present datum. Oct. 12, 1939 to Nov. 30, 1952, nonrecording gage 500 ft downstream at present datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair to poor.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in June 1919 reached a stage of 17.5 ft, from information by local residents, discharge, 25,200 ft³/s.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 260 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Mar 17	(daily)	e461	--	May 13	2200	430	3.83
Apr 21	1200	*512	3.96	Jun 25	1500	320	3.54

Minimum discharge, 3.1 ft³/s, on several days, gage height, 2.22 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10	35	e23	e20	e7.0	e6.5	84	183	142	104	11	3.6
2	8.6	31	e22	e20	e8.1	e7.0	82	181	135	91	9.9	3.4
3	8.5	36	e21	e20	e8.6	e6.5	78	183	128	79	9.0	3.5
4	19	41	e20	e20	e8.1	e6.1	73	177	123	71	8.6	3.1
5	27	41	e20	e20	e8.1	e6.1	67	178	121	65	11	3.1
6	49	41	e20	e19	e7.5	e6.1	62	181	119	65	12	3.1
7	64	40	e21	e19	e7.5	e5.6	59	193	116	63	11	3.2
8	52	39	e21	e19	e7.5	e5.6	56	192	119	57	9.8	3.4
9	50	38	e21	e19	e7.5	e5.3	52	201	125	53	8.9	3.6
10	48	37	e21	e19	e7.5	e4.6	48	232	132	49	9.2	6.3
11	45	37	e20	e18	e7.5	e4.6	46	305	130	45	11	11
12	42	37	e20	e17	e7.0	e4.6	44	356	124	42	10	9.7
13	43	36	e20	e15	e7.0	e4.3	42	414	114	39	8.8	9.3
14	42	36	e20	e14	e7.0	e6.3	42	415	104	36	8.0	21
15	38	36	e20	e14	e6.5	e27	42	395	94	33	7.2	17
16	37	34	e21	e13	e6.5	e245	51	382	86	31	6.6	12
17	36	29	e21	e12	e6.5	e461	63	348	81	29	5.8	9.1
18	37	35	e22	e12	e6.5	e425	194	318	76	26	5.5	8.5
19	35	39	e22	e11	e6.5	e313	308	294	69	24	6.1	7.8
20	34	37	e22	e10	e6.5	e253	405	261	63	23	7.9	6.4
21	35	34	e22	e9.3	e6.5	e203	504	241	56	21	6.2	6.2
22	37	33	e21	e8.2	e6.5	e177	482	230	55	20	4.7	5.4
23	36	33	e21	e7.5	e7.0	e181	434	219	51	20	4.3	4.8
24	36	e29	e20	e7.3	e7.0	e205	384	215	55	19	4.1	4.3
25	34	e19	e20	e7.1	e7.5	e194	333	209	264	17	3.8	4.0
26	34	e20	e20	e7.1	e7.0	166	288	205	223	16	4.0	3.8
27	35	e23	e19	e7.0	e7.0	155	257	201	187	15	3.8	3.8
28	35	e25	e20	e7.0	e7.0	130	227	193	163	13	3.6	3.4
29	35	e24	e21	e6.5	---	105	205	181	139	13	3.7	3.3
30	36	e23	e21	e6.1	---	93	190	169	119	12	3.7	3.3
31	37	---	e21	e6.5	---	91	---	152	---	12	3.7	---
TOTAL	1,115.1	998	644	410.6	200.4	3,503.2	5,202	7,604	3,513	1,203	222.9	190.4
MEAN	36.0	33.3	20.8	13.2	7.16	113	173	245	117	38.8	7.19	6.35
MAX	64	41	23	20	8.6	461	504	415	264	104	12	21
MIN	8.5	19	19	6.1	6.5	4.3	42	152	51	12	3.6	3.1
AC-FT	2,210	1,980	1,280	814	397	6,950	10,320	15,080	6,970	2,390	442	378
CFSM	0.05	0.05	0.03	0.02	0.01	0.17	0.26	0.37	0.18	0.06	0.01	0.01
IN.	0.06	0.06	0.04	0.02	0.01	0.20	0.29	0.43	0.20	0.07	0.01	0.01

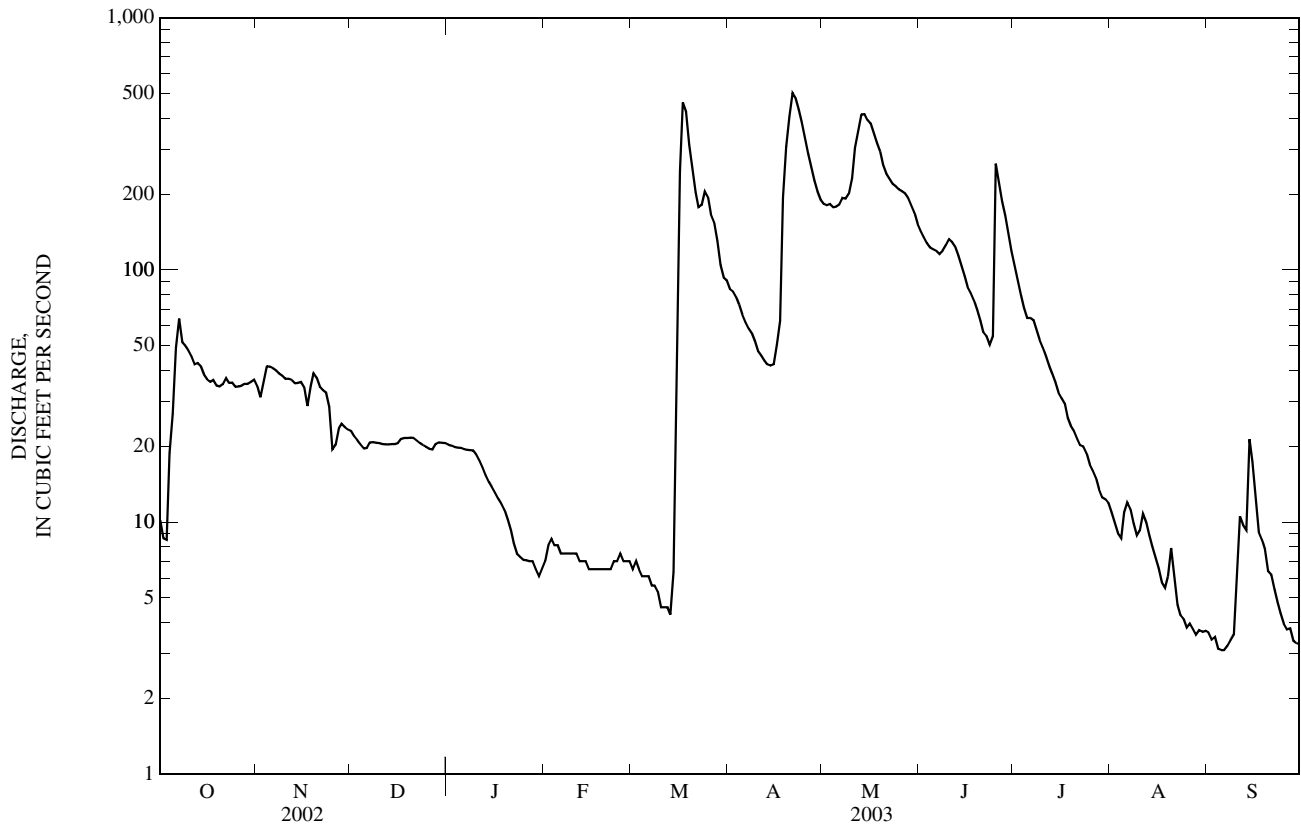
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1931 - 2003, BY WATER YEAR (WY)

MEAN	42.2	45.7	29.6	14.3	19.4	217	521	211	273	137	66.7	40.7
MAX	561	392	256	88.3	149	933	3,302	1,087	2,484	1,600	510	1,005
(WY)	(1996)	(1996)	(1996)	(1996)	(1998)	(1986)	(1969)	(1944)	(1984)	(1993)	(1953)	(1986)
MIN	1.41	1.60	1.39	0.90	0.13	3.67	2.58	1.18	1.18	0.34	0.38	0.47
(WY)	(1937)	(1938)	(1936)	(1948)	(1959)	(1975)	(1934)	(1934)	(1934)	(1933)	(1934)	(1976)

05313500 YELLOW MEDICINE RIVER NEAR GRANITE FALLS, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1931 - 2003	
ANNUAL TOTAL	52,004.5		24,806.6		a143	
ANNUAL MEAN	142		68.0		566	
HIGHEST ANNUAL MEAN					1993	
LOWEST ANNUAL MEAN					8.32	
HIGHEST DAILY MEAN	1,310	Apr 3	504	Apr 21	16,400	Apr 10, 1969
LOWEST DAILY MEAN	6.4	Sep 24	3.1	Sep 4-6	b0.00	Jul 26, 1931
ANNUAL SEVEN-DAY MINIMUM	6.8	Sep 19	3.3	Sep 2	0.00	Jan 21, 1948
MAXIMUM PEAK FLOW			c512	Apr 21	17,200	Apr 10, 1969
MAXIMUM PEAK STAGE			d4.79	Mar 17	14.90	Apr 10, 1969
INSTANTANEOUS LOW FLOW			3.1	Sep 4	b0.00	Jul 26, 1931
ANNUAL RUNOFF (AC-FT)	103,200		49,200		103,700	
ANNUAL RUNOFF (CFSM)	0.21		0.10		0.22	
ANNUAL RUNOFF (INCHES)	2.91		1.39		2.93	
10 PERCENT EXCEEDS	463		204		331	
50 PERCENT EXCEEDS	40		23		22	
90 PERCENT EXCEEDS	15		5.7		2.7	

- a Median of annual mean discharges is 87 ft³/s.
- b Many days, several years.
- c Gage height, 3.96 ft.
- d Backwater from ice.
- e Estimated



05315000 REDWOOD RIVER NEAR MARSHALL, MN

LOCATION.--Lat 44°25'49", long 95°50'43", in SW¹/₄SE¹/₄ sec. 12, T.111 N., R.42 W., Lyon County, Hydrologic Unit 07020006, on right bank 1.7 mi upstream from Redwood River diversion structure on southwest edge of town of Marshall, MN. Prior to Apr. 10, 1980, at site 5 mi downstream.

DRAINAGE AREA.--259 mi².

PERIOD OF RECORD.--March 1940 to current year. Monthly discharge only for some periods, published in WSP 1308.

REVISED RECORDS.--WDR MN-89-2: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,188.23 ft above sea level (NGVD of 1929). March 1940 to April 9, 1980, nonrecording gage 5.0 mi downstream from present site at datum 43.35 ft lower (crest-stage gage added June 12, 1968). From March 1964 to April 1980, nonrecording gage and crest-stage gage on diversion channel 1.5 mi downstream at datum 1,100.00 ft above sea level.

REMARKS.--Records good except those for estimated daily discharge, which are fair to poor. Water diverted at medium and high stages into diversion channel 3.4 mi below station. Diversion began Mar. 18, 1964. Unknown amount of natural diversion into Cottonwood River Basin occurs at extremely high stages 0.8 mi below station.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8.2	e20	e16	e9.8	e5.3	e4.7	21	164	64	47	9.6	6.4
2	6.7	e20	e15	e9.9	e5.8	e4.6	19	150	65	44	8.9	6.5
3	7.1	e19	e14	e9.9	e6.3	e4.5	16	138	65	40	8.7	6.5
4	26	19	e13	e9.9	e6.2	e4.3	14	129	65	40	8.4	6.6
5	26	18	e12	e9.9	e6.1	e4.2	13	132	63	31	10	6.4
6	25	19	e12	e9.9	e6.0	e4.1	13	139	66	27	9.3	6.5
7	21	18	e12	e9.9	e5.9	e4.0	13	134	69	25	8.7	6.7
8	17	18	e13	e9.9	e5.6	e3.9	12	125	72	24	8.4	6.8
9	16	19	e13	e10	e5.4	e3.8	12	167	70	28	8.3	6.3
10	16	19	e13	e9.7	e5.2	e3.7	12	191	70	30	8.5	13
11	17	18	e13	e9.3	e5.1	e3.6	13	218	67	29	8.3	22
12	18	17	e13	e8.8	e4.9	e3.5	13	231	62	25	8.1	17
13	17	19	e13	e8.5	e4.9	e3.5	12	211	58	19	7.9	15
14	16	19	e13	e8.2	e4.9	e5.0	12	199	53	17	7.6	11
15	16	20	e13	e7.7	e4.9	e191	13	193	48	16	7.5	9.7
16	18	e20	e13	e7.3	e5.0	e269	141	184	45	15	7.5	8.6
17	17	e19	e14	e6.9	e5.1	e234	377	171	46	14	6.9	7.6
18	17	e19	e14	e6.5	e5.1	e156	374	156	58	13	6.6	8.9
19	20	18	e14	e6.2	e5.2	e105	442	158	50	13	6.3	8.4
20	19	16	e14	e6.0	e5.3	e70	494	148	43	14	7.1	7.5
21	19	16	e14	e5.9	e5.4	e53	455	133	37	14	7.0	7.6
22	18	16	e14	e5.8	e5.4	e43	390	125	34	14	6.6	7.5
23	18	15	e14	e5.6	e5.3	e38	363	120	33	12	6.7	7.3
24	20	e15	e13	e5.5	e5.1	e38	317	114	42	12	6.8	7.2
25	20	e13	e11	e5.4	e4.9	37	284	110	55	11	6.6	6.3
26	20	e13	e9.9	e5.4	e4.9	34	260	104	74	9.9	7.0	6.1
27	19	e13	e9.5	e5.3	e4.8	35	237	97	72	9.9	6.2	5.9
28	20	e14	e9.4	e5.2	e4.8	27	213	93	68	11	6.5	5.8
29	21	e15	e9.3	e5.2	---	e21	186	86	59	11	6.1	5.9
30	22	e16	e9.4	e5.2	---	e21	170	78	55	15	6.2	5.7
31	20	---	e9.8	e5.3	---	e21	---	76	---	13	6.4	---
TOTAL	561.0	520	390.3	234.0	148.8	1,495.4	4,911	4,474	1,728	643.8	234.7	252.7
MEAN	18.1	17.3	12.6	7.55	5.31	48.2	164	144	57.6	20.8	7.57	8.42
MAX	26	20	16	10	6.3	269	494	231	74	47	10	22
MIN	6.7	13	9.3	5.2	4.8	3.5	12	76	33	9.9	6.1	5.7
AC-FT	1,110	1,030	774	464	295	2,970	9,740	8,870	3,430	1,280	466	501
CFSM	0.07	0.07	0.05	0.03	0.02	0.19	0.63	0.56	0.22	0.08	0.03	0.03
IN.	0.08	0.07	0.06	0.03	0.02	0.21	0.71	0.64	0.25	0.09	0.03	0.04

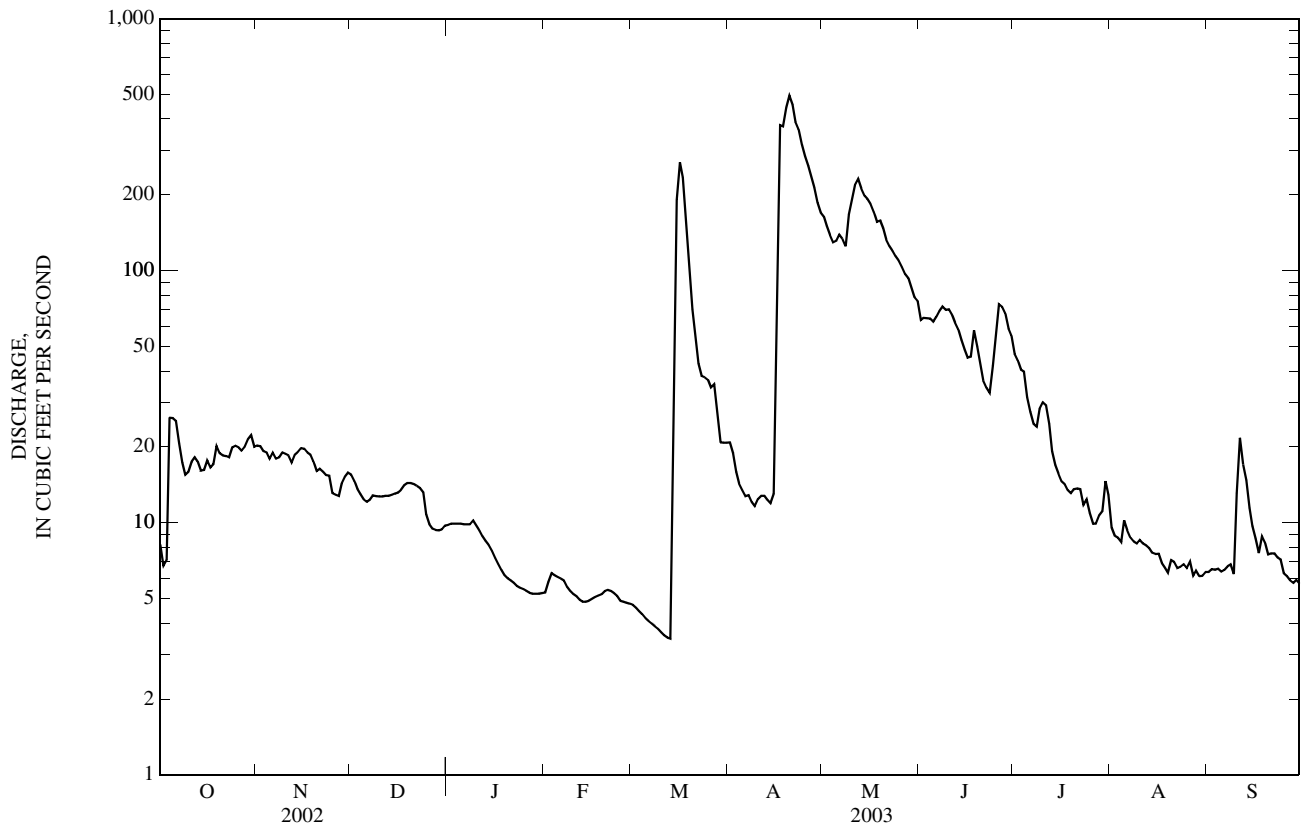
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1940 - 2003, BY WATER YEAR (WY)

MEAN	27.3	27.3	16.3	9.25	16.3	120	244	128	120	69.3	33.7	25.1
MAX	310	202	115	59.4	101	571	1,252	1,205	936	1,161	610	292
(WY)	(1996)	(1996)	(1999)	(1994)	(1983)	(1983)	(2001)	(1993)	(1993)	(1993)	(1993)	(1986)
MIN	0.029	0.58	0.87	0.000	0.090	2.70	7.36	3.90	0.83	0.058	0.042	0.007
(WY)	(1977)	(1977)	(1977)	(1977)	(1979)	(1965)	(1990)	(1981)	(1976)	(1976)	(1941)	(1941)

05315000 REDWOOD RIVER NEAR MARSHALL, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1940 - 2003	
ANNUAL TOTAL	25,533.3		15,593.7			
ANNUAL MEAN	70.0		42.7		a70.3	
HIGHEST ANNUAL MEAN					421	1993
LOWEST ANNUAL MEAN					5.13	1981
HIGHEST DAILY MEAN	372	Apr 1	494	Apr 20	5,300	May 9, 1993
LOWEST DAILY MEAN	4.0	Sep 22	3.5	Mar 12, 13	0.00	Jul 28, 1940
ANNUAL SEVEN-DAY MINIMUM	5.0	Sep 18	3.7	Mar 7	0.00	Jul 28, 1940
MAXIMUM PEAK FLOW			532	Apr 19	6,380	May 9, 1993
MAXIMUM PEAK STAGE			11.44	Apr 19	17.00	May 9, 1993
INSTANTANEOUS LOW FLOW			c1.3	Nov 2	0.00	Jul 28, 1940
ANNUAL RUNOFF (AC-FT)	50,650		30,930		50,900	
ANNUAL RUNOFF (CFSM)	0.27		0.16		0.27	
ANNUAL RUNOFF (INCHES)	3.67		2.24		3.69	
10 PERCENT EXCEEDS	213		133		168	
50 PERCENT EXCEEDS	30		14		13	
90 PERCENT EXCEEDS	11		5.4		2.0	

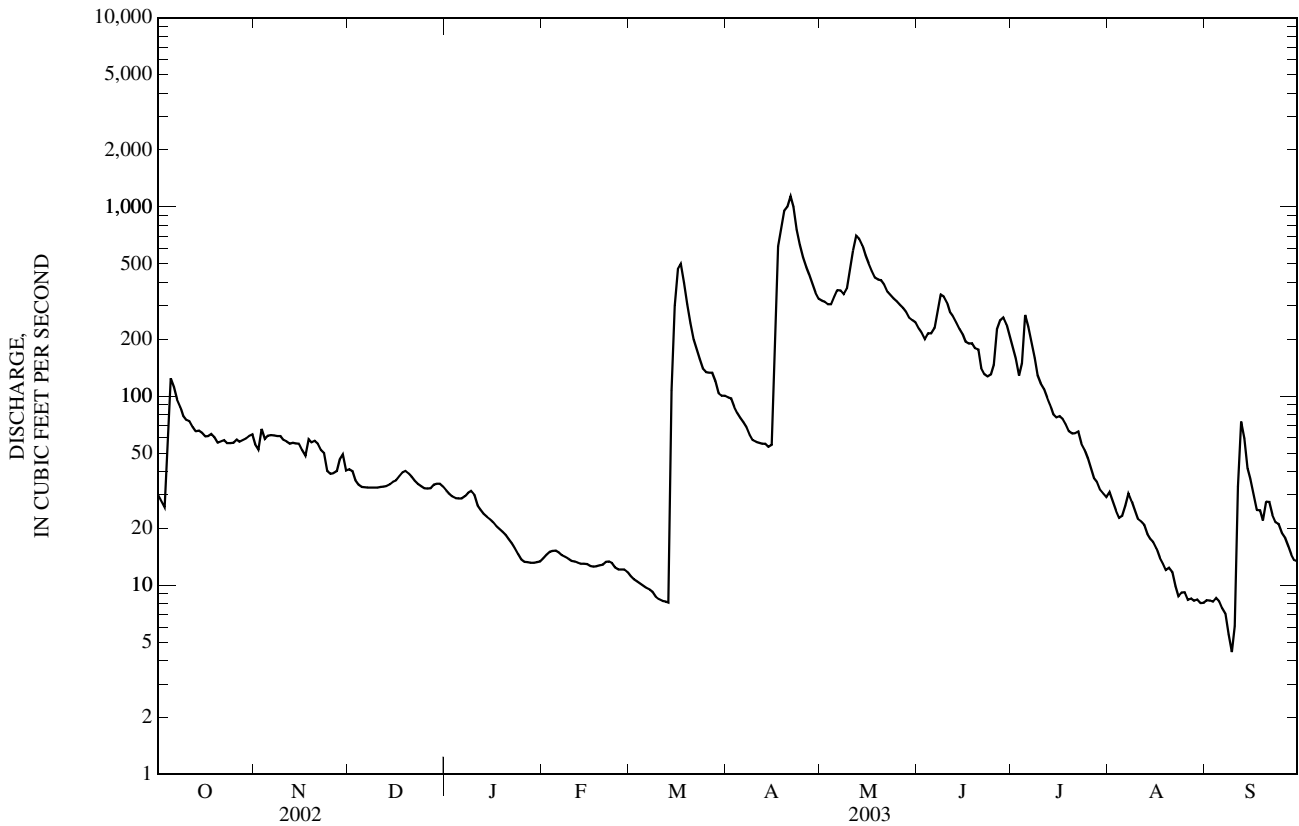
- a Median of annual mean discharges is 44.0 ft³/s.
- b Many days, several years.
- c Result of freezeup.
- e Estimated.



05316500 REDWOOD RIVER NEAR REDWOOD FALLS, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1909 - 2003	
ANNUAL TOTAL	77,090		43,289.6		a154	
ANNUAL MEAN	211		119		789	
HIGHEST ANNUAL MEAN					1993	
LOWEST ANNUAL MEAN					10.8	
HIGHEST DAILY MEAN	1,510	Jun 22	1,140	Apr 21	13,200	Apr 9, 1969
LOWEST DAILY MEAN	23	Sep 25	4.4	Sep 9	b0.00	Jan 17, 1940
ANNUAL SEVEN-DAY MINIMUM	25	Sep 20	6.8	Sep 4	0.01	Jan 25, 1940
MAXIMUM PEAK FLOW			c1,160	Apr 21	19,700	Jun 18, 1957
MAXIMUM PEAK STAGE			c4.67	Apr 21	d18.01	Mar 29, 1997
INSTANTANEOUS LOW FLOW			4.2	Sep 9	b0.00	Jan 17, 1940
ANNUAL RUNOFF (AC-FT)	152,900		85,860		111,400	
ANNUAL RUNOFF (CFSM)	0.34		0.19		0.24	
ANNUAL RUNOFF (INCHES)	4.56		2.56		3.32	
10 PERCENT EXCEEDS	616		336		365	
50 PERCENT EXCEEDS	90		52		34	
90 PERCENT EXCEEDS	34		12		2.8	

- a Median of annual mean discharges is 100 ft³/s.
- b Many days in 1940 and 1959.
- c From highwater mark.
- d Backwater from ice.
- e Estimated.



05316580 MINNESOTA RIVER AT MORTON, MN

LOCATION.--Lat 44°32'46", long 94°59'46", in NE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 36, T.113 N., R.35 W., Redwood County, Hydrologic Unit 07020007, on right bank 10 ft downstream from highway bridge, $\frac{1}{2}$ mi southwest of town of Morton, and 203 mi upstream from mouth.

DRAINAGE AREA.--8,970 mi².

PERIOD OF RECORD.--October 2000 to current year.

GAGE.--Water-stage recorder.

REMARKS.--Records good except those for estimated daily discharges, which are fair to poor. Some regulation from Big Stone Lake, Marsh Lake, and Lac qui Parle.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e402	869	e602	e486	e349	e476	1,970	2,370	2,360	2,870	1,270	e349
2	e396	898	e605	e484	e394	e534	1,650	2,310	2,300	2,780	1,300	e320
3	e354	886	e586	e484	e430	e549	1,280	2,250	2,240	2,820	1,270	e302
4	e500	852	e516	e492	e447	e553	1,110	2,200	2,140	e2,810	1,220	e286
5	669	858	e497	e494	e450	e559	1,010	2,240	1,910	e2,640	1,200	e258
6	854	856	e465	e470	e450	e597	960	2,390	1,730	e2,620	1,080	e229
7	947	858	e439	e475	e439	e665	968	2,370	1,810	e2,750	930	e219
8	924	806	e433	e472	e427	e709	1,060	2,250	2,200	e2,880	779	e215
9	903	810	e426	e475	e419	e729	1,020	2,270	2,540	2,790	724	e213
10	1,170	819	e423	e451	e406	e729	949	2,500	2,580	2,780	723	e221
11	1,240	836	e422	e429	e393	e701	961	2,930	2,560	2,780	728	e317
12	1,290	828	e422	e415	e380	e668	1,000	3,330	2,550	2,820	716	e385
13	1,310	789	e422	e407	e375	e665	922	3,580	2,470	2,750	718	e353
14	1,290	780	e423	e402	e361	e672	853	3,740	2,370	2,710	799	e305
15	1,300	785	e425	e398	e345	e1,210	853	3,840	2,190	2,680	755	e266
16	1,270	776	e422	e394	e329	e2,150	971	4,030	1,980	2,700	716	e246
17	1,200	764	e431	e388	e312	e2,780	1,590	4,120	1,870	2,750	e696	e232
18	859	720	e455	e376	e300	e3,000	1,980	4,080	1,740	2,680	e676	e219
19	749	774	e492	e362	e294	e3,070	2,380	3,980	1,560	2,560	e638	e209
20	783	765	e530	e339	e292	e2,940	2,990	4,010	1,420	2,330	e642	e201
21	922	711	e557	e321	e297	e2,950	3,440	4,330	1,280	2,210	e635	e180
22	906	698	e574	e316	e296	e3,030	3,630	4,200	1,150	2,210	e607	e204
23	872	674	e589	e312	e294	2,990	3,820	3,890	1,010	2,090	e573	e192
24	882	664	e580	e308	e301	2,850	3,780	3,490	946	2,030	e532	e171
25	875	e654	e562	e306	e317	2,740	3,620	3,200	1,100	1,820	e523	e179
26	864	e635	e553	e306	e335	2,790	3,230	3,090	2,410	1,680	e514	e162
27	860	e621	e551	e306	e386	2,560	2,930	2,980	3,790	1,660	e497	e163
28	885	e659	e538	e305	e432	2,440	2,760	2,910	3,810	1,600	e477	e164
29	843	e721	e506	e305	---	2,140	2,640	2,780	3,390	1,530	e414	e144
30	876	e611	e492	e309	---	1,980	2,490	2,630	3,090	1,440	e382	e145
31	868	---	e488	e326	---	2,070	---	2,460	---	1,310	e367	---
TOTAL	28,063	22,977	15,426	12,113	10,250	52,496	58,817	96,750	64,496	74,080	23,101	7,049
MEAN	905	766	498	391	366	1,693	1,961	3,121	2,150	2,390	745	235
MAX	1,310	898	605	494	450	3,070	3,820	4,330	3,810	2,880	1,300	385
MIN	354	611	422	305	292	476	853	2,200	946	1,310	367	144
AC-FT	55,660	45,570	30,600	24,030	20,330	104,100	116,700	191,900	127,900	146,900	45,820	13,980
CFSM	0.10	0.09	0.06	0.04	0.04	0.19	0.22	0.35	0.24	0.27	0.08	0.03
IN.	0.12	0.10	0.06	0.05	0.04	0.22	0.24	0.40	0.27	0.31	0.10	0.03

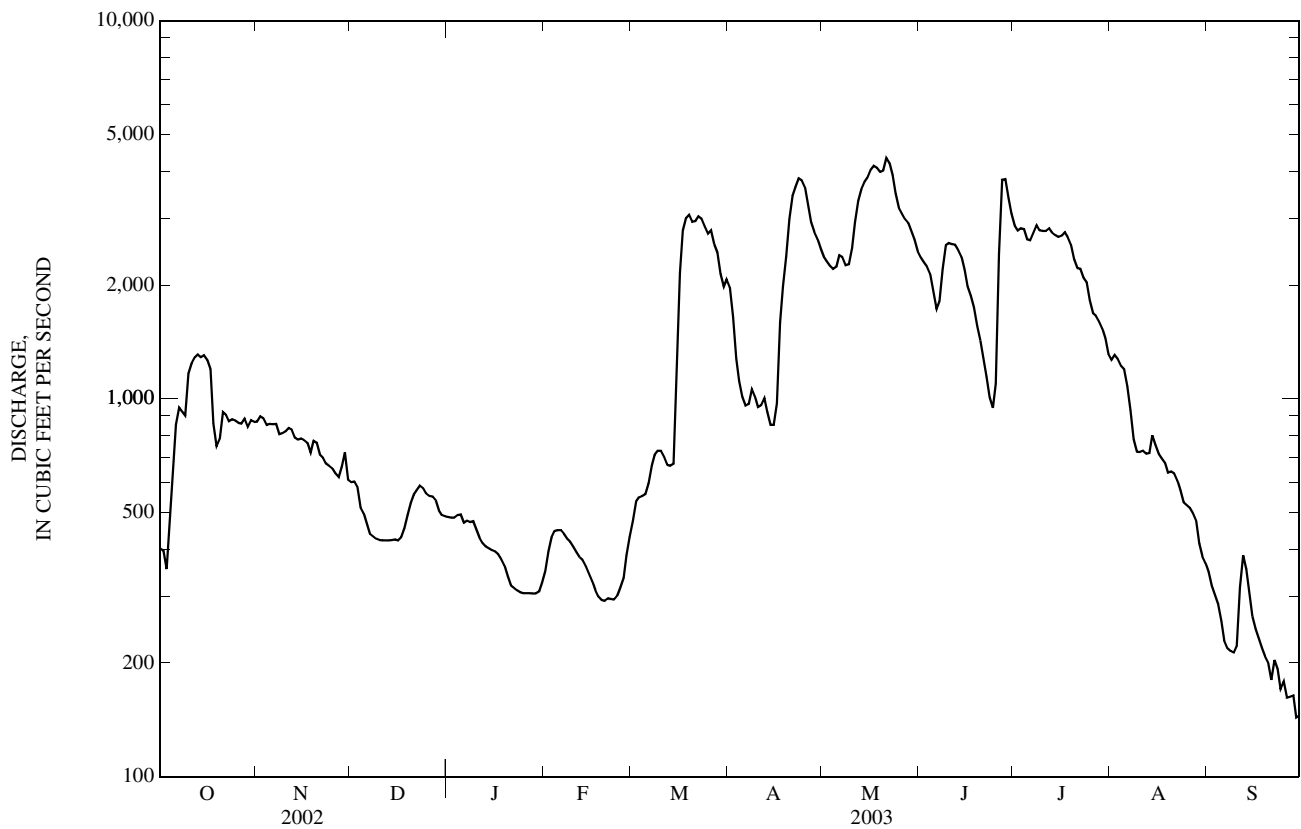
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 2001 - 2003, BY WATER YEAR (WY)

MEAN	473	582	573	430	477	1,130	11,260	6,283	3,601	2,381	1,034	463
MAX	905	766	945	661	806	1,693	26,720	11,780	6,049	3,354	1,385	724
(WY)	(2003)	(2003)	(2002)	(2002)	(2002)	(2003)	(2001)	(2001)	(2001)	(2001)	(2002)	(2002)
MIN	98.2	449	276	237	258	555	1,961	3,121	2,150	1,399	745	235
(WY)	(2001)	(2001)	(2001)	(2001)	(2001)	(2001)	(2003)	(2003)	(2003)	(2002)	(2003)	(2003)

05316580 MINNESOTA RIVER AT MORTON, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 2001 - 2003	
ANNUAL TOTAL	606,170		465,618			
ANNUAL MEAN	1,661		1,276		2,389	
HIGHEST ANNUAL MEAN					4,252 2001	
LOWEST ANNUAL MEAN					1,276 2003	
HIGHEST DAILY MEAN	6,660	Apr 14	4,330	May 21	45,400	Apr 15, 2001
LOWEST DAILY MEAN	354	Oct 3	a144	Sep 29	a81	Oct 6, 2000
ANNUAL SEVEN-DAY MINIMUM	423	Dec 10	161	Sep 24	86	Oct 5, 2000
MAXIMUM PEAK FLOW			4,400	May 21	45,400	Apr 15, 2001
MAXIMUM PEAK STAGE			16.02	May 21	b29.26	Apr 16, 2001
INSTANTANEOUS LOW FLOW			c144	Sep 29	a80	Oct 6, 2000
ANNUAL RUNOFF (AC-FT)	1,202,000		923,600		1,730,000	
ANNUAL RUNOFF (CFSM)	0.19		0.14		0.27	
ANNUAL RUNOFF (INCHES)	2.51		1.93		3.62	
10 PERCENT EXCEEDS	4,480		2,890		4,980	
50 PERCENT EXCEEDS	946		799		814	
90 PERCENT EXCEEDS	552		306		251	

- a Due in part to regulation.
- b Maximum recorded, peak stage was less than 30.0 feet.
- c Minimum recorded, peak stage was less than 30.0 feet.
- d Minimum daily. Occurred during falling stage. Due in part to regulation.
- e Estimated.



05317000 COTTONWOOD RIVER NEAR NEW ULM, MN

LOCATION.--Lat 44°17'29", long 94°26'24", in SW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 33, T.110 N., R.30 W., Brown County, Hydrologic Unit 07020008, on left bank 600 ft upstream from highway bridge, 1.8 mi south of New Ulm, and 3.2 mi upstream from mouth.

DRAINAGE AREA.--1,300 mi².

PERIOD OF RECORD.--July 1909 to December 1913, March 1931 to March 1938, August 1938 to current year (winter records incomplete prior to 1936).

REVISED RECORDS.--WSP 355: 1912.

GAGE.--Water-stage recorder. Datum of gage is 796.83 ft above sea level (NGVD of 1929). July 1, 1909 to Dec. 13, 1913, nonrecording gage at site 2.7 mi upstream at different datum. Mar. 15, 1931 to Mar. 31, 1938, nonrecording gage 2.2 mi upstream at datum 11.41 ft higher. Aug. 23, 1938 to June 25, 1948, nonrecording gage at present site and datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair to poor.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,100 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Apr 21	1900	1,300	6.90	Jun 26	0400	1,140	6.58
May 14	0400	*1,420	*7.15				

Minimum discharge, 19 ft³/s, Sept. 8, gage height, 2.62 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	75	175	e96	e104	e44	e41	198	543	520	761	66	25
2	72	168	e110	e103	e45	e40	207	516	482	652	62	26
3	69	166	e105	e102	e45	e38	215	501	460	558	60	25
4	110	170	e100	e102	e43	e38	206	479	444	514	58	23
5	118	189	e100	e103	e41	e38	196	477	440	439	62	23
6	205	187	e105	e105	e40	e37	170	476	427	401	60	22
7	245	185	e120	e105	e39	e37	152	503	444	358	59	21
8	273	183	118	e106	e39	e37	145	558	552	332	57	20
9	264	180	116	e104	e40	e37	146	613	754	351	56	20
10	261	180	119	e100	e39	e38	136	648	831	398	52	19
11	247	177	119	e78	e39	e40	134	845	835	319	51	67
12	254	172	117	e66	e40	e47	145	1,150	772	300	50	73
13	244	170	119	e56	e40	67	145	1,370	724	287	48	53
14	235	165	121	e45	e41	85	146	1,410	657	296	46	47
15	223	161	120	e41	e41	180	146	1,310	588	278	44	48
16	213	157	120	e40	e40	462	169	1,210	525	250	42	57
17	210	152	123	e40	e40	624	179	1,110	478	231	40	56
18	209	144	124	e41	e42	684	396	1,020	440	212	47	50
19	203	143	126	e42	e44	565	889	981	403	189	45	45
20	202	156	e120	e42	e44	533	1,160	1,050	368	183	43	40
21	197	156	e115	e41	e44	443	1,290	1,080	329	167	40	40
22	187	151	e108	e41	e43	371	1,270	1,020	341	158	38	38
23	182	144	e103	e40	e41	341	1,210	950	367	155	37	36
24	179	140	e101	e39	e39	368	1,110	886	651	136	35	34
25	178	120	e100	e39	e39	348	991	834	994	121	35	32
26	176	e86	e100	e39	e39	299	888	782	1,120	110	34	31
27	174	e82	e101	e40	e40	286	790	739	1,080	101	32	31
28	174	e88	e105	e40	e41	280	703	699	997	92	30	28
29	179	e100	e108	e41	---	264	636	651	914	84	28	28
30	181	e96	e110	e42	---	240	586	611	875	78	26	26
31	177	---	e107	e43	---	215	---	567	---	72	25	---
TOTAL	5,916	4,543	3,456	1,970	1,152	7,123	14,754	25,589	18,812	8,583	1,408	1,084
MEAN	191	151	111	63.5	41.1	230	492	825	627	277	45.4	36.1
MAX	273	189	126	106	45	684	1,290	1,410	1,120	761	66	73
MIN	69	82	96	39	39	37	134	476	329	72	25	19
AC-FT	11,730	9,010	6,850	3,910	2,280	14,130	29,260	50,760	37,310	17,020	2,790	2,150
CFSM	0.15	0.12	0.09	0.05	0.03	0.18	0.38	0.63	0.48	0.21	0.03	0.03
IN.	0.17	0.13	0.10	0.06	0.03	0.20	0.42	0.73	0.54	0.25	0.04	0.03

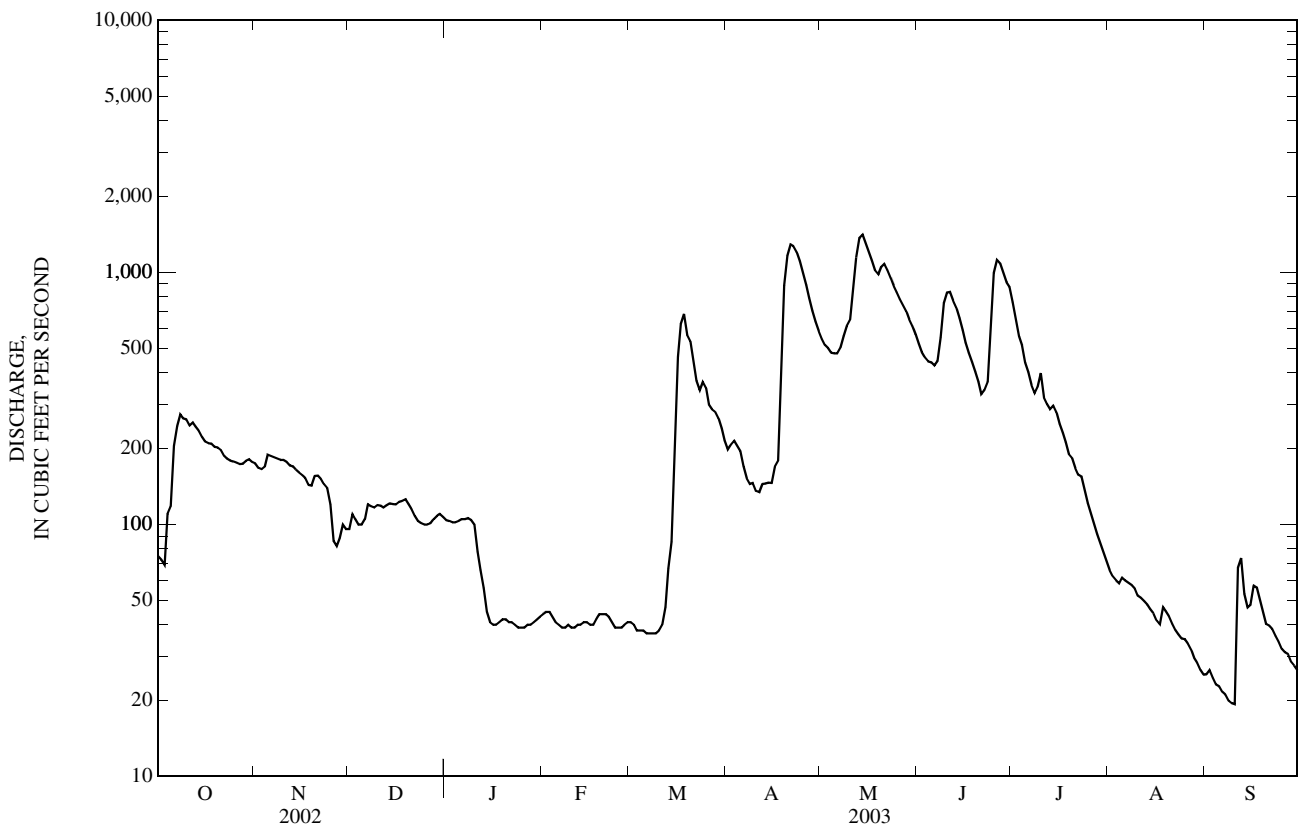
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 2003, BY WATER YEAR (WY)

MEAN	172	159	110	58.4	100	638	1,075	602	634	369	189	149
MAX	3,208	1,099	572	282	628	3,350	7,075	3,497	5,831	3,815	1,791	2,438
(WY)	(1969)	(1980)	(1980)	(1992)	(1983)	(1997)	(1969)	(1993)	(1993)	(1993)	(1993)	(1986)
MIN	4.57	7.97	5.77	1.61	1.47	13.9	40.0	7.57	8.58	4.37	1.05	3.28
(WY)	(1934)	(1940)	(1936)	(1940)	(1940)	(1965)	(1959)	(1934)	(1911)	(1934)	(1934)	(1933)

05317000 COTTONWOOD RIVER NEAR NEW ULM, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1909 - 2003	
ANNUAL TOTAL	161,342		94,390		a381	
ANNUAL MEAN	442		259		1,796	
HIGHEST ANNUAL MEAN					41.1	
LOWEST ANNUAL MEAN					27,100	
HIGHEST DAILY MEAN	5,050	Jun 4	1,410	May 14	0.60	Apr 9, 1969
LOWEST DAILY MEAN	54	Sep 24	19	Sep 10	0.64	Aug 1, 1934
ANNUAL SEVEN-DAY MINIMUM	64	Sep 18	21	Sep 4	28,700	Feb 1, 1940
MAXIMUM PEAK FLOW			1,420	May 14	20.86	Apr 10, 1969
MAXIMUM PEAK STAGE			7.15	May 14	b0.50	Apr 8, 1965
INSTANTANEOUS LOW FLOW			19	Sep 8	275,900	Nov 27, 1952
ANNUAL RUNOFF (AC-FT)	320,000		187,200			
ANNUAL RUNOFF (CFSM)	0.34		0.20		0.29	
ANNUAL RUNOFF (INCHES)	4.62		2.70		3.98	
10 PERCENT EXCEEDS	1,010		745		915	
50 PERCENT EXCEEDS	213		126		98	
90 PERCENT EXCEEDS	102		38		14	

a Median of annual mean discharges is 260 ft³/s.
 b Minimum observed.
 c Estimated.



05317200 LITTLE COTTONWOOD RIVER NEAR COURTLAND, MN

LOCATION.--Lat 44°14'47", long 94°20'19", in SW¹/₄NE¹/₄ sec.17, T.109 N., R.29 W., Blue Earth County, Hydrologic Unit 07020007, on right bank 30 ft downstream from bridge on State Highway 68, 0.7 mi above mouth, 1.5 mi south of Courtland.

DRAINAGE AREA.--170 mi².

PERIOD OF RECORD.--October 1973 to current year. September 1969 to September 1973, operated as a low-flow station only.

GAGE.--Water-stage recorder. Datum of gage is 788.25 ft above sea level (NGVD of 1929).

REMARKS.--Records good except those for estimated days, which are fair.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 200 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Jun 25	0700	*203	*4.65	No other peak greater than base discharge.			

Minimum discharge, 1.2 ft³/s, Sept. 10, gage height, 2.43 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	17	32	18	17	e3.8	11	42	47	75	113	12	2.2
2	16	31	25	16	e3.8	13	40	45	72	102	11	2.0
3	15	35	21	15	e3.8	6.1	39	44	69	90	9.6	1.9
4	21	33	20	15	e3.7	6.1	37	42	67	81	9.0	1.8
5	26	33	17	16	e3.5	6.2	35	45	65	70	11	1.7
6	55	33	17	17	e3.4	6.4	35	50	64	62	9.9	1.6
7	62	34	18	17	e3.3	6.5	32	52	64	55	8.6	1.6
8	65	37	17	18	e3.3	8.3	33	51	71	52	7.5	1.4
9	57	33	15	19	e3.3	6.0	31	56	82	63	6.9	1.4
10	54	33	16	23	e3.3	5.8	30	63	80	114	6.8	1.3
11	50	32	17	12	e3.3	5.7	30	115	80	76	5.9	2.5
12	48	30	20	10	e3.3	5.3	31	147	82	61	5.3	12
13	50	29	20	9.6	e3.3	5.5	31	139	81	53	4.9	7.4
14	51	30	20	8.6	e3.3	26	32	145	77	48	4.5	4.6
15	46	30	20	8.1	e3.3	70	34	144	70	45	4.2	3.4
16	43	29	21	8.3	e3.4	68	40	135	64	39	4.0	3.1
17	41	27	20	7.7	e3.5	81	52	129	60	36	3.8	3.0
18	40	27	23	7.2	e3.6	83	64	123	56	34	3.5	3.4
19	39	28	24	6.3	3.8	77	65	135	52	31	6.0	3.2
20	38	28	23	6.2	4.2	80	75	175	47	30	4.6	3.0
21	36	29	21	5.6	4.2	76	82	163	42	29	3.8	2.8
22	36	28	21	5.2	5.6	71	83	158	41	27	3.2	2.7
23	34	28	20	4.5	5.9	67	78	155	84	26	3.0	2.5
24	38	23	19	4.1	5.1	72	70	147	131	26	2.9	2.2
25	39	14	17	e3.9	5.1	60	66	138	189	24	2.8	1.9
26	34	25	15	e3.7	5.2	54	64	124	185	21	2.7	1.9
27	33	31	15	e3.6	4.9	50	60	110	163	19	2.4	1.9
28	32	26	16	e3.6	4.9	54	54	102	145	18	2.4	1.8
29	32	27	17	e3.6	---	55	50	93	128	18	2.3	1.7
30	33	21	19	e3.6	---	56	49	87	116	16	2.4	1.8
31	33	---	18	e3.7	---	45	---	79	---	14	2.4	---
TOTAL	1,214	876	590	302.1	111.1	1,236.9	1,464	3,238	2,602	1,493	169.3	83.7
MEAN	39.2	29.2	19.0	9.75	3.97	39.9	48.8	104	86.7	48.2	5.46	2.79
MAX	65	37	25	23	5.9	83	83	175	189	114	12	12
MIN	15	14	15	3.6	3.3	5.3	30	42	41	14	2.3	1.3
AC-FT	2,410	1,740	1,170	599	220	2,450	2,900	6,420	5,160	2,960	336	166
CFSM	0.23	0.17	0.11	0.06	0.02	0.23	0.29	0.61	0.51	0.28	0.03	0.02
IN.	0.27	0.19	0.13	0.07	0.02	0.27	0.32	0.71	0.57	0.33	0.04	0.02

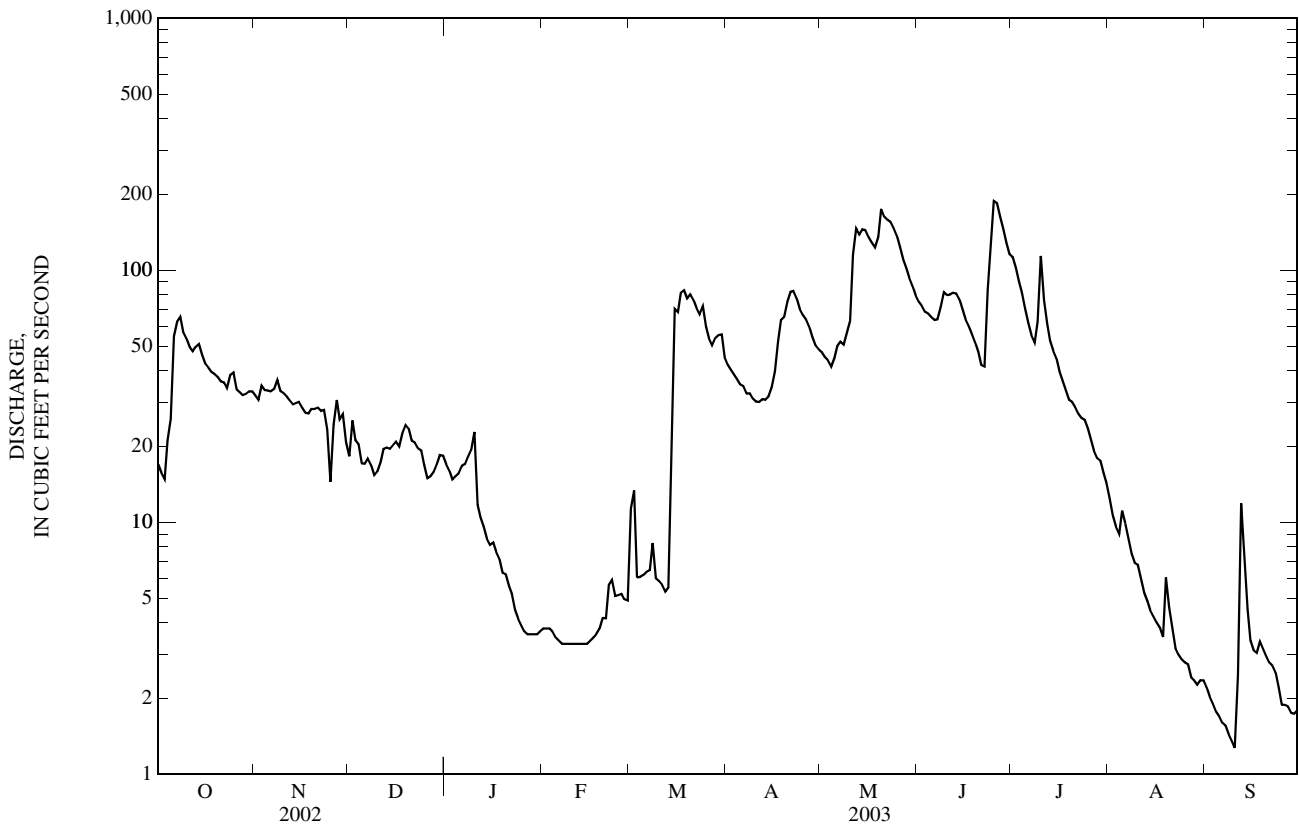
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1974 - 2003, BY WATER YEAR (WY)

MEAN	38.4	44.1	26.9	14.7	22.0	118	187	123	139	88.5	49.7	37.6
MAX	163	134	118	80.1	105	392	980	418	750	553	248	262
(WY)	(1987)	(1983)	(1992)	(1992)	(1983)	(1997)	(2001)	(1993)	(1993)	(1993)	(1993)	(1986)
MIN	0.75	0.70	0.21	0.15	0.38	5.79	9.64	4.17	2.39	0.63	0.81	0.54
(WY)	(1976)	(1977)	(1977)	(1977)	(1977)	(1975)	(1990)	(1981)	(1976)	(1988)	(1976)	(1976)

05317200 LITTLE COTTONWOOD RIVER NEAR COURTLAND, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1974 - 2003	
ANNUAL TOTAL	23,443.6		13,380.1		74.1	
ANNUAL MEAN	64.2		36.7		9.18	
HIGHEST ANNUAL MEAN					239	1993
LOWEST ANNUAL MEAN					9.18	1989
HIGHEST DAILY MEAN	747	Jun 4	189	Jun 25	2,850	Jun 20, 1993
LOWEST DAILY MEAN	4.6	Sep 24	1.3	Sep 10	0.02	Sep 12, 1977
ANNUAL SEVEN-DAY MINIMUM	5.9	Sep 18	1.5	Sep 4	0.08	Sep 11, 1977
MAXIMUM PEAK FLOW			203	Jun 25	a3,520	Jun 20, 1993
MAXIMUM PEAK STAGE			4.65	Jun 25	b11.60	Apr 4, 1997
INSTANTANEOUS LOW FLOW			1.2	Sep 10	0.01	Sep 17, 1977
ANNUAL RUNOFF (AC-FT)	46,500		26,540		53,680	
ANNUAL RUNOFF (CFSM)	0.38		0.22		0.44	
ANNUAL RUNOFF (INCHES)	5.13		2.93		5.92	
10 PERCENT EXCEEDS	103		82		190	
50 PERCENT EXCEEDS	31		26		27	
90 PERCENT EXCEEDS	17		3.3		1.6	

- a Gage-height, 10.45 ft.
- b Backwater from the Minnesota River.
- c Estimated.



05319500 WATONWAN RIVER NEAR GARDEN CITY, MN

LOCATION.--Lat 44°02'47", long 94°11'43", in SW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 28, T.107 N., R.28 W., Blue Earth County, Hydrologic Unit 07020010, on left bank 25 ft downstream from bridge on County Highway 13, 1.5 miles west of Garden City, 7.3 mi upstream from mouth, and 9.2 mi downstream from Perch Creek.

DRAINAGE AREA.--851 mi².

PERIOD OF RECORD.--March 1940 to September 1945, September 1976 to current year. 1953, 1960, 1961, and 1969 (one or more discharge measurements each year).

REVISED RECORDS.--WDR MN-78-2: 1977. WRIR 97-4249: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 905.05 ft above sea level (NGVD of 1929). Prior to September 30, 1945, nonrecording gage at site 200 ft upstream and at datum 0.17 ft higher.

REMARKS.--Records good except those for estimated daily discharge, which are fair to poor.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 7, 1965, reached a stage of 18.89 ft at datum 0.17 ft higher, from floodmarks, discharge, 19,000 ft³/s.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,200 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
May 21	1800	*1,270	4.14	No other peak greater than base discharge.			

Minimum discharge, 5.0 ft³/s, Sept. 9, gage height, 0.33 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	36	121	e64	e54	e22	e22	156	364	491	1,050	49	9.8
2	35	114	e66	e54	e22	e21	147	370	453	871	44	8.2
3	32	112	e62	e52	e21	e20	136	351	429	725	40	7.3
4	58	119	e56	e51	e20	e20	128	337	417	622	36	8.0
5	84	121	e54	e51	e19	e19	122	342	402	541	39	6.9
6	118	120	e54	e50	e19	e19	110	381	397	481	39	6.0
7	168	118	e56	e48	e19	e20	112	412	424	432	37	5.7
8	218	116	e58	e46	e19	e20	109	425	564	381	34	5.6
9	225	116	e56	e44	e20	e20	105	429	872	375	32	5.2
10	224	118	e58	e41	e21	e19	117	460	991	401	28	5.6
11	211	118	e59	e33	e20	e19	136	603	966	386	25	11
12	197	113	e60	e26	e19	e19	169	999	898	359	24	35
13	192	109	e60	e24	e20	e20	214	1,090	818	325	23	45
14	181	113	e60	e23	e20	e37	231	1,070	730	287	23	35
15	173	110	e62	e22	e20	e66	244	1,030	649	256	21	25
16	171	110	e62	e22	e20	e115	295	988	579	228	18	18
17	165	105	e63	e22	e21	e200	425	922	532	204	17	16
18	159	102	e63	e22	e21	e400	526	830	491	183	16	15
19	156	101	e64	e22	e22	e350	555	771	462	163	20	15
20	152	103	e62	e22	e22	e340	581	943	446	151	25	13
21	142	101	e60	e22	e22	e290	617	1,230	407	147	35	13
22	138	97	e58	e21	e22	e240	620	1,240	377	141	24	13
23	133	95	e56	e20	e21	e198	580	1,150	360	124	20	11
24	128	e92	e54	e19	e20	e165	533	1,040	406	111	18	11
25	127	e82	e54	e19	e20	e135	490	936	572	100	18	9.7
26	127	e76	e54	e19	e20	e120	454	840	762	91	17	10
27	125	e75	e55	e20	e21	150	421	756	882	82	15	9.5
28	126	e75	e56	e20	e22	214	396	693	916	72	15	8.7
29	126	e73	e57	e20	---	258	374	639	1,020	66	14	8.0
30	123	e62	e58	e21	---	210	355	586	1,130	61	12	7.0
31	121	---	e56	e22	---	173	---	555	---	55	11	---
TOTAL	4,371	3,087	1,817	952	575	3,919	9,458	22,782	18,843	9,471	789	397.2
MEAN	141	103	58.6	30.7	20.5	126	315	735	628	306	25.5	13.2
MAX	225	121	66	54	22	400	620	1,240	1,130	1,050	49	45
MIN	32	62	54	19	19	19	105	337	360	55	11	5.2
AC-FT	8,670	6,120	3,600	1,890	1,140	7,770	18,760	45,190	37,380	18,790	1,560	788
CFSM	0.17	0.12	0.07	0.04	0.02	0.15	0.37	0.86	0.74	0.36	0.03	0.02
IN.	0.19	0.13	0.08	0.04	0.03	0.17	0.41	1.00	0.82	0.41	0.03	0.02

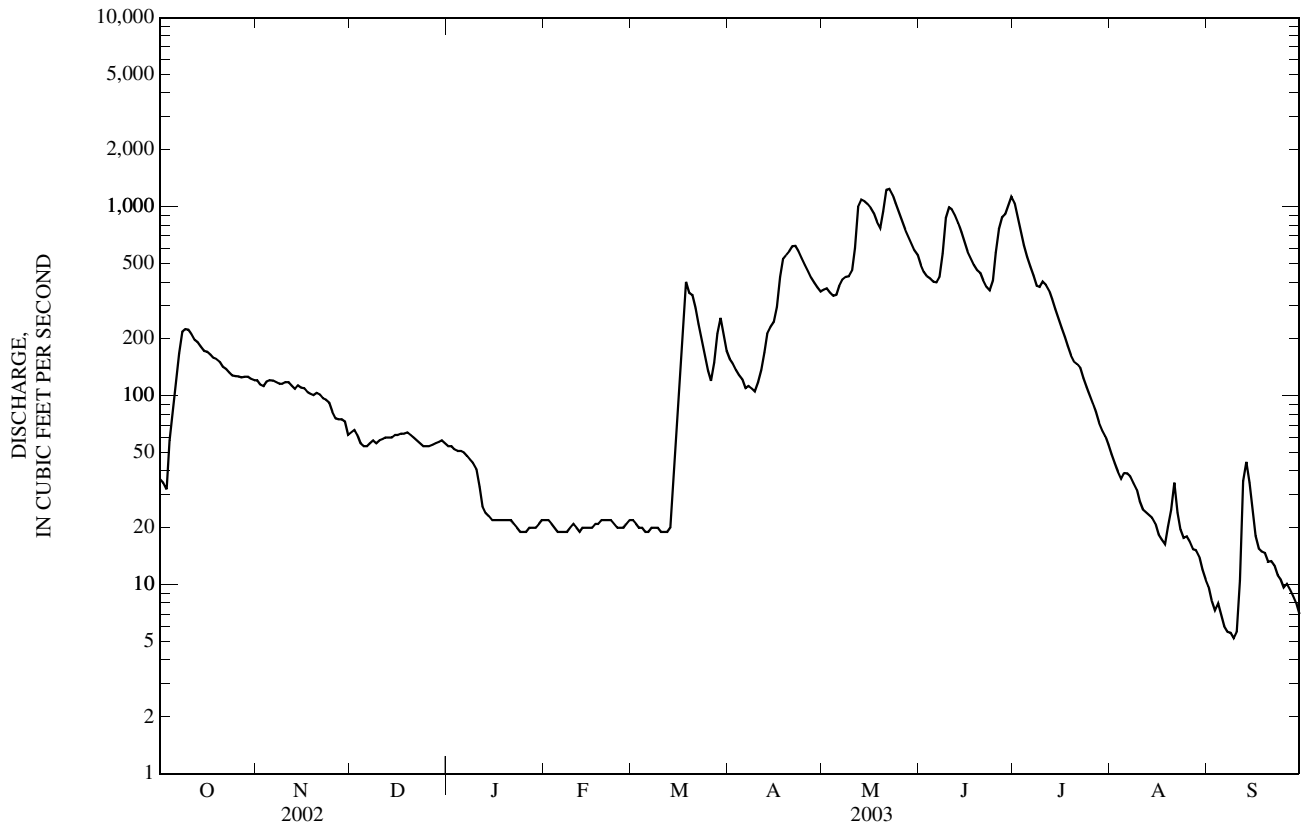
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1940 - 2003, BY WATER YEAR (WY)

MEAN	183	226	137	67.6	102	550	943	631	852	466	234	180
MAX	686	826	530	319	626	2,105	4,411	2,025	4,494	2,389	1,095	819
(WY)	(1993)	(1993)	(1992)	(1992)	(1983)	(1992)	(2001)	(1993)	(1993)	(1993)	(1979)	(1993)
MIN	5.37	7.69	3.76	2.70	2.39	19.3	33.7	16.1	17.3	8.27	6.56	3.63
(WY)	(1990)	(1977)	(1990)	(1977)	(1977)	(1940)	(1990)	(1940)	(1989)	(1940)	(1989)	(1976)

05319500 WATONWAN RIVER NEAR GARDEN CITY, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1940 - 2003	
ANNUAL TOTAL	61,719		76,461.2			
ANNUAL MEAN	169		209		391	
HIGHEST ANNUAL MEAN					1,330	1993
LOWEST ANNUAL MEAN					43.7	1989
HIGHEST DAILY MEAN	896	Aug 24	1,240	May 22	13,400	Jun 20, 1993
LOWEST DAILY MEAN	27	Sep 24	5.2	Sep 9	1.8	Dec 24, 1989
ANNUAL SEVEN-DAY MINIMUM	31	Sep 20	6.1	Sep 4	1.9	Jan 20, 1977
MAXIMUM PEAK FLOW			1,270	May 21	13,900	Jun 20, 1993
MAXIMUM PEAK STAGE			4.15	May 22	15.91	Jun 20, 1993
INSTANTANEOUS LOW FLOW			5.0	Sep 9	1.8	Dec 24, 1989
ANNUAL RUNOFF (AC-FT)	122,400		151,700		283,500	
ANNUAL RUNOFF (CFSM)	0.20		0.25		0.46	
ANNUAL RUNOFF (INCHES)	2.70		3.34		6.25	
10 PERCENT EXCEEDS	396		609		1,050	
50 PERCENT EXCEEDS	101		91		138	
90 PERCENT EXCEEDS	50		18		14	

e Estimated.



05320000 BLUE EARTH RIVER NEAR RAPIDAN, MN

LOCATION.--Lat 44°05'44", long 94°06'33", in SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 6, T.107 N., R.27 W., Blue Earth County, Hydrologic Unit 07020009, on left bank 0.2 mi downstream from power plant (reactivated in 1984) operated by Rapidan Redevelopment Limited Partnership, 2 mi west of Rapidan, 3.5 mi downstream from Watonwan River, and 7.8 mi upstream from Le Sueur River.

DRAINAGE AREA.--2,410 mi².

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. Annual maximums only, 1912 to 1939.

REVISED RECORDS.-- WSP 1508: 1910.

GAGE.--Water-stage recorder. Datum of gage is 807.83 ft above sea level (NGVD of 1929). July 20, 1909 to Apr. 28, 1910, nonrecording gage at site 0.2 mi upstream at different datum. Apr. 29 to Nov. 12, 1910, nonrecording gage at site 800 ft upstream at different datum. Oct. 4 to Nov. 14, 1939, nonrecording gage at present site and datum.

REMARKS.--Records good.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	204	592	263	234	87	107	900	1,280	1,600	2,620	292	55
2	211	571	276	236	79	104	711	1,260	1,510	2,280	263	54
3	244	542	283	236	80	104	764	1,240	1,430	2,060	213	54
4	374	534	264	234	89	105	608	1,120	1,350	1,780	123	44
5	265	543	331	216	101	104	563	1,240	1,240	1,480	143	45
6	894	548	311	215	114	104	562	1,180	1,270	1,470	175	44
7	1,920	542	301	215	113	106	562	1,790	1,250	1,260	183	45
8	2,140	520	312	227	112	105	556	2,290	1,390	1,350	182	45
9	2,080	522	287	245	112	108	504	2,320	1,920	1,180	180	44
10	1,910	531	279	239	101	107	572	2,280	2,260	1,480	130	42
11	1,630	529	300	204	96	92	559	2,940	2,320	1,690	107	42
12	1,490	531	309	183	92	84	778	4,000	2,480	2,260	107	59
13	1,370	531	302	181	91	86	1,010	4,380	2,520	2,080	106	94
14	1,240	482	300	171	92	87	1,100	4,730	2,290	1,780	121	87
15	1,150	466	300	142	95	129	1,170	4,740	2,120	1,560	130	79
16	1,080	465	302	146	95	165	1,370	4,220	1,810	1,330	129	76
17	1,050	466	302	150	95	274	1,360	3,770	1,830	1,200	110	60
18	983	465	302	148	96	395	2,030	3,500	1,780	1,080	96	49
19	934	465	301	137	93	377	2,230	3,290	1,420	964	85	48
20	930	439	301	129	88	438	2,250	3,240	1,470	882	74	46
21	815	420	304	127	99	438	2,260	3,350	1,400	768	63	45
22	756	419	313	120	106	506	2,490	3,240	1,190	719	71	45
23	772	414	310	114	106	545	2,470	3,030	1,310	651	78	45
24	692	408	259	106	107	514	2,270	2,890	1,120	583	93	45
25	669	345	229	105	108	384	2,040	2,700	1,400	577	92	40
26	654	303	209	96	109	345	1,900	2,480	1,610	409	89	36
27	650	237	219	96	110	410	1,690	2,370	1,940	353	87	35
28	649	270	235	98	108	417	1,570	2,200	2,560	397	83	35
29	629	326	263	94	---	474	1,480	2,070	2,760	334	64	34
30	601	403	261	92	---	1,020	1,400	1,930	2,780	266	54	34
31	596	---	243	92	---	1,070	---	1,800	---	279	55	---
TOTAL	29,582	13,829	8,771	5,028	2,774	9,304	39,729	82,870	53,330	37,122	3,778	1,506
MEAN	954	461	283	162	99.1	300	1,324	2,673	1,778	1,197	122	50.2
MAX	2,140	592	331	245	114	1,070	2,490	4,740	2,780	2,620	292	94
MIN	204	237	209	92	79	84	504	1,120	1,120	266	54	34
AC-FT	58,680	27,430	17,400	9,970	5,500	18,450	78,800	164,400	105,800	73,630	7,490	2,990
CFSM	0.39	0.19	0.12	0.07	0.04	0.12	0.54	1.10	0.73	0.49	0.05	0.02
IN.	0.45	0.21	0.13	0.08	0.04	0.14	0.61	1.27	0.82	0.57	0.06	0.02

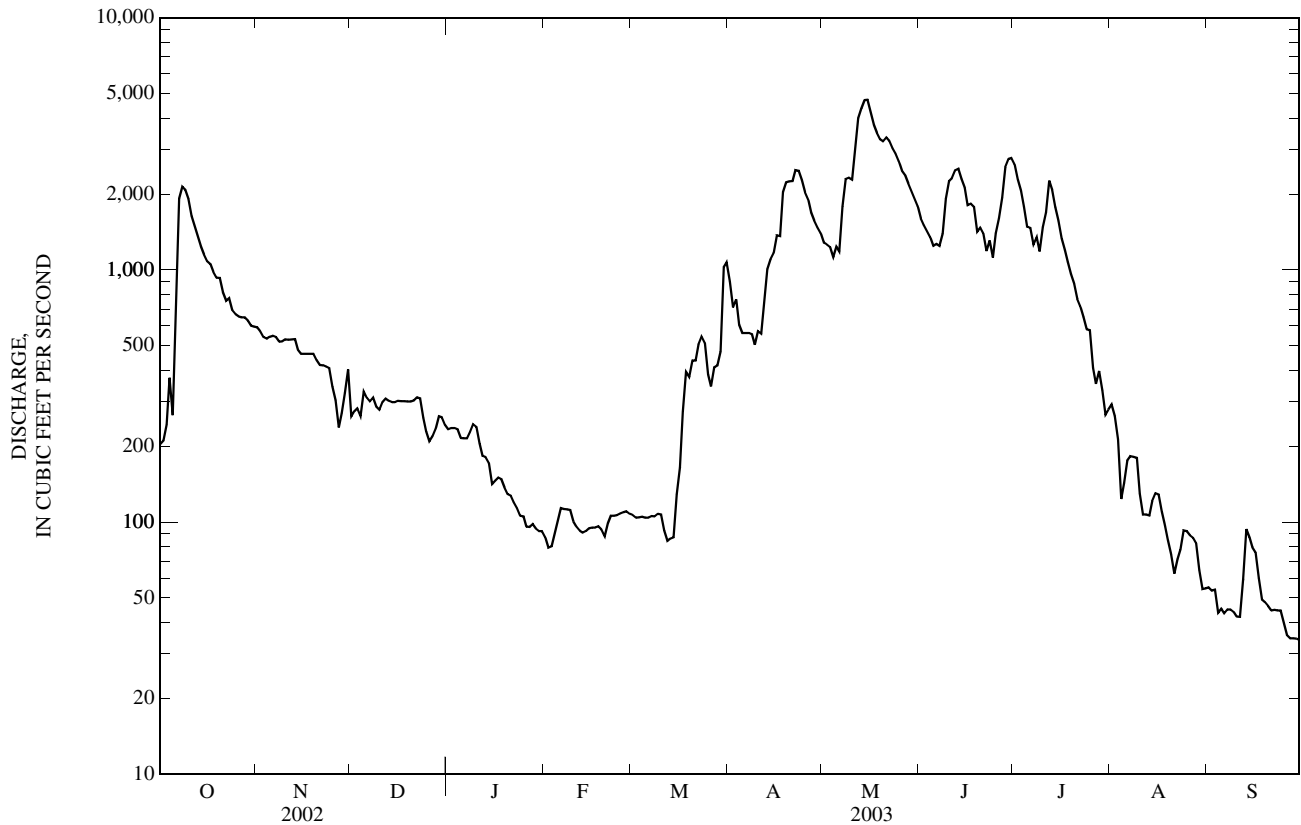
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 2003, BY WATER YEAR (WY)

MEAN	557	556	348	201	261	1,364	2,758	1,811	2,204	1,363	681	499
MAX	5,121	2,878	1,724	1,093	1,793	6,277	13,230	5,775	11,700	8,540	5,541	4,313
(WY)	(1969)	(1993)	(1992)	(1992)	(1983)	(1983)	(1965)	(1991)	(1993)	(1993)	(1979)	(1993)
MIN	22.5	26.7	16.0	14.8	14.2	92.4	142	53.4	110	30.9	37.7	22.1
(WY)	(1940)	(1940)	(1956)	(1977)	(1959)	(1968)	(1977)	(1940)	(1976)	(1940)	(1976)	(1976)

05320000 BLUE EARTH RIVER NEAR RAPIDAN, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1909 - 2003	
ANNUAL TOTAL	228,545		287,623		1,067	
ANNUAL MEAN	626		788		4,518	
HIGHEST ANNUAL MEAN					105	
LOWEST ANNUAL MEAN					1940	
HIGHEST DAILY MEAN	2,900	Jun 14	4,740	May 15	42,500	Apr 9, 1965
LOWEST DAILY MEAN	93	Jan 1	34	Sep 29,30	7.4	Oct 28, 1955
ANNUAL SEVEN-DAY MINIMUM	109	Jan 1	37	Sep 24	8.1	Oct 24, 1955
MAXIMUM PEAK FLOW			a5,660	May 14	43,100	Apr 9, 1965
MAXIMUM PEAK STAGE			a6.68	May 14	b21.36	Apr 9, 1965
INSTANTANEOUS LOW FLOW			a20	Sep 4	6.9	Oct 12, 1955
ANNUAL RUNOFF (AC-FT)	453,300		570,500		772,700	
ANNUAL RUNOFF (CFSM)	0.26		0.32		0.44	
ANNUAL RUNOFF (INCHES)	3.50		4.40		5.96	
10 PERCENT EXCEEDS	1,510		2,240		2,860	
50 PERCENT EXCEEDS	466		374		364	
90 PERCENT EXCEEDS	139		80		46	

a Due in part to regulation.
 b From floodmark.



05320270 LITTLE COBB RIVER NEAR BEAUFORD, MN

LOCATION.--Lat 43°59'48", long 93°54'30", in SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 11, T.106 N., R.26 W., Blue Earth County, Hydrologic Unit 07020011, on left bank at downstream end of bridge on County Road No. 16, 1.6 mi upstream from mouth, 2.6 mi east of Beauford, and 5.3 mi northeast of Mapleton.

DRAINAGE AREA.--130 mi².

PERIOD OF RECORD.--April 1996 to September 30, 1999, June 2001 to current year.

REVISED RECORDS.-- WDR MN-99-1: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 980 ft above sea level (from topographic map).

REMARKS.--Records good except those for estimated daily discharges, which are fair to poor.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum gage height observed, 12.17 ft, on April 5, 2001, discharge 2,220 ft³/s (from highwater mark).

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.0	34	15	7.6	0.88	1.0	73	94	64	60	4.8	0.00
2	6.5	32	17	7.4	1.3	1.1	67	85	57	55	3.8	0.00
3	11	30	12	7.3	1.8	0.88	60	77	53	49	3.0	0.00
4	36	31	15	7.6	1.7	0.78	55	70	50	44	2.5	0.00
5	103	30	13	7.6	0.96	0.78	51	70	47	40	2.3	0.00
6	181	29	13	7.5	0.79	0.68	46	82	47	37	2.5	0.00
7	248	29	14	6.9	0.62	0.62	46	102	54	34	1.9	0.00
8	280	28	13	7.1	0.61	0.65	43	111	70	31	1.6	0.00
9	311	27	13	7.6	0.49	0.85	44	129	75	34	1.2	0.00
10	346	27	13	5.7	0.47	0.89	45	157	90	96	0.99	0.00
11	345	27	13	5.3	0.39	0.66	47	243	98	128	0.75	0.00
12	309	26	13	6.3	0.38	0.74	49	284	102	130	0.62	0.00
13	263	25	12	5.9	0.38	0.78	50	303	102	125	0.45	0.00
14	226	24	11	e5.9	0.40	8.4	51	347	97	112	0.27	0.00
15	191	23	11	e6.6	0.41	43	54	397	88	97	0.20	0.00
16	160	23	11	e6.7	0.48	45	66	399	78	80	0.11	0.00
17	135	21	9.1	e6.8	0.47	50	118	371	70	66	e0.05	0.00
18	116	23	13	e6.9	0.49	58	145	340	65	55	e0.02	0.00
19	97	23	12	e6.8	0.57	56	157	307	58	47	e0.02	0.00
20	80	22	12	e5.7	0.99	58	169	276	52	43	e0.09	0.00
21	66	21	11	e5.0	1.3	54	177	248	46	38	0.13	0.00
22	59	20	10	e4.6	3.4	49	180	222	42	32	e0.05	0.00
23	53	20	9.6	e4.0	2.6	46	179	196	45	28	e0.01	0.00
24	48	19	9.7	2.1	1.7	44	171	174	47	24	0.00	0.00
25	45	14	9.2	1.0	1.6	39	161	154	52	21	0.00	0.00
26	44	19	8.6	0.63	1.1	32	151	137	62	18	0.00	0.00
27	43	19	8.1	0.52	0.94	35	138	122	67	16	0.00	0.00
28	40	18	8.2	0.55	0.90	57	127	108	68	12	0.00	0.00
29	38	19	8.4	0.50	---	87	113	95	67	9.2	0.00	0.00
30	37	15	8.5	0.49	---	90	102	84	64	7.4	0.00	0.00
31	36	---	7.9	0.66	---	82	---	73	---	6.1	0.00	---
TOTAL	3,958.5	718	354.3	155.25	28.14	943.81	2,935	5,857	1,977	1,574.7	27.36	0.00
MEAN	128	23.9	11.4	5.01	1.00	30.4	97.8	189	65.9	50.8	0.88	0.00
MAX	346	34	17	7.6	3.4	90	180	399	102	130	4.8	0.00
MIN	5.0	14	7.9	0.49	0.38	0.62	43	70	42	6.1	0.00	0.00
AC-FT	7,850	1,420	703	308	56	1,870	5,820	11,620	3,920	3,120	54	0.00
CFSM	0.98	0.18	0.09	0.04	0.01	0.23	0.75	1.45	0.51	0.39	0.01	0.00
IN.	1.13	0.21	0.10	0.04	0.01	0.27	0.84	1.68	0.57	0.45	0.01	0.00

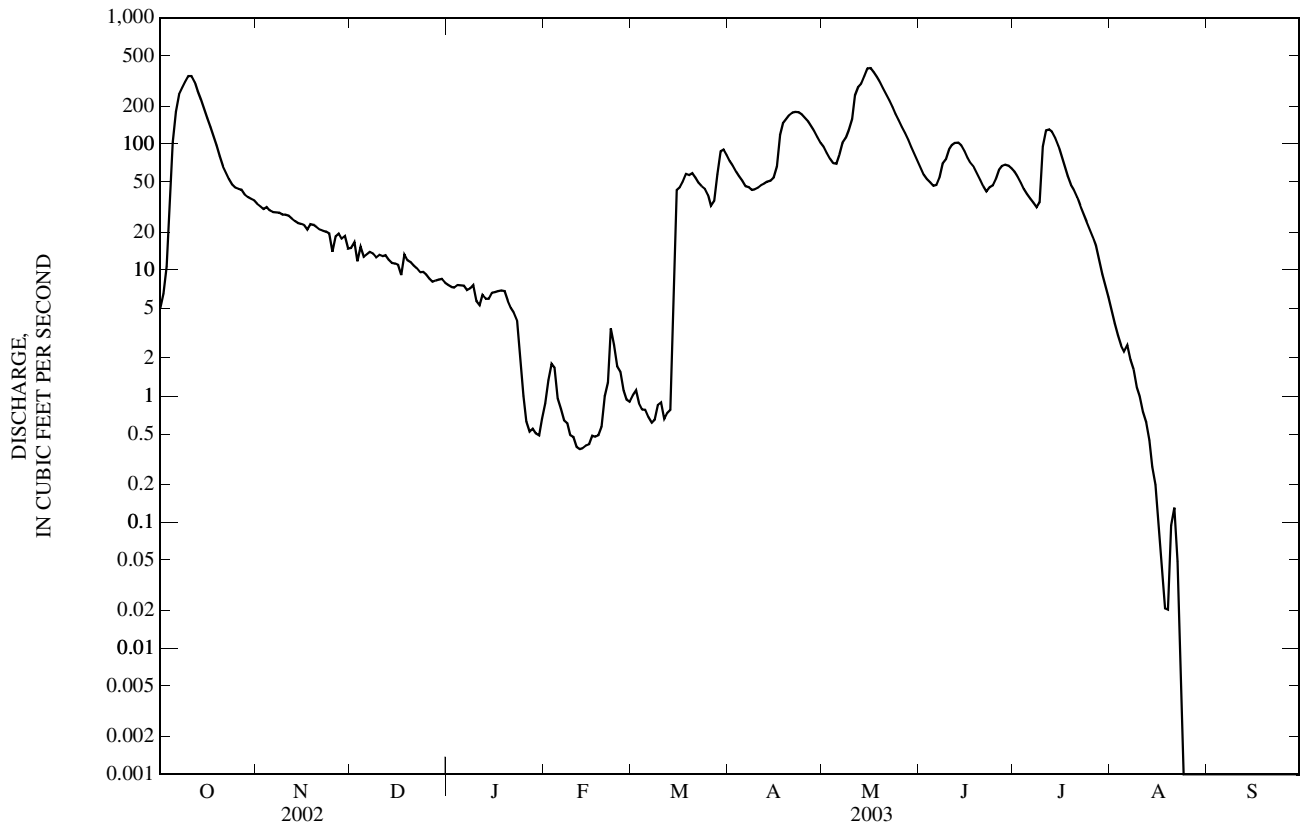
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1996 - 2003, BY WATER YEAR (WY)

MEAN	29.9	28.2	14.8	6.00	27.7	99.9	183	146	130	71.6	21.7	4.76
MAX	128	89.7	54.0	18.2	58.2	278	410	341	217	150	58.0	17.2
(WY)	(2003)	(1997)	(1997)	(1997)	(1999)	(1997)	(1999)	(1999)	(1999)	(1999)	(1999)	(1997)
MIN	0.00	0.74	1.46	0.49	1.00	12.5	42.6	40.6	65.9	23.8	0.88	0.00
(WY)	(2002)	(2002)	(2000)	(1999)	(2003)	(2002)	(2002)	(2002)	(2003)	(2002)	(2003)	(2003)

05320270 LITTLE COBB RIVER NEAR BEAUFORD, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1996 - 2003	
ANNUAL TOTAL	14,100.12		18,529.06			
ANNUAL MEAN	38.6		50.8		68.2	
HIGHEST ANNUAL MEAN					114	1999
LOWEST ANNUAL MEAN					25.3	2002
HIGHEST DAILY MEAN	346	Oct 10	399	May 16	811	Apr 12, 1999
LOWEST DAILY MEAN	0.18	Sep 24	0.00	Aug 24 - Sep 30	a0.00	Sep 6, 1998
ANNUAL SEVEN-DAY MINIMUM	0.33	Sep 19	0.00	Aug 24	0.00	Sep 12, 1998
MAXIMUM PEAK FLOW			406	May 15	852	Apr 12, 1999
MAXIMUM PEAK STAGE			8.82	May 15	11.38	Mar 14, 1997
INSTANTANEOUS LOW FLOW			0.00	Aug 23	a0.00	Sep 5, 1998
ANNUAL RUNOFF (AC-FT)	27,970		36,750		49,400	
ANNUAL RUNOFF (CFSM)	0.30		0.39		0.52	
ANNUAL RUNOFF (INCHES)	4.03		5.30		7.13	
10 PERCENT EXCEEDS	100		141		182	
50 PERCENT EXCEEDS	15		20		23	
90 PERCENT EXCEEDS	1.8		0.00		0.48	

a Many days, several years.
 e Estimated.



05320270 LITTLE COBB RIVER NEAR BEAUFORD, MN—Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Alachlor, water, fltrd, ug/L (46342)	alpha-HCH, water, fltrd, ug/L (34253)	Atrazine, water, fltrd, ug/L (39632)	Azin-phos- methyl, water, fltrd 0.7u GF ug/L (82686)	Ben- flur- alin, water, fltrd 0.7u GF ug/L (82673)	Butyl- ate, water, fltrd, ug/L (04028)	Car- baryl, water, fltrd 0.7u GF ug/L (82680)	Carbo- furan, water, fltrd 0.7u GF ug/L (82674)	Chlor- pyrifos water, fltrd, ug/L (38933)	cis- Per- methrin water fltrd 0.7u GF ug/L (82687)	Cyana- zine, water, fltrd, ug/L (04041)	DCPA, water fltrd 0.7u GF ug/L (82682)	Desulf- inyl fipro- nil, water, fltrd, ug/L (62170)
OCT 02...	<0.004	<0.005	0.093	<0.050	<0.010	<0.002	<0.041	<0.020	<0.005	<0.006	<0.018	<0.003	--
OCT 02...	--	--	--	--	--	--	--	--	--	--	--	--	--
NOV 13...	--	--	--	--	--	--	--	--	--	--	--	--	--
NOV 13...	--	--	--	--	--	--	--	--	--	--	--	--	--
DEC 26...	--	--	--	--	--	--	--	--	--	--	--	--	--
JAN 14...	--	--	--	--	--	--	--	--	--	--	--	--	--
FEB 12...	<0.004	<0.005	0.039	<0.050	<0.010	<0.002	<0.041	<0.020	<0.005	<0.006	<0.018	<0.003	<0.004
APR 09...	<0.004	<0.005	0.029	<0.050	<0.010	<0.002	<0.041	<0.020	<0.005	<0.006	<0.018	<0.003	<0.004
APR 09...	--	--	--	--	--	--	--	--	--	--	--	--	--
MAY 06...	<0.004	<0.005	0.054	<0.050	<0.010	<0.002	<0.041	<0.020	<0.005	<0.006	<0.018	<0.003	<0.004
JUN 19...	<0.004	<0.005	0.119	<0.050	<0.010	<0.002	<0.041	<0.020	<0.005	<0.006	<0.018	<0.003	<0.004
JUN 19...	0.139	0.128	0.239	E.096	0.082	0.103	E.102	E.126	0.114	0.063	0.130	0.105	<0.004
JUL 22...	<0.004	<0.005	<0.007	<0.050	<0.010	<0.002	<0.041	<0.020	<0.005	<0.006	<0.018	<0.003	<0.004
JUL 22...	<0.004	<0.005	0.307	<0.050	<0.010	<0.002	<0.041	<0.020	<0.005	<0.006	<0.018	<0.003	<0.004
AUG 06...	<0.004	<0.005	0.148	<0.050	<0.010	<0.002	<0.041	<0.020	0.007	<0.006	<0.018	<0.003	<0.004
AUG 06...	<0.004	<0.005	0.148	<0.050	<0.010	<0.002	<0.041	<0.020	0.007	<0.006	<0.018	<0.003	<0.004

Date	Diazi- non, water, fltrd, ug/L (39572)	Diel- drin, water, fltrd, ug/L (39381)	Disul- foton, water, fltrd 0.7u GF ug/L (82677)	EPTC, water, fltrd 0.7u GF ug/L (82668)	Ethal- flur- alin, water, fltrd 0.7u GF ug/L (82663)	Etho- prop, water, fltrd 0.7u GF ug/L (82672)	Desulf- inyl- fipro- nil amide, wat flt ug/L (62169)	Fipro- nil sulfide water, fltrd, ug/L (62167)	Fipro- nil sulfone water, fltrd, ug/L (62168)	Fipro- nil, water, fltrd, ug/L (62166)	Fonofos water, fltrd, ug/L (04095)	Lindane water, fltrd, ug/L (39341)	Linuron water fltrd 0.7u GF ug/L (82666)
OCT 02...	<0.005	<0.005	<0.02	<0.002	<0.009	<0.005	--	--	--	--	<0.003	<0.004	<0.035
OCT 02...	--	--	--	--	--	--	--	--	--	--	--	--	--
NOV 13...	--	--	--	--	--	--	--	--	--	--	--	--	--
NOV 13...	--	--	--	--	--	--	--	--	--	--	--	--	--
DEC 26...	--	--	--	--	--	--	--	--	--	--	--	--	--
JAN 14...	--	--	--	--	--	--	--	--	--	--	--	--	--
FEB 12...	<0.005	<0.005	<0.02	<0.002	<0.009	<0.005	<0.009	<0.005	<0.005	<0.007	<0.003	<0.004	<0.035
APR 09...	<0.005	<0.005	<0.02	<0.002	<0.009	<0.005	<0.009	<0.005	<0.005	<0.007	<0.003	<0.004	<0.035
APR 09...	--	--	--	--	--	--	--	--	--	--	--	--	--
MAY 06...	<0.005	<0.005	<0.02	<0.045	<0.009	<0.005	<0.009	<0.005	<0.005	<0.007	<0.003	<0.004	<0.035
JUN 19...	<0.005	<0.005	<0.02	<0.002	<0.009	<0.005	<0.009	<0.005	<0.005	<0.007	<0.003	<0.004	<0.035
JUN 19...	0.141	0.117	0.05	0.093	0.103	0.097	<0.009	<0.005	<0.005	<0.007	0.131	0.136	0.164
JUL 22...	<0.005	<0.005	<0.02	<0.007	<0.009	<0.005	<0.009	<0.005	<0.005	<0.007	<0.003	<0.004	<0.035
JUL 22...	<0.005	<0.005	<0.02	<0.005	<0.009	<0.005	<0.009	<0.005	<0.005	<0.007	<0.003	<0.004	<0.035
AUG 06...	<0.005	<0.005	<0.02	<0.002	<0.009	<0.005	<0.009	<0.005	<0.005	<0.007	<0.003	<0.004	<0.035
AUG 06...	<0.005	<0.005	<0.02	<0.002	<0.009	<0.005	<0.009	<0.005	<0.005	<0.007	<0.003	<0.004	<0.035

05320270 LITTLE COBB RIVER NEAR BEAUFORD, MN—Continued

WATER-QUALITY DATA, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Date	Malathion, water, fltrd, ug/L (39532)	Methyl parathion, water, fltrd 0.7u GF ug/L (82667)	Metolachlor, water, fltrd, ug/L (39415)	Metribuzin, water, fltrd, ug/L (82630)	Molinate, water, fltrd 0.7u GF ug/L (82671)	Napropamide, water, fltrd 0.7u GF ug/L (82684)	p,p'-DDE, water, fltrd, ug/L (34653)	Parathion, water, fltrd, ug/L (39542)	Pebulate, water, fltrd 0.7u GF ug/L (82669)	Pendimethalin, water, fltrd 0.7u GF ug/L (82683)	Phorate water fltrd 0.7u GF ug/L (82664)	Prometon, water, fltrd, ug/L (04037)	Pronamide, water, fltrd 0.7u GF ug/L (82676)
OCT 02...	<0.042	<0.006	0.032	<0.006	<0.002	<0.007	<0.003	<0.010	<0.004	<0.022	<0.011	E.01	<0.004
OCT 02...	--	--	--	--	--	--	--	--	--	--	--	--	--
NOV 13...	--	--	--	--	--	--	--	--	--	--	--	--	--
NOV 13...	--	--	--	--	--	--	--	--	--	--	--	--	--
DEC 26...	--	--	--	--	--	--	--	--	--	--	--	--	--
JAN 14...	--	--	--	--	--	--	--	--	--	--	--	--	--
FEB 12...	<0.027	<0.006	0.027	<0.006	<0.002	<0.007	<0.003	<0.010	<0.004	<0.022	<0.011	<0.01	<0.004
APR 09...	<0.027	<0.006	0.031	<0.006	<0.002	<0.007	<0.003	<0.010	<0.004	<0.022	<0.011	<0.01	<0.004
APR 09...	--	--	--	--	--	--	--	--	--	--	--	--	--
MAY 06...	<0.027	<0.006	0.056	<0.006	<0.002	<0.007	<0.003	<0.010	<0.004	<0.022	<0.011	<0.01	<0.004
JUN 19...	<0.027	<0.006	0.027	<0.006	<0.002	<0.007	<0.003	<0.010	<0.004	<0.022	<0.011	<0.01	<0.004
JUN 19...	0.096	0.108	0.160	0.111	0.111	0.121	0.068	0.161	0.102	0.108	0.079	0.12	0.119
JUL 22...	<0.027	<0.006	<0.013	<0.006	<0.002	<0.007	<0.003	<0.010	<0.004	<0.022	<0.011	<0.01	<0.004
JUL 22...	<0.027	<0.006	0.043	<0.006	<0.002	<0.007	<0.003	<0.010	<0.004	<0.022	<0.011	M	<0.004
AUG 06...	<0.027	<0.006	0.023	<0.006	<0.002	<0.007	<0.003	<0.010	<0.004	<0.022	<0.011	M	<0.004
AUG 06...	<0.027	<0.006	0.023	<0.006	<0.002	<0.007	<0.003	<0.010	<0.004	<0.022	<0.011	M	<0.004

Date	Propachlor, water, fltrd, ug/L (04024)	Propanil, water, fltrd 0.7u GF ug/L (82679)	Propargite, water, fltrd 0.7u GF ug/L (82685)	Simazine, water, fltrd, ug/L (04035)	Tebu-thiuron water fltrd 0.7u GF ug/L (82670)	Terbacil, water, fltrd 0.7u GF ug/L (82665)	Terbufos, water, fltrd 0.7u GF ug/L (82675)	Thio-bencarb water fltrd 0.7u GF ug/L (82681)	Tri-allate, water, fltrd 0.7u GF ug/L (82678)	Tri-fluralin, water, fltrd 0.7u GF ug/L (82661)	Suspended sediment concentration mg/L (80154)
OCT 02...	<0.010	<0.011	<0.02	<0.005	<0.02	<0.034	<0.02	<0.005	<0.002	<0.009	58
OCT 02...	--	--	--	--	--	--	--	--	--	--	--
NOV 13...	--	--	--	--	--	--	--	--	--	--	61
NOV 13...	--	--	--	--	--	--	--	--	--	--	--
DEC 26...	--	--	--	--	--	--	--	--	--	--	--
JAN 14...	--	--	--	--	--	--	--	--	--	--	99
FEB 12...	<0.010	<0.011	<0.02	<0.005	<0.02	<0.034	<0.02	<0.005	<0.002	<0.009	124
APR 09...	<0.010	<0.011	<0.02	<0.005	<0.02	<0.034	<0.02	<0.005	<0.002	<0.009	57
APR 09...	--	--	--	--	--	--	--	--	--	--	--
MAY 06...	<0.010	<0.011	<0.02	<0.005	<0.02	<0.034	<0.02	<0.005	<0.002	<0.009	138
JUN 19...	<0.010	<0.011	<0.02	<0.005	<0.02	<0.034	<0.02	<0.005	<0.002	<0.009	--
JUN 19...	0.141	0.128	0.11	0.101	0.14	E.105	0.08	0.139	0.130	0.084	--
JUL 22...	<0.010	<0.011	<0.02	<0.005	<0.02	<0.034	<0.02	<0.005	<0.002	<0.009	--
JUL 22...	<0.010	<0.011	<0.02	<0.005	<0.02	<0.034	<0.02	<0.005	<0.002	<0.009	--
AUG 06...	<0.010	<0.011	<0.02	0.006	<0.02	<0.034	<0.02	<0.005	<0.002	<0.009	--
AUG 06...	<0.010	<0.011	<0.02	0.006	<0.02	<0.034	<0.02	<0.005	<0.002	<0.009	--

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05320500 LE SUEUR RIVER NEAR RAPIDAN, MN

LOCATION.--Lat 44°06'40", long 94°02'28", in SW¹/₄ sec. 35, T.108 N., R.27 W., Blue Earth County, Hydrologic Unit 07020011, on right bank 600 ft downstream from highway bridge, 1.8 mi northeast of Rapidan, and 2.3 mi upstream from mouth.

DRAINAGE AREA.--1,110 mi².

PERIOD OF RECORD.--October 1939 to September 1945, July 1949 to current year.

GAGE.--Water-stage recorder. Datum of gage is 775.76 ft above sea level (NGVD of 1929). Prior to Nov. 15, 1939, nonrecording gage at same site and datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair to poor.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,600 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Oct 8	0700	2,950	5.77	May 15	0900	*3,980	*6.81
Apr 21	2200	1,630	4.24				

Minimum discharge, 13 ft³/s, Sept. 25, 26, 30, gage height, 0.69 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	172	474	e170	157	e43	e52	739	751	634	793	90	22
2	269	458	e160	e135	e45	e53	637	704	581	714	80	22
3	351	441	e155	e119	e47	e53	562	659	549	635	72	20
4	452	424	e153	e106	e48	e51	500	629	532	581	66	20
5	1,180	407	e150	e104	e47	e50	461	643	508	506	67	19
6	2,180	393	e150	e109	e46	e49	428	674	508	458	67	18
7	2,820	382	e153	e115	e44	e49	406	1,010	534	402	61	16
8	2,930	368	e158	123	e44	e49	406	1,210	689	370	57	16
9	2,690	356	e162	128	e44	e50	389	1,390	882	393	53	15
10	2,360	354	e166	141	e44	e52	407	1,670	1,070	820	51	15
11	2,080	353	e171	e110	e44	e54	457	2,470	1,110	910	48	18
12	1,810	333	179	e82	e44	e58	559	2,880	1,100	1,070	43	38
13	1,590	314	193	e69	e45	e66	655	3,080	1,060	1,030	39	32
14	1,380	300	195	e64	e46	e90	686	3,250	978	901	37	27
15	1,200	290	181	e59	e49	e130	693	3,790	891	803	38	26
16	1,080	296	195	e52	e48	e170	768	3,210	794	698	36	22
17	972	287	177	e49	e47	e250	1,130	2,870	742	607	34	20
18	894	279	169	e47	e47	e310	1,400	2,420	755	522	30	18
19	827	277	169	e47	e48	e325	1,540	2,090	668	431	31	17
20	762	275	189	e46	e50	351	1,560	1,850	583	364	34	16
21	692	268	189	e45	e56	313	1,620	1,640	517	326	38	15
22	639	266	171	e45	e64	292	1,610	1,480	469	289	35	16
23	597	253	150	e47	e66	275	1,530	1,350	456	257	30	15
24	562	247	135	e45	e60	310	1,420	1,230	478	223	27	14
25	547	e180	e123	e43	e57	273	1,290	1,110	491	197	29	13
26	566	e130	e120	e42	e55	243	1,170	1,010	508	171	32	15
27	570	e125	e123	e42	e54	244	1,070	924	607	154	28	16
28	556	e200	e128	e41	e53	391	970	843	780	140	25	15
29	527	e230	132	e41	---	622	885	787	791	123	23	14
30	508	e200	138	e41	---	967	812	737	821	109	22	14
31	493	---	172	e42	---	858	---	681	---	98	21	---
TOTAL	34,256	9,160	4,976	2,336	1,385	7,100	26,760	49,042	21,086	15,095	1,344	564
MEAN	1,105	305	161	75.4	49.5	229	892	1,582	703	487	43.4	18.8
MAX	2,930	474	195	157	66	967	1,620	3,790	1,110	1,070	90	38
MIN	172	125	120	41	43	49	389	629	456	98	21	13
AC-FT	67,950	18,170	9,870	4,630	2,750	14,080	53,080	97,270	41,820	29,940	2,670	1,120
CFSM	1.00	0.28	0.14	0.07	0.04	0.21	0.80	1.43	0.63	0.44	0.04	0.02
IN.	1.15	0.31	0.17	0.08	0.05	0.24	0.90	1.64	0.71	0.51	0.05	0.02

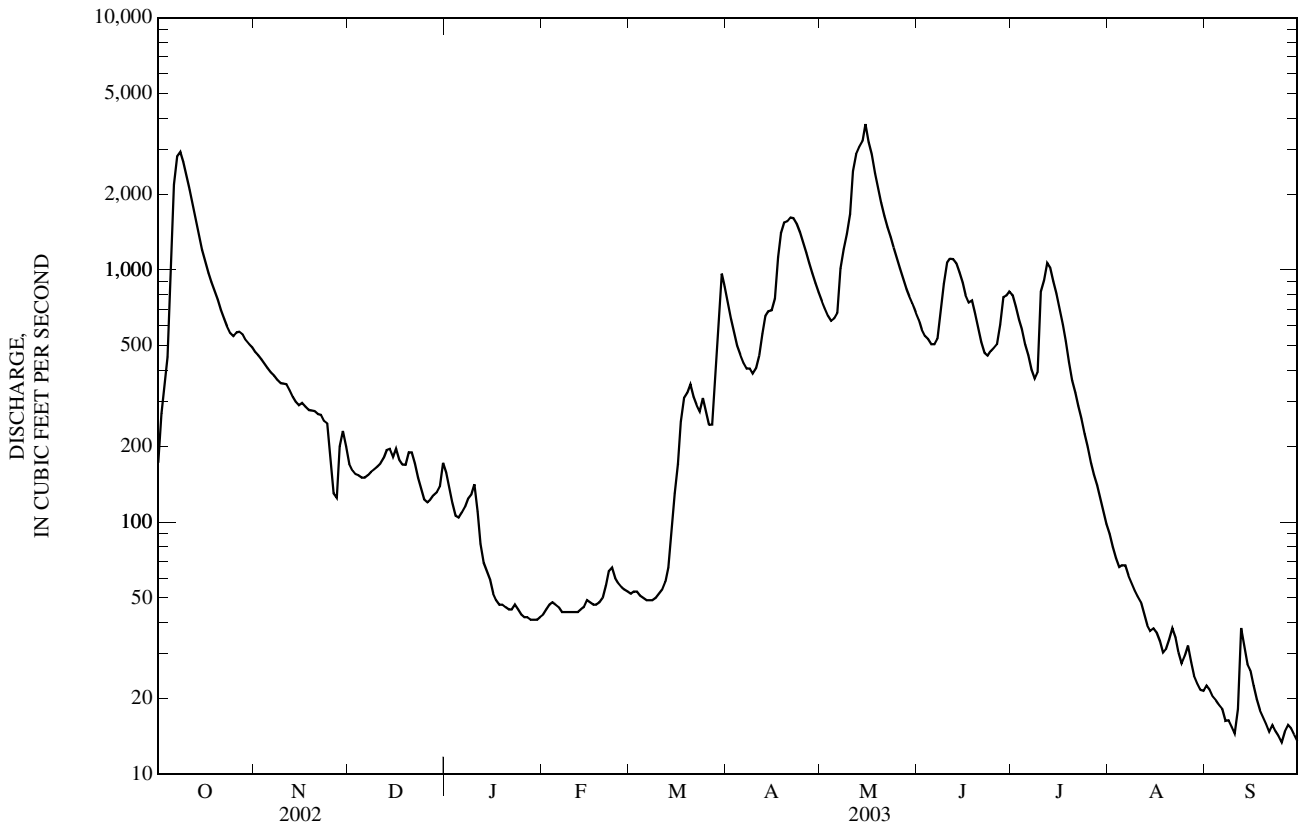
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1940 - 2003, BY WATER YEAR (WY)

MEAN	326	270	149	83.1	138	780	1,422	983	1,072	651	399	235
MAX	3,300	1,561	698	493	1,299	3,465	6,563	3,706	3,913	2,760	3,656	1,526
(WY)	(1969)	(1993)	(1992)	(1992)	(1984)	(1983)	(1965)	(1960)	(1993)	(1993)	(1993)	(1993)
MIN	7.41	11.1	5.04	2.96	1.68	33.0	48.3	18.8	40.4	20.6	8.20	7.55
(WY)	(1990)	(1956)	(1959)	(1957)	(1959)	(1964)	(1957)	(1940)	(1950)	(1988)	(1989)	(1976)

05320500 LE SUEUR RIVER NEAR RAPIDAN, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1940 - 2003	
ANNUAL TOTAL	168,205		173,104		544	
ANNUAL MEAN	461		474		51.4	
HIGHEST ANNUAL MEAN					2,035	1993
LOWEST ANNUAL MEAN					51.4	1977
HIGHEST DAILY MEAN	2,930	Oct 8	3,790	May 15	23,400	Apr 8, 1965
LOWEST DAILY MEAN	53	Jan 2	13	Sep 25	1.6	Feb 9, 1959
ANNUAL SEVEN-DAY MINIMUM	54	Jan 1	14	Sep 24	1.6	Feb 9, 1959
MAXIMUM PEAK FLOW			3,980	May 15	24,700	Apr 8, 1965
MAXIMUM PEAK STAGE			6.81	May 15	a22.72	May 22, 1960
INSTANTANEOUS LOW FLOW			13	Sep 25	1.6	Feb 9, 1959
ANNUAL RUNOFF (AC-FT)	333,600		343,400		394,000	
ANNUAL RUNOFF (CFSM)	0.42		0.43		0.49	
ANNUAL RUNOFF (INCHES)	5.64		5.80		6.66	
10 PERCENT EXCEEDS	1,260		1,170		1,510	
50 PERCENT EXCEEDS	266		243		155	
90 PERCENT EXCEEDS	62		30		18	

a From highwater mark.
 e Estimated.



05325000 MINNESOTA RIVER AT MANKATO, MN

LOCATION(REVISED).--Lat 44°10'08", long 94°00'11", in SE $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 7, T. 108 N., R. 26 W., Blue Earth County, Hydrologic Unit 07020007, on right bank 300 ft downstream from Memorial Bridge in Mankato, 2.0 mi downstream from Blue Earth River and at mile 106.2 upstream from Mississippi River.

DRAINAGE AREA.--14,900 mi² (approximately).

PERIOD OF RECORD.--May 1903 to current year (no winter records 1904, 1906-10, 1918-29). Monthly discharge only for some periods, published in WSP 1308. Published as "near Mankato": 1903-21.

REVISED RECORDS.--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). WDR-MN-76-1: 1881(M).

GAGE.--Water-stage recorder. Datum of gage is 747.92 ft above sea level (NGVD of 1929). Prior to Oct. 19, 1921, nonrecording gage, at site 1.8 mi upstream at datum 6.4 ft higher. Mar. 15, 1922 to Nov. 30, 1924, nonrecording gage, and Dec. 1, 1924 to May 24, 1971, recorder at site 0.2 mi upstream at present datum. May 25, 1971 to Aug. 14, 1977, recorder at site 0.5 mi upstream at present datum. Aug. 14, 1977 to July 27, 1978, nonrecording gage; and from July 28, 1978 to Sept. 30, 1993, recording gage at site 0.7 mi upstream of present site.

REMARKS.--Records good except those for estimated daily discharges, which are fair to poor.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage, 29.9 ft, Apr. 26, 1881, near present site and datum, from floodmark (estimated discharge, 110,000 ft³/s).

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	912	2,550	e1,350	e1,000	e540	e540	4,150	5,550	5,990	8,100	2,080	572
2	998	2,510	e1,300	e980	e540	e550	3,880	5,240	5,610	7,350	1,930	526
3	1,100	2,490	e1,260	e950	e560	e550	3,700	5,030	5,370	6,680	1,810	488
4	1,460	2,480	e1,200	e920	e600	e540	3,380	4,790	5,170	6,320	1,710	447
5	1,860	2,490	e1,200	e890	e610	e540	2,970	4,880	4,920	5,900	1,690	409
6	3,160	2,500	e1,200	e860	e610	e530	2,710	4,850	4,880	5,710	1,690	417
7	5,360	2,460	e1,200	e800	e600	e530	2,620	5,490	4,680	5,350	1,650	424
8	6,230	2,450	e1,250	e760	e590	e520	2,540	6,470	4,900	5,120	1,570	414
9	6,160	2,420	e1,250	e720	e600	e500	2,450	6,840	5,770	5,160	1,430	390
10	5,790	2,420	e1,250	e690	e630	e500	2,470	7,020	6,890	6,300	1,280	367
11	5,140	2,410	e1,300	e680	e660	e500	2,550	8,900	7,220	6,740	1,120	461
12	4,880	2,360	e1,300	e680	e670	e520	2,710	11,100	7,280	7,270	1,040	592
13	4,550	2,330	e1,270	e680	e680	e520	3,000	12,500	7,290	6,930	992	587
14	4,250	2,300	e1,250	e690	e680	e840	3,170	13,400	6,930	6,410	964	573
15	3,990	2,230	e1,210	e710	e670	1,490	3,190	14,800	6,440	6,070	970	606
16	3,740	2,200	e1,200	e690	e660	1,830	3,560	14,000	5,950	5,540	984	587
17	3,570	2,180	e1,200	e680	e630	2,170	3,820	13,100	5,580	5,180	963	528
18	3,570	2,170	e1,200	e670	e605	3,030	4,660	12,200	5,470	4,930	898	499
19	3,410	2,160	e1,210	e660	e600	3,970	5,970	11,700	4,890	4,670	912	502
20	3,240	2,120	e1,200	e640	e605	4,190	7,000	11,700	4,540	4,430	876	467
21	2,980	2,120	e1,130	e630	e615	4,110	7,750	11,600	4,310	4,160	859	443
22	2,810	2,110	e1,060	e620	e610	3,930	8,500	11,300	3,870	3,790	884	434
23	2,790	2,080	e1,020	e600	e580	3,900	8,870	10,900	3,920	3,590	833	411
24	2,760	2,020	e1,000	e590	e550	4,040	8,730	10,400	3,860	3,350	809	394
25	2,720	1,880	e980	e570	e530	3,770	8,460	9,750	4,500	3,200	797	373
26	2,700	e1,600	e980	e560	e530	3,660	8,070	8,920	5,090	3,020	729	361
27	2,680	e1,350	e1,020	e550	e530	3,900	7,470	8,280	5,800	2,680	694	361
28	2,670	e1,440	e1,040	e540	e530	4,220	6,790	7,800	7,600	2,620	667	355
29	2,630	e1,430	e1,040	e540	---	4,120	6,300	7,320	8,510	2,440	649	331
30	2,600	e1,420	e1,030	e540	---	4,510	5,900	6,990	8,580	2,310	600	318
31	2,570	---	e1,030	e540	---	4,550	---	6,510	---	2,170	585	---
TOTAL	103,280	64,680	36,130	21,630	16,815	69,070	147,340	279,330	171,810	153,490	34,665	13,637
MEAN	3,332	2,156	1,165	698	601	2,228	4,911	9,011	5,727	4,951	1,118	455
MAX	6,230	2,550	1,350	1,000	680	4,550	8,870	14,800	8,580	8,100	2,080	606
MIN	912	1,350	980	540	530	500	2,450	4,790	3,860	2,170	585	318
AC-FT	204,900	128,300	71,660	42,900	33,350	137,000	292,200	554,100	340,800	304,400	68,760	27,050
CFSM	0.22	0.14	0.08	0.05	0.04	0.15	0.33	0.60	0.38	0.33	0.08	0.03
IN.	0.26	0.16	0.09	0.05	0.04	0.17	0.37	0.70	0.43	0.38	0.09	0.03

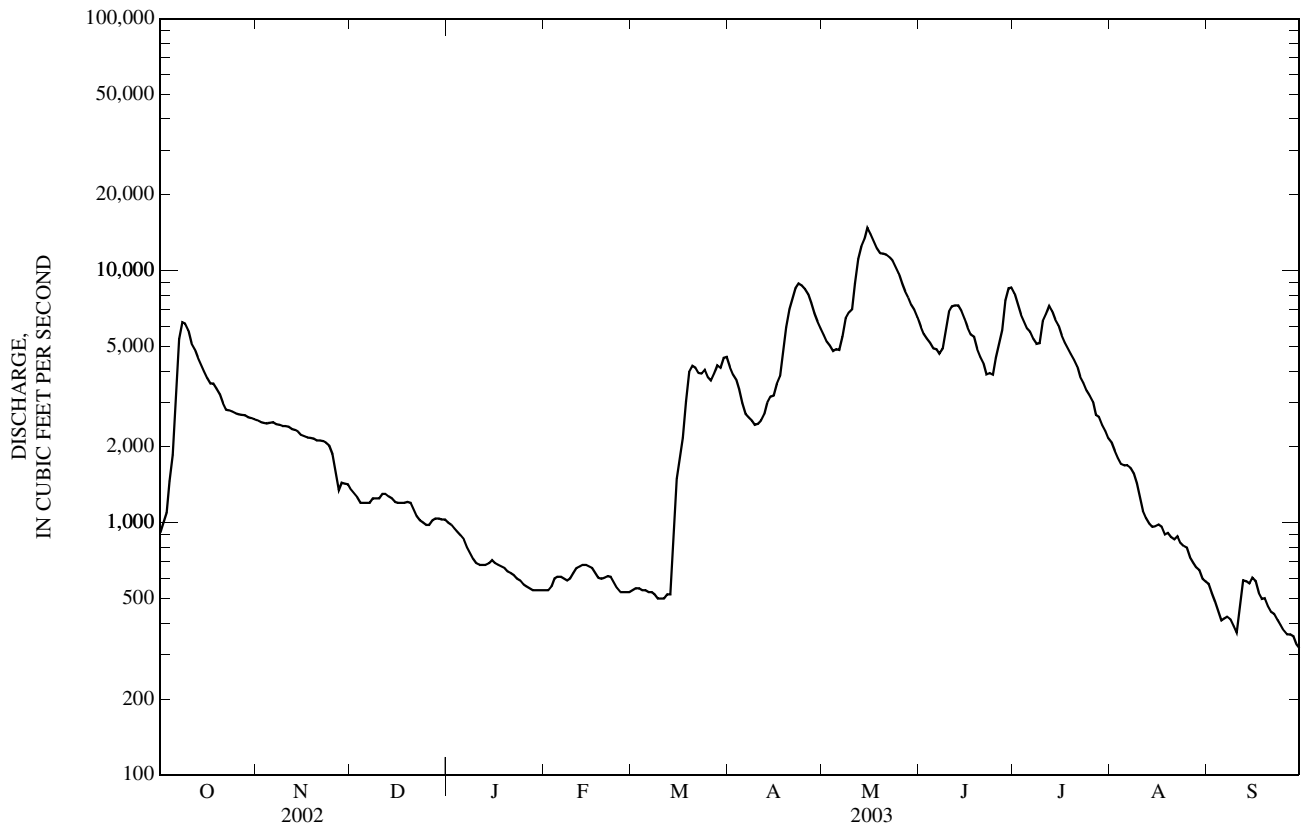
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1903 - 2003, BY WATER YEAR (WY)

MEAN	1,635	1,576	1,050	655	801	4,469	9,764	6,075	6,324	4,608	2,361	1,619
MAX	14,600	8,569	4,770	3,009	4,505	18,230	52,910	25,740	34,230	33,130	23,520	11,070
(WY)	(1969)	(1996)	(1983)	(1992)	(1983)	(1983)	(2001)	(2001)	(1993)	(1993)	(1993)	(1993)
MIN	66.1	83.5	80.9	61.5	58.4	132	609	101	194	58.3	37.4	56.6
(WY)	(1934)	(1934)	(1934)	(1940)	(1940)	(1934)	(1931)	(1934)	(1934)	(1934)	(1934)	(1934)

05325000 MINNESOTA RIVER AT MANKATO, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1903 - 2003	
ANNUAL TOTAL	1,285,778		1,111,877		a3,572	
ANNUAL MEAN	3,523		3,046		14,890	
HIGHEST ANNUAL MEAN					136	
LOWEST ANNUAL MEAN					1934	
HIGHEST DAILY MEAN	12,800	Jun 24	14,800	May 15	92,700	Apr 10, 1965
LOWEST DAILY MEAN	690	Sep 24	318	Sep 30	31	Aug 3, 1934
ANNUAL SEVEN-DAY MINIMUM	779	Sep 19	356	Sep 24	33	Jul 29, 1934
MAXIMUM PEAK FLOW			15,000	May 15	94,100	Apr 10, 1965
MAXIMUM PEAK STAGE			11.83	May 15	30.11	Jun 21, 1993
INSTANTANEOUS LOW FLOW			b310	Sep 30	c26	Aug 4, 1934
ANNUAL RUNOFF (AC-FT)	2,550,000		2,205,000		2,588,000	
ANNUAL RUNOFF (CFSM)	0.24		0.20		0.24	
ANNUAL RUNOFF (INCHES)	3.21		2.78		3.26	
10 PERCENT EXCEEDS	7,480		7,010		9,610	
50 PERCENT EXCEEDS	2,420		2,120		1,290	
90 PERCENT EXCEEDS	1,040		536		182	

- a Median of annual mean discharges is 2900 ft³/s.
- b Falling stage.
- c Minimum observed.
- e Estimated.



05325000 MINNESOTA RIVER AT MANKATO, MN—Continued

SUSPENDED-SEDIMENT
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

Day	Mean		Mean		Mean		Mean		Mean		Mean	
	concentration (mg/l)	Load (tons/day)	concentration (mg/l)	Load (tons/day)	concentration (mg/l)	Load (tons/day)	concentration (mg/l)	Load (tons/day)	concentration (mg/l)	Load (tons/day)	concentration (mg/l)	Load (tons/day)
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	65	160	86	592	126	459	99	267	136	198	141	206
2	100	269	92	623	127	446	95	251	138	201	140	208
3	141	419	94	632	128	435	92	236	139	210	140	208
4	205	808	96	643	128	415	88	219	140	227	142	207
5	296	1,490	97	652	128	415	83	199	139	229	142	207
6	419	3,570	99	668	128	415	80	186	139	229	144	206
7	541	7,830	102	677	130	421	77	166	139	225	143	205
8	566	9,520	104	688	130	439	76	156	139	221	140	197
9	478	7,950	106	693	131	442	80	156	139	225	135	182
10	358	5,600	109	712	131	442	115	214	139	236	132	178
11	273	3,790	109	709	131	460	133	244	138	246	129	174
12	219	2,890	110	701	130	456	133	244	138	250	123	173
13	183	2,250	111	698	130	446	132	242	135	248	121	170
14	159	1,820	111	689	129	435	132	246	136	250	115	261
15	141	1,520	112	674	129	421	128	245	133	241	115	463
16	120	1,210	111	659	129	418	127	237	134	239	123	608
17	108	1,040	112	659	128	415	126	231	134	228	161	943
18	98	945	113	662	128	415	124	224	135	221	261	2,140
19	95	875	113	659	127	415	123	219	135	219	524	5,620
20	94	822	114	653	125	405	122	211	136	222	460	5,200
21	90	724	114	653	122	372	120	204	134	223	313	3,470
22	88	668	115	655	120	343	118	198	134	221	272	2,890
23	83	625	117	657	119	328	122	198	134	210	237	2,500
24	78	581	120	654	118	319	124	198	134	199	217	2,370
25	72	529	120	609	114	302	126	194	134	192	207	2,110
26	66	481	121	523	112	296	128	194	134	192	218	2,150
27	65	470	123	448	110	303	130	193	136	195	256	2,700
28	66	476	123	478	108	303	132	192	138	197	246	2,800
29	69	490	124	479	106	298	133	194	---	---	253	2,810
30	73	512	126	483	105	292	135	197	---	---	320	3,900
31	79	548	---	---	102	284	137	200	---	---	264	3,240
TOTAL	---	60,882	---	18,982	---	12,055	---	6,555	---	6,194	---	48,696

05327000 HIGH ISLAND CREEK NEAR HENDERSON, MN

LOCATION.--Lat 44°34'19", long 93°55'18", in NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 26, T.113 N., R.26 W., Sibley County, Hydrologic Unit 07020012, on left bank 20 ft downstream from bridge on County Road 6, 1.6 mi upstream from mouth, and 3.1 mi north of Henderson.

DRAINAGE AREA.--238 mi².

PERIOD OF RECORD.--October 1973 to current year. May 1970 to September 1973, operated as a low-flow station only.

REVISED RECORDS.--WDR-MN-80-2: 1974-75, 1977-79, WRD MN-98: 1993.

GAGE.--Water-stage recorder. Datum of gage is 728.56 ft above sea level (NGVD of 1929).

REMARKS.--Records good except those for estimated daily discharges, which are fair to poor.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	33	60	30	11	4.8	e7.0	42	79	159	159	7.9	1.4
2	31	59	31	e9.9	6.5	e7.2	41	73	141	124	7.3	1.3
3	31	56	e26	e9.3	6.3	e7.2	39	67	124	96	6.5	1.1
4	55	52	e23	9.6	e5.2	e6.6	38	63	114	97	6.0	1.2
5	80	52	e23	10	e4.7	e6.9	34	65	108	97	5.6	1.2
6	147	54	e22	11	e4.4	e6.3	34	64	114	98	5.4	1.0
7	157	53	25	11	e4.4	e6.3	33	65	123	88	5.0	0.97
8	141	53	24	12	e4.5	e6.3	29	62	143	79	4.6	0.95
9	127	52	e21	13	e4.4	e6.3	28	77	145	71	4.5	0.96
10	141	51	20	e12	e4.3	e6.4	26	84	158	65	4.4	1.0
11	149	49	19	e11	e4.3	e6.4	25	191	160	58	4.2	2.4
12	144	46	19	e9.7	e4.3	e6.7	26	247	152	53	3.9	4.7
13	155	45	21	e8.8	e4.3	6.8	29	240	138	48	3.6	4.2
14	149	44	20	e8.4	e4.4	68	26	272	122	45	3.2	2.3
15	133	43	18	e8.5	e4.3	142	24	291	110	48	2.2	1.8
16	120	41	17	e8.5	e4.5	98	40	285	100	44	2.0	1.6
17	112	41	17	e8.6	e5.2	80	88	299	92	41	1.9	1.5
18	104	40	20	e9.4	e5.0	95	94	327	85	38	1.8	1.5
19	99	39	20	e9.4	e5.9	97	109	437	78	35	2.1	1.5
20	93	37	18	e9.5	7.3	101	134	564	72	33	2.3	1.3
21	89	36	17	e9.1	9.6	100	154	495	66	30	1.6	1.4
22	83	35	18	e8.5	15	88	163	464	64	29	1.4	1.4
23	81	35	e16	e8.2	29	84	164	454	63	29	1.3	1.2
24	84	32	e15	e8.5	30	81	150	442	60	27	1.4	1.2
25	79	26	e12	e8.5	14	76	135	419	66	24	1.6	1.1
26	72	e24	e12	e7.9	13	68	123	379	79	20	1.4	1.2
27	67	e24	e12	e7.2	e7.2	66	111	332	113	14	1.3	1.1
28	69	e28	14	6.3	e7.0	71	100	288	162	12	1.3	1.2
29	67	30	12	5.1	---	64	93	249	185	11	1.3	1.2
30	66	32	13	4.2	---	54	85	219	187	9.8	1.3	1.3
31	64	---	e12	4.5	---	47	---	183	---	8.7	1.7	---
TOTAL	3,022	1,269	587	278.6	223.8	1,566.4	2,217	7,776	3,483	1,631.5	100.0	46.18
MEAN	97.5	42.3	18.9	8.99	7.99	50.5	73.9	251	116	52.6	3.23	1.54
MAX	157	60	31	13	30	142	164	564	187	159	7.9	4.7
MIN	31	24	12	4.2	4.3	6.3	24	62	60	8.7	1.3	0.95
AC-FT	5,990	2,520	1,160	553	444	3,110	4,400	15,420	6,910	3,240	198	92
CFSM	0.41	0.18	0.08	0.04	0.03	0.21	0.31	1.06	0.49	0.22	0.01	0.01
IN.	0.47	0.20	0.09	0.04	0.04	0.25	0.35	1.22	0.55	0.26	0.02	0.01

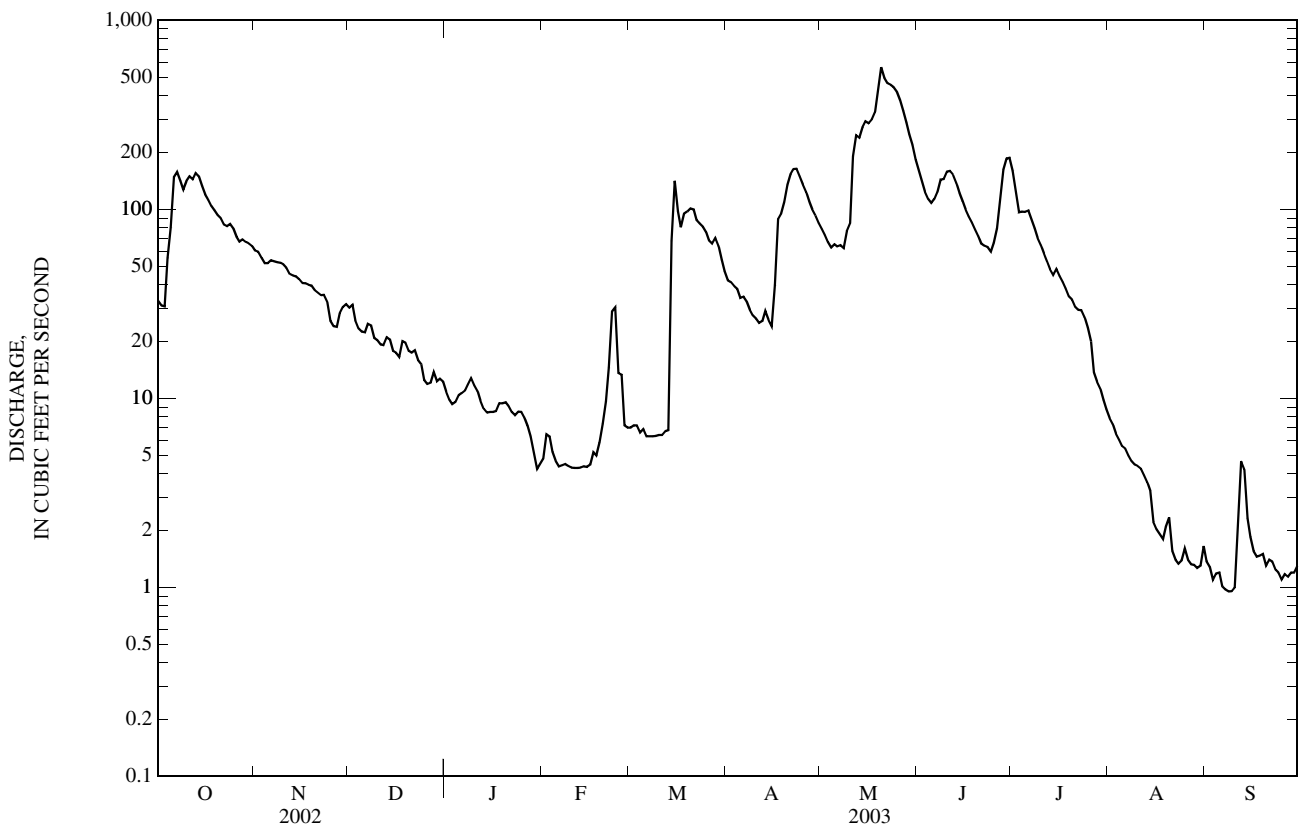
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1974 - 2003, BY WATER YEAR (WY)

MEAN	68.8	57.3	31.8	14.1	21.9	152	267	162	167	122	78.5	90.1
MAX	298	219	111	72.5	121	547	1,104	478	646	783	380	592
(WY)	(1986)	(1993)	(1983)	(1992)	(1984)	(1992)	(2001)	(1993)	(1993)	(1993)	(1997)	(1991)
MIN	1.51	2.11	1.37	0.98	1.28	5.33	6.69	3.32	1.58	0.80	1.16	1.18
(WY)	(1990)	(1990)	(1976)	(1977)	(1989)	(2001)	(1990)	(1976)	(1976)	(1976)	(1976)	(1974)

05327000 HIGH ISLAND CREEK NEAR HENDERSON, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1974 - 2003	
ANNUAL TOTAL	32,801.5		22,200.48			
ANNUAL MEAN	89.9		60.8		103	
HIGHEST ANNUAL MEAN					293 1993	
LOWEST ANNUAL MEAN					9.23 1976	
HIGHEST DAILY MEAN	1,240	Jun 25	564	May 20	2,400	Apr 12, 2001
LOWEST DAILY MEAN	2.6	Jan 25	0.95	Sep 8	0.46	Oct 3, 1976
ANNUAL SEVEN-DAY MINIMUM	2.8	Jan 21	1.0	Sep 4	0.59	Jul 10, 1976
MAXIMUM PEAK FLOW			599	May 20	a2,830	Jul 25, 1997
MAXIMUM PEAK STAGE			6.28	May 20	9.88	Apr 23, 2001
INSTANTANEOUS LOW FLOW			0.79	Sep 7, 27	b0.20	Jan 4, 1981
ANNUAL RUNOFF (AC-FT)	65,060		44,030		74,510	
ANNUAL RUNOFF (CFSM)	0.38		0.26		0.43	
ANNUAL RUNOFF (INCHES)	5.15		3.48		5.90	
10 PERCENT EXCEEDS	205		149		292	
50 PERCENT EXCEEDS	38		29		28	
90 PERCENT EXCEEDS	3.8		1.8		2.0	

- a Backwater from Minnesota River.
- b Result of freezeup.
- c Estimated.



05330000 MINNESOTA RIVER NEAR JORDAN, MN

LOCATION.--Lat 44°41'35", long 93°38'30", in NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 7, T.114 N., R.23 W., Carver County, Hydrologic Unit 07020012, on right bank 100 ft downstream from bridge on Scott County Highway 9, 1.5 mi northwest of Jordan, and at mile 39.4 upstream from Mississippi River.

DRAINAGE AREA.--16,200 mi² (approximately).

PERIOD OF RECORD.--September 1934 to current year. Prior to Oct. 1, 1966, published as "near Carver, Minn".

REVISED RECORDS.--WSP 955: Drainage area. WSP 1508: 1935. WDR MN-87-2: 1976 (cal. yr. summary).

GAGE.--Water-stage recorder. Datum of gage is 690.00 ft above sea level (NGVD of 1929). Prior to Oct. 1, 1966, water-stage recorder 2.8 mi downstream with auxiliary nonrecording gage at present site and present datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair to poor.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1,280	2,760	1,790	e1,220	e780	e740	4,830	6,270	7,070	9,180	2,600	777
2	1,300	2,730	1,660	e1,180	e760	e750	4,500	5,920	6,600	8,690	2,540	749
3	1,320	2,700	1,490	e1,140	e750	e760	4,230	5,590	6,160	7,800	2,400	733
4	1,510	2,640	1,490	e1,120	e740	e760	4,000	5,360	5,790	7,170	2,270	677
5	1,880	2,630	e1,450	e1,200	e740	e770	3,760	5,220	5,520	6,740	2,240	636
6	2,530	2,630	e1,430	e1,140	e750	e780	3,290	5,150	5,270	6,350	2,200	594
7	3,740	2,630	e1,420	e1,130	e760	e780	3,000	5,170	5,160	5,960	2,170	562
8	5,680	2,620	e1,410	e1,140	e760	e770	2,800	5,400	5,190	5,660	e2,100	527
9	6,660	2,590	e1,410	e970	e770	e760	2,710	6,360	5,570	5,320	e2,050	506
10	6,930	2,570	e1,420	e870	e780	e760	2,630	6,890	6,310	5,490	e2,000	493
11	6,780	2,540	e1,430	e830	e800	e780	2,570	7,620	7,100	6,410	1,980	495
12	6,300	2,520	e1,470	e820	e810	e820	2,590	9,780	7,450	7,140	1,850	626
13	5,880	2,470	e1,500	e830	e820	e890	2,660	11,800	7,530	7,220	1,750	691
14	5,560	2,460	e1,570	e840	e840	e1,000	2,930	13,000	7,470	7,060	1,690	726
15	5,240	2,420	e1,600	e840	e830	e1,400	3,110	14,100	7,120	6,750	e1,570	700
16	4,860	2,350	e1,570	e840	e820	e1,850	3,270	15,300	6,660	6,390	e1,480	692
17	4,550	2,300	e1,560	e840	e810	e2,300	3,840	15,800	6,230	5,930	e1,430	704
18	4,280	2,280	e1,550	e840	e790	e3,100	4,380	15,600	5,810	5,500	e1,380	701
19	4,080	2,270	e1,540	e830	e770	3,970	4,940	14,900	5,370	5,250	e1,280	651
20	3,870	2,270	e1,450	e820	e780	4,910	6,030	14,600	5,040	4,940	e1,240	603
21	3,690	2,250	e1,370	e810	e780	5,060	7,070	14,500	4,720	4,710	1,180	602
22	3,440	2,210	e1,290	e800	e750	4,600	7,800	14,100	4,400	4,480	1,110	584
23	3,180	2,210	e1,200	e790	e730	4,330	8,470	13,700	4,260	4,060	1,090	555
24	3,070	2,180	e1,160	e790	e700	4,280	8,910	13,000	4,500	3,810	1,110	550
25	3,060	2,110	e1,160	e780	e710	4,320	8,900	12,300	4,790	3,560	1,050	523
26	2,990	2,030	e1,230	e780	e720	4,180	8,670	11,500	5,240	3,410	1,060	514
27	2,940	1,850	e1,270	e780	e730	4,000	8,310	10,400	6,030	3,420	995	506
28	2,920	1,800	e1,280	e780	e740	4,200	7,800	9,460	6,680	3,150	920	485
29	2,900	1,750	e1,290	e780	---	4,530	7,180	8,730	7,940	2,810	879	470
30	2,870	1,760	e1,290	e790	---	4,480	6,690	8,150	8,980	2,670	850	465
31	2,820	---	e1,270	e800	---	4,640	---	7,590	---	2,550	817	---
TOTAL	118,110	70,530	44,020	28,120	21,520	77,270	151,870	313,260	181,960	169,580	49,281	18,097
MEAN	3,810	2,351	1,420	907	769	2,493	5,062	10,110	6,065	5,470	1,590	603
MAX	6,930	2,760	1,790	1,220	840	5,060	8,910	15,800	8,980	9,180	2,600	777
MIN	1,280	1,750	1,160	780	700	740	2,570	5,150	4,260	2,550	817	465
AC-FT	234,300	139,900	87,310	55,780	42,680	153,300	301,200	621,400	360,900	336,400	97,750	35,900
CFSM	0.24	0.15	0.09	0.06	0.05	0.15	0.31	0.62	0.37	0.34	0.10	0.04
IN.	0.27	0.16	0.10	0.06	0.05	0.18	0.35	0.72	0.42	0.39	0.11	0.04

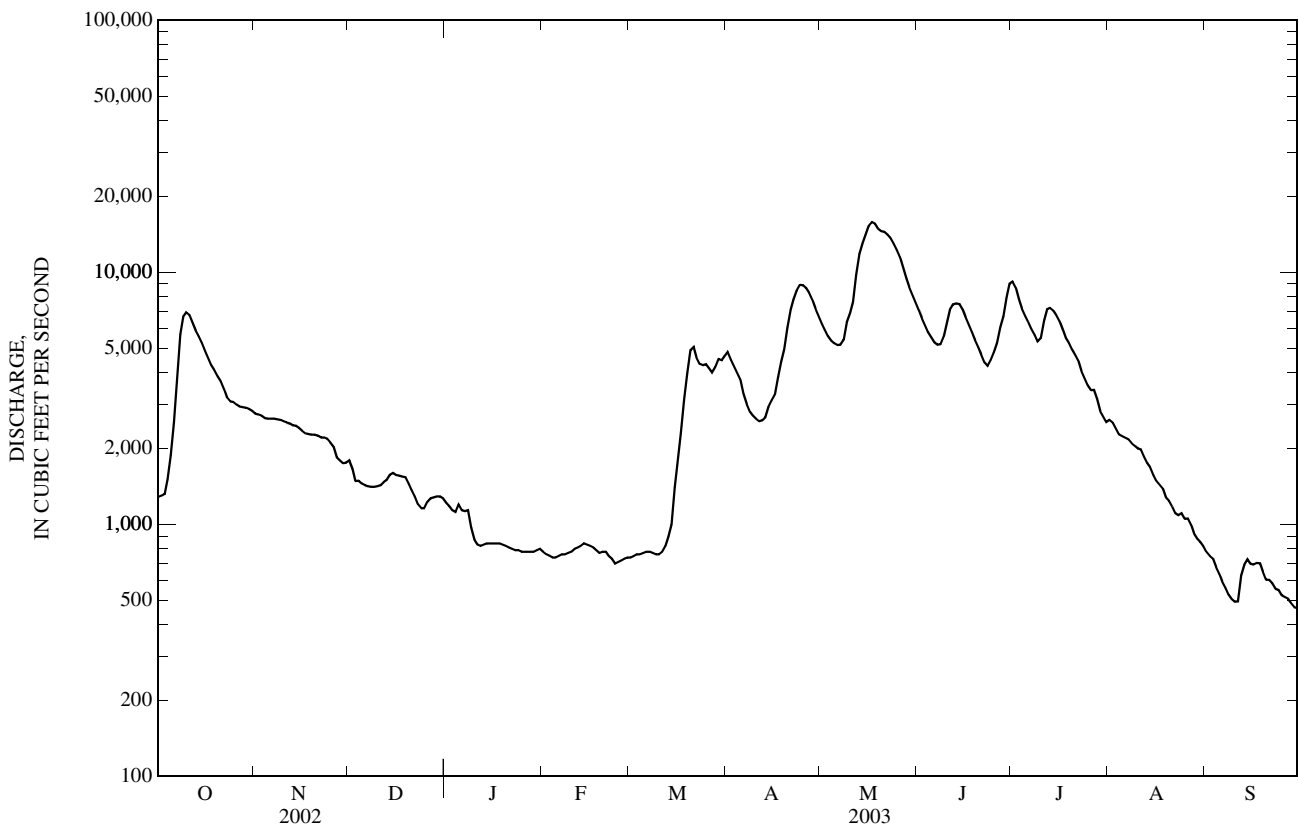
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1935 - 2003, BY WATER YEAR (WY)

MEAN	2,198	2,148	1,517	933	1,017	5,080	12,800	8,344	7,964	5,948	3,296	2,215
MAX	16,030	9,463	5,216	3,344	3,992	21,170	59,030	31,480	41,460	38,640	25,660	14,460
(WY)	(1969)	(1996)	(1983)	(1992)	(1983)	(1983)	(2001)	(2001)	(1993)	(1993)	(1993)	(1993)
MIN	167	178	158	111	130	322	926	923	633	279	178	183
(WY)	(1935)	(1935)	(1977)	(1940)	(1940)	(1940)	(1959)	(1959)	(1976)	(1936)	(1936)	(1976)

05330000 MINNESOTA RIVER NEAR JORDAN, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1935 - 2003	
ANNUAL TOTAL	1,484,470		1,243,618			
ANNUAL MEAN	4,067		3,407		a4,461	
HIGHEST ANNUAL MEAN					16,910	1993
LOWEST ANNUAL MEAN					687	1940
HIGHEST DAILY MEAN	18,200	Jun 26	15,800	May 17	112,000	Apr 11, 1965
LOWEST DAILY MEAN	1,160	Dec 24	465	Sep 30	85	Jan 21, 1940
ANNUAL SEVEN-DAY MINIMUM	1,230	Dec 22	502	Sep 24	89	Jan 20, 1940
MAXIMUM PEAK FLOW			15,900	May 17	117,000	Apr 11, 1965
MAXIMUM PEAK STAGE			19.10	May 17	35.07	Apr 12, 1965
INSTANTANEOUS LOW FLOW			b459	Sep 30	79	Nov 17, 1955
ANNUAL RUNOFF (AC-FT)	2,944,000		2,467,000		3,232,000	
ANNUAL RUNOFF (CFSM)	0.25		0.21		0.28	
ANNUAL RUNOFF (INCHES)	3.41		2.86		3.74	
10 PERCENT EXCEEDS	8,050		7,310		11,800	
50 PERCENT EXCEEDS	2,750		2,300		1,850	
90 PERCENT EXCEEDS	1,340		740		330	

- a Median of annual mean discharges is 3,700 ft³/s.
- b Falling stage.
- e Estimated.



05331000 MISSISSIPPI RIVER AT ST. PAUL, MN

LOCATION.--LAT 44°56'01", long 93°06'20", in NE¹/₄NE¹/₄ sec.13, T. 28 N., R. 22 W., Ramsey County, Hydrologic Unit 07010206, on left bank in St. Paul, 100 ft upstream from Smith Ave. Bridge, 4.8 mi downstream from Minnesota River, and at mile 840.5 upstream from Ohio River.

DRAINAGE AREA.--36,800 mi² (approximately).

PERIOD OF RECORD.--Water year 1867-69, 1872-92 (annual maximums), 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.

REVISED RECORDS.--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. WRD MN-74: 1973.

GAGE.--Water-stage recorder. Datum of gage is 683.62 ft above sea level (NGVD of 1929). Prior to Mar. 18, 1925, nonrecording gage at several sites within 300 ft of each other and 1.2 miles downstream of present site at present datum. Mar. 19, 1925 to June 24, 1999, recording gage 1.2 miles downstream of present site at present datum. Since September 1938, auxiliary water-stage recorder 5.6 mi downstream.

REMARKS.--Records good except those for estimated days, which are fair to poor. Flow-routing techniques were used from Oct. 1, 2002 to April 20, 2003, May 5 to 10, June 1 to 26 and July 16 to Sept. 30, 2003. Routed discharges are considered fair to poor. Slight regulation, except during extreme floods, by reservoirs on headquarters and by power plants. Beginning July 20, 1939, effluent from Minneapolis and St. Paul, which formerly entered the river above station, was diverted to a wastewater treatment plant, thence to river about 4 miles below station. Daily-mean discharge figures do not include this diversion.

COOPERATION.--Records of discharge from the Metro Plant wastewater treatment plant were provided by the Metropolitan Council - Environmental Services.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9,570	14,600	8,710	e7,010	e4,750	e4,870	12,000	20,600	20,500	37,800	11,000	3,670
2	9,660	14,400	7,930	e7,160	e4,640	e4,290	12,000	19,000	19,200	37,200	10,500	3,690
3	9,140	14,000	8,710	e6,960	e4,640	e4,060	11,700	18,300	17,900	37,400	10,000	3,370
4	8,770	14,200	7,850	e7,170	e4,440	e3,960	11,200	17,600	17,000	36,500	9,850	3,260
5	9,750	13,500	7,480	e6,980	e4,260	e3,900	11,200	17,000	16,000	36,000	9,410	3,400
6	11,300	13,500	e6,830	e7,530	e4,160	e3,760	10,800	16,100	15,400	34,300	9,260	3,220
7	12,700	13,200	e7,350	e6,990	e4,240	e3,810	9,670	16,100	15,200	31,900	9,100	3,300
8	15,000	13,200	e7,910	e6,770	e4,330	e3,870	9,390	16,500	14,900	30,800	8,920	3,040
9	18,800	13,100	e7,600	e7,050	e4,420	e3,940	9,480	16,500	14,600	29,100	8,620	3,110
10	21,800	12,900	e6,880	e7,110	e4,510	e3,810	9,100	18,600	15,100	27,700	8,380	3,590
11	23,200	12,800	e7,570	e6,510	e4,500	e4,220	8,730	24,500	16,300	26,800	e8,110	3,080
12	22,500	12,700	e8,070	e5,620	e4,510	e4,470	8,750	27,700	17,500	27,200	e7,720	3,220
13	22,700	12,600	e8,460	e5,600	e4,510	e4,030	8,450	30,000	18,800	27,400	e7,490	4,730
14	23,600	12,700	e8,230	e5,600	e4,410	e3,960	8,380	32,500	18,800	27,000	6,800	4,420
15	22,100	12,200	e8,430	e5,580	e4,430	e4,130	8,040	33,300	18,900	27,300	6,800	4,470
16	21,300	12,100	e8,660	e5,600	e4,450	e4,310	8,560	33,700	18,400	26,800	6,710	4,260
17	21,100	11,800	e7,970	e5,470	e4,470	e5,070	9,750	34,000	17,100	25,600	6,280	4,130
18	19,900	11,500	e7,940	e5,500	e4,480	e5,940	12,800	34,100	16,100	23,900	e6,070	4,000
19	19,500	10,900	e8,670	e5,410	e4,600	e7,360	16,300	34,500	15,600	22,500	e5,910	3,820
20	18,600	11,300	e8,730	e5,310	e4,590	e9,600	18,000	34,900	14,500	21,300	e5,410	4,260
21	17,500	11,200	e8,520	e5,300	e4,580	11,600	22,600	34,600	13,200	20,200	e5,340	4,310
22	17,700	11,400	e7,800	e5,200	e4,680	12,700	25,700	34,300	12,300	19,100	e5,010	3,870
23	17,600	11,500	e7,780	e5,000	e4,680	12,200	27,600	34,300	11,400	18,000	e4,890	3,810
24	16,500	11,200	e7,000	e4,790	e4,560	12,300	29,400	33,400	11,400	17,000	4,610	4,140
25	16,100	11,100	e6,950	e4,690	e4,030	13,100	29,800	32,100	14,700	15,900	4,280	3,960
26	15,700	10,200	e7,300	e4,880	e3,840	13,500	29,400	30,300	25,100	14,900	4,130	3,790
27	15,400	9,480	e7,450	e4,980	e3,940	13,300	28,000	28,300	29,600	14,100	4,220	3,730
28	14,800	9,060	e7,310	e4,870	e4,540	13,300	26,300	25,600	32,200	13,600	4,090	3,540
29	14,800	8,810	e7,320	e4,860	---	13,100	24,400	24,300	34,700	12,900	4,040	3,640
30	14,700	8,780	e7,510	e4,850	---	12,600	22,500	22,800	36,900	12,300	3,900	3,520
31	14,900	---	e7,590	e4,750	---	12,300	---	20,900	---	11,200	3,760	---
TOTAL	516,690	359,930	242,510	181,100	124,190	233,360	480,000	816,400	559,300	763,700	210,610	112,350
MEAN	16,670	12,000	7,823	5,842	4,435	7,528	16,000	26,340	18,640	24,640	6,794	3,745
MAX	23,600	14,600	8,730	7,530	4,750	13,500	29,800	34,900	36,900	37,800	11,000	4,730
MIN	8,770	8,780	6,830	4,690	3,840	3,760	8,040	16,100	11,400	11,200	3,760	3,040
AC-FT	1,025,000	713,900	481,000	359,200	246,300	462,900	952,100	1,619,000	1,109,000	1,515,000	417,700	222,800
CFSM	0.45	0.33	0.21	0.16	0.12	0.20	0.43	0.72	0.51	0.67	0.18	0.10
IN.	0.52	0.36	0.25	0.18	0.13	0.24	0.49	0.83	0.57	0.77	0.21	0.11

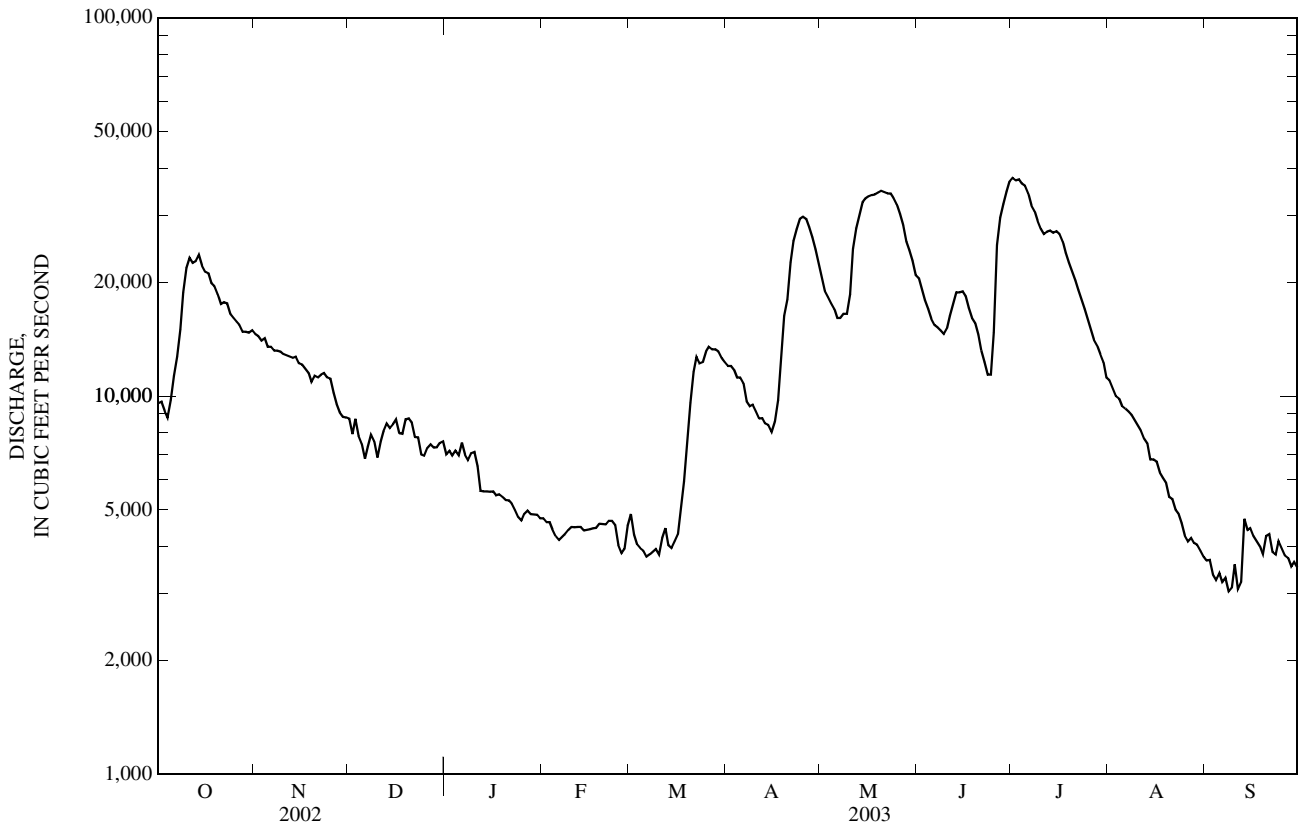
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1892 - 2003, BY WATER YEAR (WY)

MEAN	8,602	7,948	5,779	4,667	4,613	11,110	26,500	21,420	18,520	14,720	9,003	8,069
MAX	38,210	27,660	16,080	11,500	14,700	43,240	96,590	70,430	57,170	73,590	42,550	34,380
(WY)	(1987)	(1972)	(1983)	(1983)	(1966)	(1983)	(2001)	(1993)	(1993)	(1993)	(1993)	(1986)
MIN	1,289	1,348	1,277	1,097	1,300	1,757	3,421	3,085	1,980	1,272	864	1,143
(WY)	(1937)	(1937)	(1935)	(1935)	(1895)	(1940)	(1895)	(1934)	(1934)	(1934)	(1934)	(1934)
+	367	379	356	360	347	401	436	458	419	442	424	445
±MEAN	17,000	12,400	8,180	6,200	4,780	7,930	16,400	26,800	19,100	25,100	7,220	4,190
±CFSM	0.46	0.34	0.22	0.17	0.13	0.22	0.45	0.73	0.53	0.68	0.20	0.11
±IN	0.53	0.37	0.26	0.19	0.14	0.25	0.50	0.84	0.59	0.78	0.22	0.12

05331000 MISSISSIPPI RIVER AT ST. PAUL, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1892 - 2003	
ANNUAL TOTAL	5,638,430		4,600,140		11,830	
ANNUAL MEAN	15,450		12,600		1,935	
HIGHEST ANNUAL MEAN					29,580	1986
LOWEST ANNUAL MEAN					1,935	1934
HIGHEST DAILY MEAN	43,000	Jun 30	37,800	Jul 1	171,000	Apr 16, 1965
LOWEST DAILY MEAN	5,490	Feb 15	3,040	Sep 8	632	Aug 26, 1934
ANNUAL SEVEN-DAY MINIMUM	5,500	Feb 12	3,220	Sep 6	741	Aug 26, 1934
MAXIMUM PEAK FLOW			38,600	Jul 3	171,000	Apr 16, 1965
MAXIMUM PEAK STAGE			8.63	Jul 3	26.01	Apr 16, 1965
ANNUAL RUNOFF (AC-FT)	11,180,000		9,124,000		8,568,000	
ANNUAL RUNOFF (CFSM)	0.42		0.34		0.32	
ANNUAL RUNOFF (INCHES)	5.70		4.65		4.37	
10 PERCENT EXCEEDS	27,100		27,300		27,400	
50 PERCENT EXCEEDS	14,700		9,600		7,170	
90 PERCENT EXCEEDS	6,180		4,040		2,700	

+ Diversion, in cubic feet per second, from wastewater treatment plant.
 † Adjusted for discharges from wastewater treatment plant.
 e Estimated.



05331580 MISSISSIPPI RIVER BELOW LOCK AND DAM 2, AT HASTINGS, MN

LOCATION.--Lat 44°44'48", long 92°51'08", SE¹/₄SE¹/₄ sec. 21, T.115 N., R.17 W., Dakota County, Hydrologic Unit 07010206, near bridge on U.S. Highway 61 in Hastings, 1.2 mi downstream from Lock and Dam 2, 2.5 mi upstream from St. Croix River, and at mile 813.8 upstream from Ohio River.

DRAINAGE AREA.--37,050 mi².

PERIOD OF RECORD.--October 1996 to current year.

REMARKS.-- Records fair to poor. Water-discharge computed on the basis of routed discharge for Mississippi River at St. Paul (station 05331000) adjusted for inflow (including metropolitan wastewater treatment plant) and travel time.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

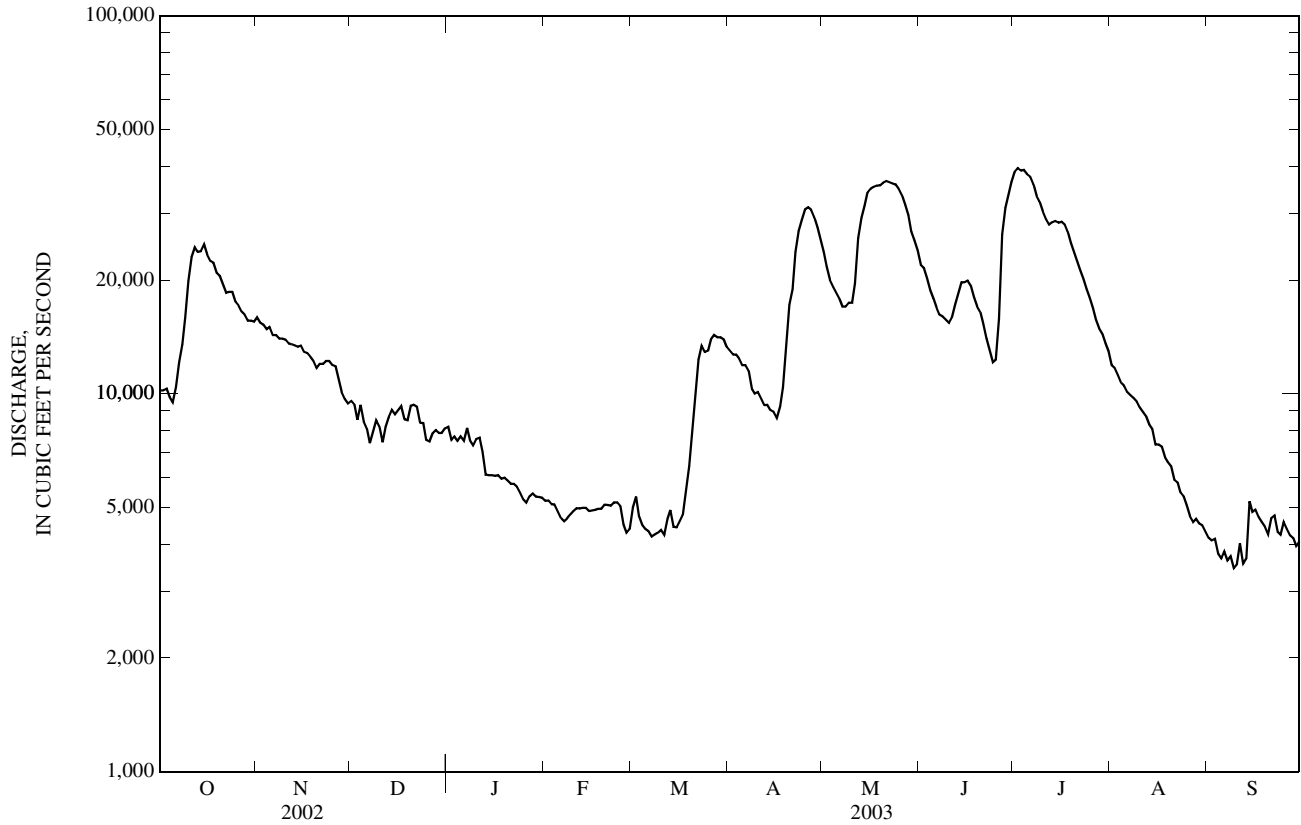
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10,200	15,900	9,560	8,170	5,210	5,000	13,000	23,600	21,900	38,600	11,900	4,160
2	10,200	15,400	9,340	7,540	5,220	5,340	12,700	21,600	21,500	39,500	11,700	4,090
3	10,300	15,200	8,530	7,700	5,100	4,740	12,700	20,000	20,200	38,900	11,200	4,130
4	9,810	14,800	9,340	7,500	5,100	4,500	12,400	19,200	18,800	39,100	10,700	3,780
5	9,500	15,000	8,450	7,710	4,890	4,390	11,900	18,500	17,900	38,100	10,500	3,670
6	10,400	14,300	8,070	7,520	4,700	4,330	11,900	17,900	16,900	37,500	10,100	3,820
7	12,100	14,300	7,400	8,100	4,600	4,190	11,500	17,000	16,200	35,800	9,900	3,620
8	13,500	14,000	7,930	7,530	4,680	4,240	10,300	17,000	16,000	33,300	9,730	3,710
9	15,900	14,000	8,510	7,300	4,790	4,290	10,000	17,400	15,700	32,200	9,530	3,450
10	19,900	13,900	8,190	7,590	4,890	4,360	10,100	17,400	15,400	30,400	9,210	3,530
11	23,000	13,600	7,440	7,650	4,980	4,240	9,710	19,600	15,900	29,000	8,960	4,020
12	24,400	13,500	8,150	7,030	4,970	4,660	9,330	25,800	17,200	28,000	8,710	3,550
13	23,700	13,400	8,660	6,110	4,990	4,920	9,340	29,100	18,400	28,400	8,290	3,660
14	23,800	13,300	9,060	6,090	4,990	4,450	9,040	31,400	19,700	28,600	8,070	5,190
15	24,800	13,400	8,820	6,090	4,890	4,430	8,960	34,000	19,700	28,300	7,340	4,870
16	23,300	12,900	9,030	6,070	4,910	4,610	8,630	34,800	19,900	28,500	7,340	4,930
17	22,400	12,800	9,260	6,090	4,930	4,780	9,240	35,200	19,300	28,000	7,240	4,720
18	22,200	12,500	8,560	5,960	4,960	5,550	10,400	35,500	18,000	26,800	6,790	4,570
19	20,900	12,200	8,520	5,990	4,960	6,440	13,500	35,600	17,000	25,000	6,600	4,460
20	20,500	11,700	9,290	5,890	5,090	7,920	17,200	36,100	16,400	23,600	6,430	4,250
21	19,500	12,000	9,340	5,780	5,080	10,200	18,900	36,500	15,300	22,300	5,920	4,690
22	18,500	12,000	9,230	5,780	5,060	12,300	23,700	36,200	14,000	21,200	5,830	4,760
23	18,600	12,200	8,380	5,680	5,160	13,400	26,900	35,900	13,000	20,100	5,480	4,310
24	18,600	12,200	8,370	5,470	5,160	12,900	28,800	35,800	12,100	18,900	5,350	4,240
25	17,500	11,900	7,550	5,250	5,040	13,000	30,700	34,800	12,300	17,900	5,060	4,580
26	17,100	11,800	7,470	5,150	4,490	13,900	31,100	33,500	15,800	16,800	4,740	4,390
27	16,500	10,900	7,860	5,350	4,290	14,300	30,700	31,600	26,400	15,700	4,580	4,220
28	16,200	10,100	8,010	5,450	4,390	14,100	29,300	29,600	31,000	14,900	4,670	4,150
29	15,600	9,680	7,870	5,340	---	14,100	27,500	26,800	33,700	14,400	4,540	3,950
30	15,600	9,420	7,870	5,330	---	13,900	25,500	25,400	36,300	13,600	4,480	4,060
31	15,500	---	8,090	5,310	---	13,300	---	23,900	---	13,000	4,310	---
TOTAL	540,010	388,300	262,150	199,520	137,520	242,780	494,950	856,700	571,900	826,400	235,200	125,530
MEAN	17,420	12,940	8,456	6,436	4,911	7,832	16,500	27,640	19,060	26,660	7,587	4,184
MAX	24,800	15,900	9,560	8,170	5,220	14,300	31,100	36,500	36,300	39,500	11,900	5,190
MIN	9,500	9,420	7,400	5,150	4,290	4,190	8,630	17,000	12,100	13,000	4,310	3,450
AC-FT	1,071,000	770,200	520,000	395,700	272,800	481,600	981,700	1,699,000	1,134,000	1,639,000	466,500	249,000
CFSM	0.47	0.35	0.23	0.17	0.13	0.21	0.44	0.74	0.51	0.72	0.20	0.11
IN.	0.54	0.39	0.26	0.20	0.14	0.24	0.50	0.86	0.57	0.83	0.24	0.13

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1996 - 2003, BY WATER YEAR (WY)

MEAN	11,360	13,230	10,090	7,615	7,439	13,150	45,250	35,340	26,650	24,040	12,660	8,391
MAX	25,600	24,960	13,290	9,657	10,040	20,360	95,650	76,140	52,600	36,910	23,560	16,620
(WY)	(1996)	(1996)	(1997)	(1996)	(1998)	(1998)	(2001)	(2001)	(2001)	(1997)	(1997)	(2002)
MIN	4,661	7,207	6,912	6,022	4,911	6,436	10,400	14,070	16,100	15,970	6,460	4,184
(WY)	(2001)	(2002)	(2000)	(2000)	(2003)	(2001)	(2000)	(2000)	(1997)	(2000)	(2000)	(2003)

05331580 MISSISSIPPI RIVER BELOW LOCK AND DAM 2, AT HASTINGS, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1996 - 2003	
ANNUAL TOTAL	5,954,710		4,880,960			
ANNUAL MEAN	16,310		13,370		17,950	
HIGHEST ANNUAL MEAN					25,040	
LOWEST ANNUAL MEAN					10,310	
HIGHEST DAILY MEAN	44,900	Jul 1	39,500	Jul 2	147,000	Apr 19, 2001
LOWEST DAILY MEAN	5,970	Feb 16	3,450	Sep 9	3,450	Sep 9, 2003
ANNUAL SEVEN-DAY MINIMUM	5,980	Feb 13	3,650	Sep 7	3,650	Sep 7, 2003
ANNUAL RUNOFF (AC-FT)	11,810,000		9,681,000		13,010,000	
ANNUAL RUNOFF (CFSM)	0.44		0.36		0.48	
ANNUAL RUNOFF (INCHES)	5.97		4.89		6.58	
10 PERCENT EXCEEDS	28,400		28,500		36,700	
50 PERCENT EXCEEDS	15,500		10,200		11,600	
90 PERCENT EXCEEDS	6,680		4,500		5,640	



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05336700 KETTLE RIVER BELOW SANDSTONE, MN

LOCATION.--Lat 46°06'20", long 92°51'50", in NW¹/₄SW¹/₄ sec. 22, T.42 N., R.20 W., Pine County, Hydrologic Unit 07030003, on Sandstone Federal Correctional Institution property, on left bank, about 1.8 mi south of Sandstone.

DRAINAGE AREA.--868 mi².

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

GAGE.--Water-stage recorder and crest-stage gage. Datum of gage is 931.50 ft above sea level (NGVD of 1929, Minnesota Department of Transportation benchmark).

REMARKS.--Records good except those for estimated daily discharge, which are fair to poor.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in April 1965 reached a stage of 12.96 ft, from flood marks, discharge, 13,400 ft³/s.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 3,200 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Apr 22	0200	3,420	7.75	Jun 24	1230	*6,300	*9.40

Minimum daily-mean discharge, 92 ft³/s, Mar. 6, (backwater from ice).

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	473	478	e223	e165	e113	e93	326	777	680	2,240	417	126
2	440	455	e213	e163	e115	e93	383	690	632	1,860	421	117
3	402	443	e205	e159	e118	e92	362	625	576	1,980	402	112
4	488	429	e198	e158	e117	e92	295	579	519	2,290	383	106
5	1,150	411	e194	e158	e117	e92	307	776	474	1,950	361	104
6	1,370	400	e185	e157	e118	e92	342	1,930	452	1,600	341	105
7	1,440	388	e182	e158	e117	e96	337	2,160	495	1,480	325	102
8	1,430	382	e175	e157	e116	e97	310	1,970	517	2,110	305	102
9	1,340	407	e174	e150	e115	e98	302	2,020	538	1,830	281	102
10	1,240	425	e173	e145	e116	e98	311	2,780	823	1,740	264	101
11	1,130	416	e177	e140	e114	e102	331	3,040	1,530	2,290	255	108
12	1,130	400	e178	e137	e112	e100	365	2,890	1,530	2,420	252	263
13	1,200	379	e178	e134	e111	e102	373	2,580	1,360	2,020	237	386
14	1,130	356	e178	e128	e110	e104	420	2,230	1,180	1,710	229	355
15	1,030	326	e176	e127	e106	e108	457	1,940	994	1,760	215	319
16	944	339	e174	e126	e103	e113	597	1,670	801	1,570	206	281
17	841	323	e173	e122	e100	e118	885	1,440	678	1,350	198	247
18	765	306	e180	e120	e99	e123	889	1,270	650	1,180	186	261
19	731	301	e190	e118	e99	e115	1,320	1,220	624	1,040	175	361
20	705	295	e200	e115	e99	e105	2,230	1,990	581	949	169	471
21	683	294	e200	e111	e100	e120	3,080	2,070	518	833	162	491
22	655	288	e195	e108	e104	e150	3,200	1,840	451	753	153	479
23	621	288	e185	e107	e105	e200	2,620	1,740	3,450	675	147	460
24	583	272	e180	e105	e103	e240	2,120	1,580	5,960	602	145	424
25	554	255	e175	e104	e102	e305	1,770	1,410	5,280	548	142	383
26	545	236	e175	e103	e97	e300	1,500	1,250	4,300	510	154	351
27	540	e220	e175	e102	e95	293	1,280	1,100	3,790	474	150	324
28	526	e225	e175	e101	e93	249	1,140	958	3,230	439	147	301
29	508	e230	e175	e102	---	219	1,010	849	2,950	422	149	274
30	506	e230	e170	e105	---	247	893	753	2,710	406	140	254
31	500	---	e168	e108	---	283	---	708	---	402	133	---
TOTAL	25,600	10,197	5,699	3,993	3,014	4,639	29,755	48,835	48,273	41,433	7,244	7,870
MEAN	826	340	184	129	108	150	992	1,575	1,609	1,337	234	262
MAX	1,440	478	223	165	118	305	3,200	3,040	5,960	2,420	421	491
MIN	402	220	168	101	93	92	295	579	451	402	133	101
AC-FT	50,780	20,230	11,300	7,920	5,980	9,200	59,020	96,860	95,750	82,180	14,370	15,610
CFSM	0.95	0.39	0.21	0.15	0.12	0.17	1.14	1.81	1.85	1.54	0.27	0.30
IN.	1.10	0.44	0.24	0.17	0.13	0.20	1.28	2.09	2.07	1.78	0.31	0.34

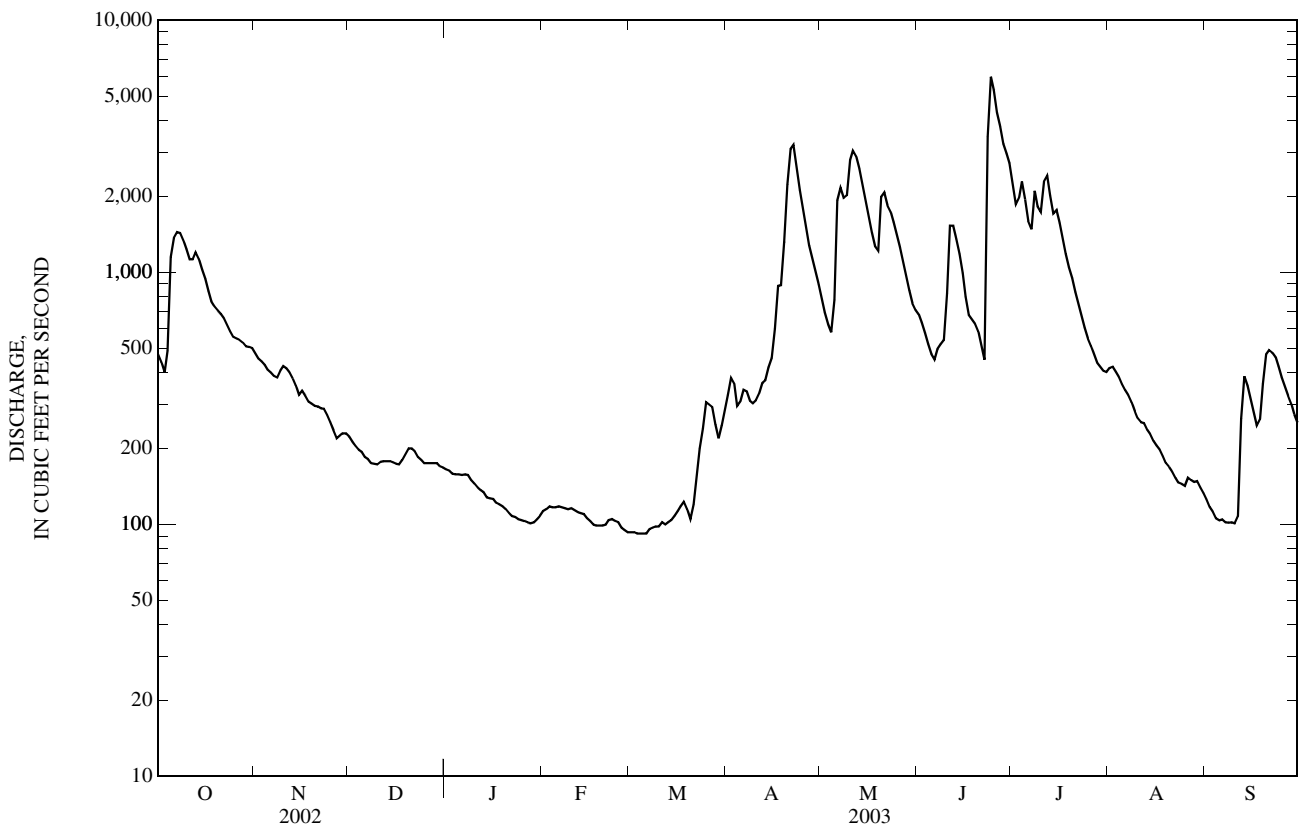
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1979 - 2003, BY WATER YEAR (WY)

MEAN	673	526	285	189	196	554	2,363	1,275	887	672	397	555
MAX	2,071	1,569	652	411	447	1,451	6,459	3,168	2,799	1,960	1,575	3,065
(WY)	(1983)	(1992)	(1984)	(1984)	(1998)	(1992)	(2001)	(1986)	(1993)	(1993)	(1999)	(1986)
MIN	129	137	118	86.4	108	141	453	222	131	110	97.2	90.0
(WY)	(1988)	(1990)	(1990)	(1981)	(2003)	(1980)	(1987)	(1980)	(1988)	(1988)	(1989)	(1998)

05336700 KETTLE RIVER BELOW SANDSTONE, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1979 - 2003	
ANNUAL TOTAL	253,487		236,552		714	
ANNUAL MEAN	694		648		318	
HIGHEST ANNUAL MEAN					1,352	1986
LOWEST ANNUAL MEAN					318	1988
HIGHEST DAILY MEAN	5,460	Apr 12	5,960	Jun 24	14,200	Apr 24, 2001
LOWEST DAILY MEAN	120	Mar 3	92	Mar 3-6	78	Sep 22, 1998
ANNUAL SEVEN-DAY MINIMUM	122	Mar 1	92	Feb 28	80	Jan 23, 1981
MAXIMUM PEAK FLOW			6,300	Jun 24	17,200	Jul 23, 1972
MAXIMUM PEAK STAGE			9.40	Jun 24	15.38	Jul 23, 1972
INSTANTANEOUS LOW FLOW			a92	Mar 3	b25	Nov 11, 1977
ANNUAL RUNOFF (AC-FT)	502,800		469,200		517,400	
ANNUAL RUNOFF (CFSM)	0.80		0.75		0.82	
ANNUAL RUNOFF (INCHES)	10.86		10.14		11.18	
10 PERCENT EXCEEDS	1,520		1,790		1,730	
50 PERCENT EXCEEDS	390		323		316	
90 PERCENT EXCEEDS	142		105		136	

- a Estimated daily-mean, backwater from ice.
- b Result of freezeup.
- e Estimated.



05338500 SNAKE RIVER NEAR PINE CITY, MN

LOCATION.--Lat 45°50'30", long 92°56'00", in SE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 26, T. 39 N., R. 21 W., Pine County, Hydrologic Unit 07030004, on left bank at site of former power plant and dam, 0.5 mi downstream from Cross Lake and 1.5 mi northeast of Pine City.

DRAINAGE AREA.--974 mi².

PERIOD OF RECORD.--June 1913 to September 1917, July 1951 to Sept. 1981, Oct. 1992 to current year.

REVISED RECORDS.--1999-2002, summary statistics revised in 2003.

GAGE.--Water-stage recorder. Datum of gage is 919.00 ft above sea level (NGVD of 1929). June 25, 1913 to Sept. 30, 1917, nonrecording gage at site 500 ft downstream at different datum. July 1 to Oct. 28, 1951, nonrecording gage at present site and datum.

REMARKS.--Records good.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	448	652	240	165	90	88	432	1,650	669	4,930	309	80
2	421	619	239	163	94	89	402	1,390	612	4,380	302	80
3	397	605	220	159	108	90	409	1,170	565	4,240	286	82
4	502	572	214	158	106	91	427	947	521	3,980	266	70
5	632	552	213	159	105	89	413	919	496	3,930	255	69
6	922	543	204	156	110	86	381	957	464	3,980	243	76
7	1,280	516	203	158	111	88	352	1,060	460	4,000	223	87
8	1,520	494	192	161	111	95	349	1,170	468	3,830	210	86
9	1,680	485	183	163	109	98	325	1,420	467	3,510	197	83
10	1,740	489	182	174	109	91	300	1,680	540	3,130	191	80
11	1,700	475	184	164	109	88	279	2,150	679	2,720	173	102
12	1,620	467	187	144	107	86	263	2,560	951	2,370	168	215
13	1,500	454	186	138	103	88	254	2,870	1,300	2,090	159	224
14	1,400	443	189	132	100	90	274	3,040	1,500	1,870	152	231
15	1,310	426	189	123	99	98	259	3,080	1,560	1,680	145	230
16	1,200	411	186	117	97	115	422	2,960	1,490	1,480	135	219
17	1,070	392	182	111	95	145	865	2,720	1,340	1,320	126	203
18	970	382	201	112	92	196	1,350	2,420	1,180	1,160	124	229
19	881	379	210	108	89	242	1,870	2,240	961	981	119	256
20	798	359	217	105	90	303	2,400	2,060	822	853	122	220
21	788	356	215	102	92	355	2,940	1,910	695	739	131	209
22	765	335	212	99	94	377	3,370	1,890	606	650	107	218
23	743	349	211	95	96	403	3,740	1,890	584	586	88	196
24	724	315	188	89	97	425	3,910	1,830	807	525	98	207
25	701	289	191	89	92	435	3,850	1,720	1,900	479	99	162
26	695	270	185	85	90	450	3,590	1,560	3,190	458	107	159
27	679	263	181	84	88	473	3,200	1,400	4,270	423	93	165
28	671	266	184	85	88	480	2,730	1,220	5,070	393	93	146
29	673	285	182	85	---	465	2,310	1,010	5,440	371	88	147
30	673	266	183	86	---	449	1,950	854	5,340	341	86	146
31	664	---	194	90	---	433	---	740	---	315	82	---
TOTAL	29,767	12,709	6,147	3,859	2,771	7,101	43,616	54,487	44,947	61,714	4,977	4,677
MEAN	960	424	198	124	99.0	229	1,454	1,758	1,498	1,991	161	156
MAX	1,740	652	240	174	111	480	3,910	3,080	5,440	4,930	309	256
MIN	397	263	181	84	88	86	254	740	460	315	82	69
AC-FT	59,040	25,210	12,190	7,650	5,500	14,080	86,510	108,100	89,150	122,400	9,870	9,280
CFSM	1.00	0.44	0.21	0.13	0.10	0.24	1.52	1.83	1.56	2.08	0.17	0.16
IN.	1.16	0.49	0.24	0.15	0.11	0.28	1.69	2.12	1.75	2.40	0.19	0.18

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1913 - 2003, BY WATER YEAR (WY)

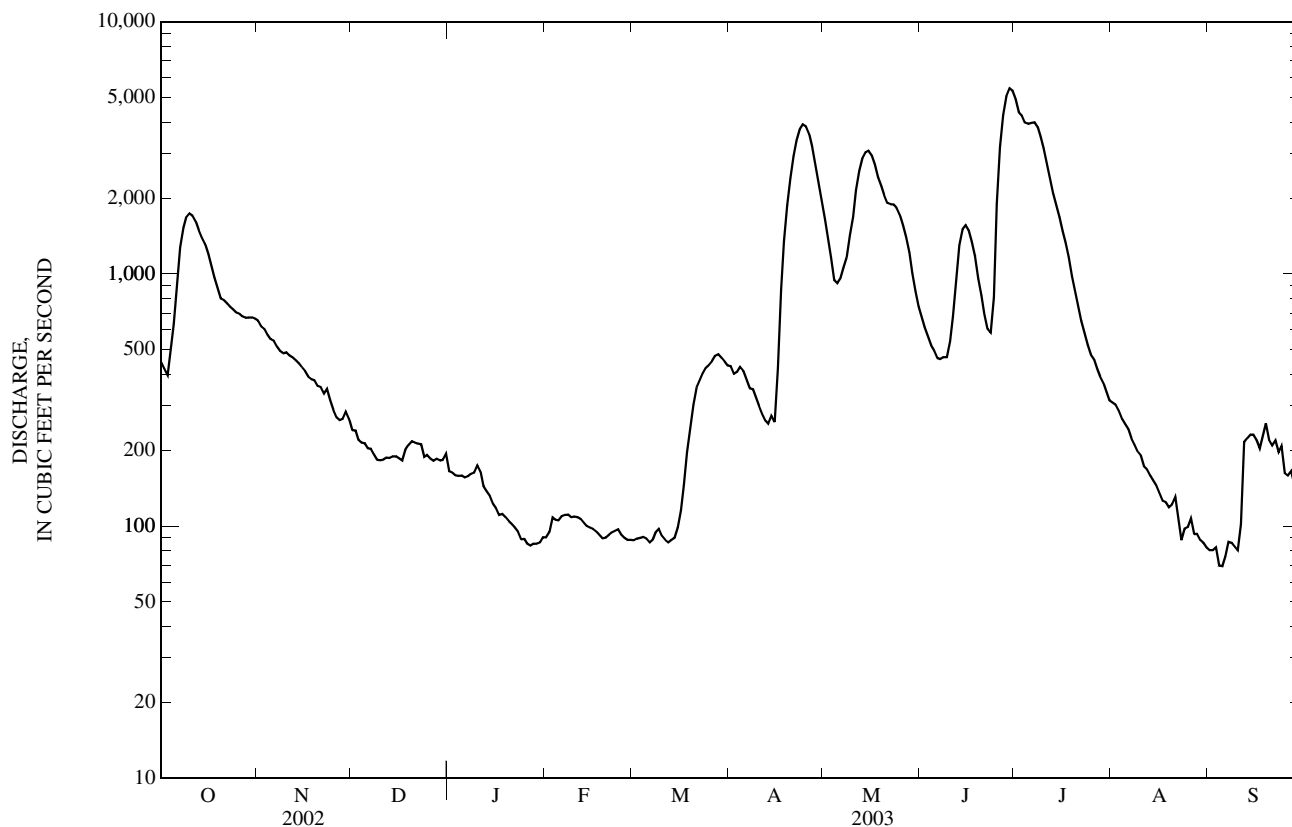
MEAN	398	404	216	131	133	467	2,110	1,174	825	756	334	308
MAX	3,130	2,310	837	343	549	2,658	5,905	2,726	2,775	3,400	2,018	1,201
(WY)	(1969)	(1972)	(1978)	(1966)	(1966)	(1966)	(2001)	(1979)	(1967)	(1952)	(1972)	(1951)
MIN	47.1	59.9	36.1	29.3	33.4	61.5	172	203	167	100	34.9	37.8
(WY)	(1977)	(1977)	(1977)	(1977)	(1977)	(1965)	(1959)	(1998)	(1997)	(1961)	(1976)	(1976)

05338500 SNAKE RIVER NEAR PINE CITY, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1913 - 2003	
ANNUAL TOTAL	339,856		276,772		a601	
ANNUAL MEAN	931		758		1,223	
HIGHEST ANNUAL MEAN					177	
LOWEST ANNUAL MEAN					14,200	
HIGHEST DAILY MEAN	6,400	Apr 16	5,440	Jun 29	14,200	Jul 27, 1972
LOWEST DAILY MEAN	96	Feb 7	69	Sep 5	26	Aug 29, 1976
ANNUAL SEVEN-DAY MINIMUM	98	Feb 2	77	Aug 31	28	Jan 21, 1977
MAXIMUM PEAK FLOW			5,500	Jun 29	14,300	Jul 27, 1972
MAXIMUM PEAK STAGE			7.06	Jun 29	10.38	Jul 27, 1972
INSTANTANEOUS LOW FLOW			69	Sep 4	b5.5	Oct 1, 1964
ANNUAL RUNOFF (AC-FT)	674,100		549,000		435,400	
ANNUAL RUNOFF (CFSM)	0.97		0.79		0.63	
ANNUAL RUNOFF (INCHES)	13.20		10.75		8.52	
10 PERCENT EXCEEDS	2,110		2,110		1,470	
50 PERCENT EXCEEDS	495		309		221	
90 PERCENT EXCEEDS	128		90		78	

a Median of annual mean discharges is 550 ft³/s.

b Result of dam rehabilitation.



05340500 ST. CROIX RIVER AT ST. CROIX FALLS, WI

LOCATION.--Lat 45°24'25", long 92°38'49", in SW ¼ NW ¼ sec.30, T.34 N., R.18 W., Polk County, Hydrologic Unit 07030005, St. Croix National Scenic Riverway, on left bank, 1,500 ft downstream from powerplant of Northern States Power Co., in St. Croix Falls, and at mile 52.2.

DRAINAGE AREA.--6,240 mi².

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."

REVISED RECORDS.--WSP 1115: 1929. WDR WI-82-1: Drainage area.

GAGE.--Water-stage recorder and crest-stage gage. Datum of gage is 689.94 ft above NGVD of 1929. 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. February 1940 to Sept. 30, 1979, water-stage recorder at site 300 ft downstream at same datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair (see page 11). Diurnal fluctuation caused by St. Croix Falls Powerplant 1,500 ft upstream. Gage-height telemeter and data-collection platform at station.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5,020	6,070	2,610	2,840	2,090	2,270	4,520	7,610	6,560	16,200	3,380	1,830
2	4,820	5,280	2,610	2,500	2,110	e2,100	4,550	7,110	6,190	13,600	3,450	1,830
3	4,760	5,390	2,000	e2,600	e2,200	2,150	4,420	6,500	5,960	13,300	3,520	1,930
4	5,490	5,300	2,260	2,410	e2,200	2,230	4,460	6,300	5,700	15,200	3,380	1,750
5	7,090	5,130	2,840	2,610	e2,300	e2,200	4,120	6,360	5,240	14,400	3,050	1,740
6	9,600	5,070	2,280	2,840	e2,300	e2,200	4,270	7,170	4,960	12,900	3,310	1,770
7	11,300	4,890	2,760	2,900	e2,200	2,220	4,170	9,820	5,010	11,400	3,150	1,800
8	12,100	4,670	3,260	2,970	e2,300	2,280	3,890	10,900	5,240	10,300	2,930	1,840
9	12,200	5,120	2,900	3,060	e2,200	e2,000	3,710	11,500	5,180	10,200	2,920	1,780
10	11,900	4,820	3,440	3,030	e2,100	e2,100	3,750	13,900	5,390	9,420	2,640	1,720
11	11,400	4,840	3,270	2,480	e2,300	2,180	3,750	17,200	6,040	8,990	2,660	1,690
12	10,700	4,840	3,330	2,220	2,480	2,180	3,760	21,800	8,480	9,100	2,630	2,340
13	10,100	4,430	3,260	2,220	2,220	2,220	3,830	22,200	8,910	8,760	2,720	2,940
14	9,610	4,690	3,360	2,150	2,310	2,320	3,730	21,200	8,440	8,320	2,420	2,560
15	9,070	4,410	3,390	2,040	2,440	2,340	3,760	19,600	7,830	8,150	2,360	2,800
16	8,200	4,340	3,240	2,180	2,100	3,220	5,170	17,600	7,140	7,600	2,350	2,410
17	7,770	4,260	3,180	2,090	2,090	3,170	6,370	15,400	6,700	7,170	2,110	2,430
18	7,600	4,130	3,240	2,090	2,260	3,800	8,010	13,600	5,540	6,760	2,470	2,640
19	7,290	4,120	3,340	2,190	2,080	3,820	9,290	12,700	5,520	6,080	2,220	2,710
20	7,020	4,110	3,420	2,280	2,460	4,250	11,400	13,400	5,200	5,980	2,250	3,080
21	6,930	4,030	3,520	2,190	2,160	4,550	14,200	14,900	4,360	5,450	1,960	3,340
22	6,870	3,990	3,280	2,080	2,260	4,980	16,100	16,100	4,470	5,240	2,130	3,460
23	6,710	3,950	3,240	2,150	2,340	5,050	17,000	15,700	4,200	4,890	1,990	3,260
24	6,240	3,950	2,970	2,080	e2,300	5,730	16,100	13,900	8,710	4,500	2,100	2,850
25	6,230	3,650	2,860	2,020	e2,200	6,070	14,600	12,400	18,000	4,020	2,040	2,640
26	6,210	2,970	2,910	1,900	2,110	5,880	12,600	11,000	19,500	4,130	2,100	2,810
27	6,220	3,390	2,580	2,020	2,340	6,220	11,100	9,290	19,300	3,740	2,110	2,630
28	6,210	2,820	2,800	1,890	2,190	5,250	10,000	8,540	18,600	3,890	2,100	2,770
29	6,140	3,570	2,850	2,020	---	4,990	8,910	7,820	17,500	3,670	1,940	2,530
30	5,540	3,660	3,090	2,110	---	4,430	8,240	7,300	17,100	3,250	1,930	2,440
31	5,730	---	3,110	2,120	---	4,710	---	6,880	---	3,410	1,750	---
TOTAL	242,070	131,890	93,200	72,280	62,640	109,110	229,780	385,700	256,970	250,020	78,070	72,320
MEAN	7,809	4,396	3,006	2,332	2,237	3,520	7,659	12,440	8,566	8,065	2,518	2,411
MAX	12,200	6,070	3,520	3,060	2,480	6,220	17,000	22,200	19,500	16,200	3,520	3,460
MIN	4,760	2,820	2,000	1,890	2,080	2,000	3,710	6,300	4,200	3,250	1,750	1,690
CFSM	1.25	0.70	0.48	0.37	0.36	0.56	1.23	1.99	1.37	1.29	0.40	0.39
IN.	1.44	0.79	0.56	0.43	0.37	0.65	1.37	2.30	1.53	1.49	0.47	0.43

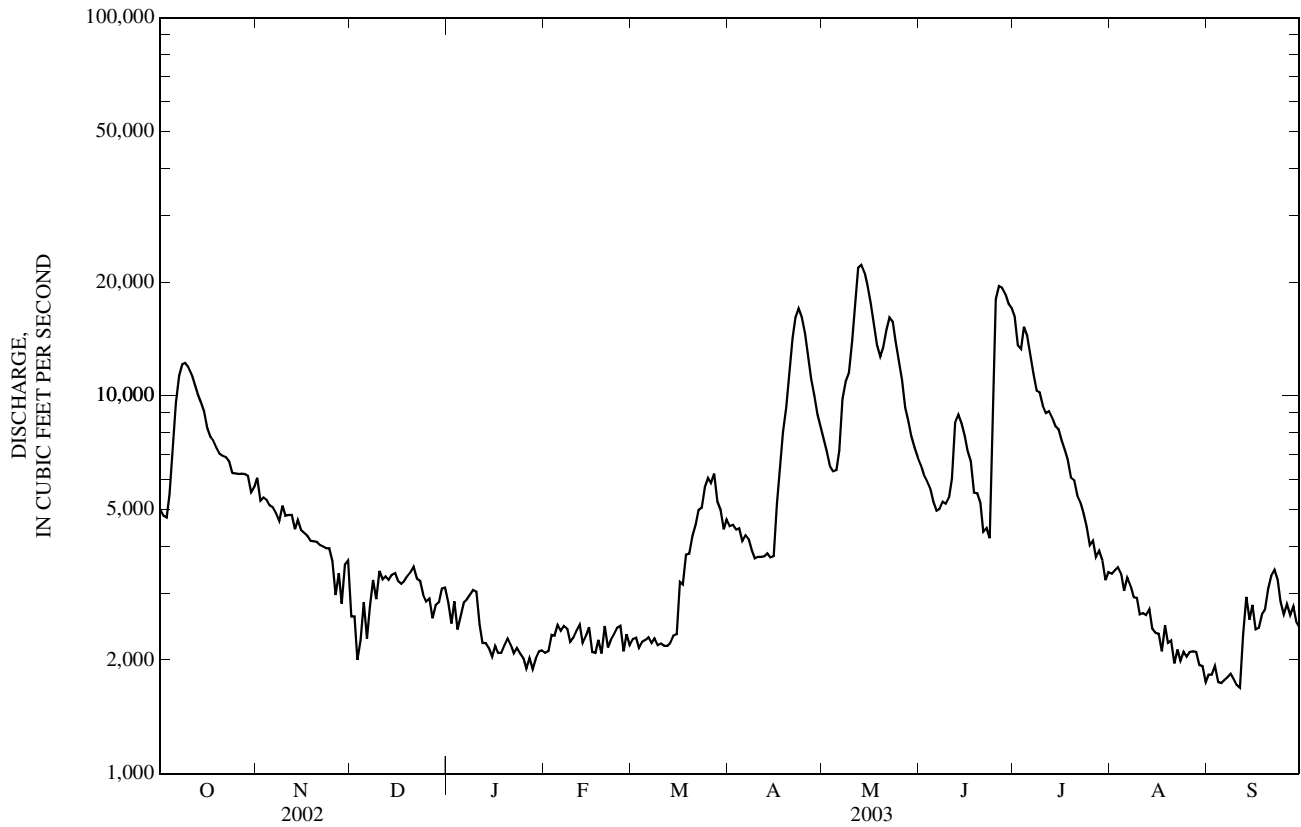
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1902 - 2003, BY WATER YEAR (WY)

MEAN	3,775	3,506	2,604	2,198	2,170	4,232	10,330	7,547	5,732	4,214	2,942	3,501
MAX	14,270	11,910	5,821	4,279	6,021	14,420	29,600	21,840	19,510	17,260	9,777	14,590
(WY)	(1969)	(1972)	(1984)	(1984)	(1984)	(1945)	(2001)	(1950)	(1944)	(1952)	(1955)	(1941)
MIN	1,380	1,342	1,288	1,157	1,257	1,538	2,212	2,430	1,481	1,014	839	1,152
(WY)	(1933)	(1911)	(1911)	(1911)	(1913)	(1912)	(1902)	(1934)	(1934)	(1934)	(1934)	(1933)

05340500 ST. CROIX RIVER AT ST. CROIX FALLS, WI—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1902 - 2003	
ANNUAL TOTAL	2,191,780		1,984,050			
ANNUAL MEAN	6,005		5,436		4,409	
HIGHEST ANNUAL MEAN					8,569 1986	
LOWEST ANNUAL MEAN					1,754 1934	
HIGHEST DAILY MEAN	32,300	Apr 15,16	22,200	May 13	59,500	Apr 26, 2001
LOWEST DAILY MEAN	1,940	Feb 7	1,690	Sep 11	75	Jul 17, 1910
ANNUAL SEVEN-DAY MINIMUM	2,260	Feb 6	1,760	Sep 5	754	Jul 29, 1934
MAXIMUM PEAK FLOW			22,600	May 12	60,900	Apr 25, 2001
MAXIMUM PEAK STAGE			11.15	May 12	25.88	Apr 25, 2001
ANNUAL RUNOFF (CFSM)	0.96		0.87		0.71	
ANNUAL RUNOFF (INCHES)	13.07		11.83		9.60	
10 PERCENT EXCEEDS	11,300		12,000		8,990	
50 PERCENT EXCEEDS	4,690		3,760		2,800	
90 PERCENT EXCEEDS	2,510		2,100		1,580	

(e) Estimated due to ice effect or missing record



UPPER MISSISSIPPI RIVER MAIN STEM

05344500 MISSISSIPPI RIVER AT PRESCOTT, WI

LOCATION.--Lat 44°44'45", long 92°48'00", in sec. 9, T.26 N., R.20 W., Pierce County, Hydrologic Unit 07040001, on left bank at Prescott, 200 ft downstream from St. Croix River, 300 ft south of Chicago, Burlington & Quincy Railroad bridge, 800 ft south of bridge on U.S. Highway 10, and at mile 811.4 upstream from Ohio River.

DRAINAGE AREA.--44,800 mi² (approximately).

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

REVISED RECORDS.--WSP 1508: 1941. WRD MN-74: 1973.

GAGE.--Water-stage recorder. Datum of gage is 649.50 ft above sea level (NGVD of 1929). Prior to Aug. 2, 1932, nonrecording gage at railroad bridge 300 ft upstream at following datums: June 3, 1928 to Sept. 30, 1929, 19.27 ft higher; Oct. 1, 1929 to Sept. 30, 1930, 17.68 ft higher; Oct. 1, 1930 to Aug. 1, 1932, 19.28 ft higher. Aug. 2, 1932 to Oct. 30, 1938, water-stage recorder at present site at datum 19.28 ft higher; Nov. 1, 1938 to Sept. 7, 1971, water-stage recorder at present site at datum 50.00 ft lower. Auxiliary water-stage recorder 10.7 mi downstream from base gage is used in discharge computations.

REMARKS.--Records good except for those determined by flow routing, which are fair to poor. Discharges below a stage of about 27 ft may be computed by routing flows from the Mississippi River at St. Paul (05331000) and St. Croix River at St. Croix Falls, WI (05340500). In the 2003 water year, discharges for the periods Dec. 6 to Mar. 20 and Aug. 12 to Sep. 30 were obtained by routing. Some regulation by reservoirs, navigation dams, and power plants at low and medium stages.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	16,400	23,100	13,400	11,800	7,780	7,630	19,000	34,600	31,800	53,700	16,300	6,260
2	16,000	22,700	13,400	10,800	7,770	8,050	19,200	32,100	30,100	53,900	16,300	6,270
3	14,700	21,900	12,200	10,700	7,660	7,450	19,400	29,800	29,000	52,400	14,100	6,290
4	17,900	21,700	11,500	10,800	7,910	7,070	19,000	28,300	27,400	52,400	13,400	6,090
5	20,600	21,600	10,500	10,600	7,680	7,050	18,400	27,600	26,600	51,700	14,500	5,760
6	23,100	21,000	11,500	10,700	7,650	7,020	18,400	27,000	25,200	50,800	13,200	5,890
7	27,300	20,500	10,200	11,500	7,470	6,950	17,000	27,600	24,800	48,500	14,500	5,730
8	31,600	20,700	11,300	10,900	7,610	6,920	15,800	28,200	25,000	45,500	13,900	5,880
9	35,000	20,600	12,300	10,800	7,680	7,040	15,900	30,500	24,400	43,100	12,900	5,620
10	36,600	20,500	11,600	11,200	7,580	6,930	16,000	33,300	23,900	41,500	12,700	5,590
11	38,200	19,600	11,500	11,200	7,730	6,910	16,100	38,000	25,400	39,500	12,600	6,060
12	38,200	19,400	12,000	9,860	7,830	7,330	15,700	43,500	26,600	38,300	11,900	5,560
13	37,500	20,000	12,600	8,720	7,920	7,560	15,300	50,500	28,800	38,000	11,400	6,390
14	37,300	19,800	12,900	8,770	7,640	7,080	15,400	56,200	29,800	37,900	11,200	8,550
15	36,000	18,900	12,700	8,720	7,660	7,220	16,000	58,900	29,700	38,300	10,200	7,800
16	34,200	18,400	12,900	8,560	7,760	7,430	17,600	58,500	29,200	37,800	10,100	8,140
17	32,900	18,200	13,000	8,770	7,460	8,690	22,600	57,700	28,500	36,600	9,980	7,520
18	32,000	17,700	12,300	8,500	7,490	9,350	25,600	55,800	27,600	34,700	9,290	7,360
19	31,000	17,500	12,300	8,530	7,680	10,900	28,400	53,800	25,600	33,400	9,420	7,460
20	29,700	17,400	13,200	8,500	7,620	12,800	30,800	52,400	23,800	31,700	8,990	7,470
21	28,800	17,200	13,400	8,510	7,980	16,700	34,000	52,000	21,100	29,700	8,540	8,380
22	28,700	17,300	13,300	8,400	7,700	18,800	37,600	52,300	19,200	28,000	8,200	8,700
23	27,900	18,000	12,300	8,200	7,890	20,400	41,500	52,600	18,700	27,100	7,990	8,230
24	26,300	17,500	12,200	8,050	7,920	20,700	44,900	52,200	19,400	25,300	7,700	7,980
25	25,100	16,800	11,000	7,730	7,880	21,700	47,100	50,100	28,600	23,600	7,520	7,900
26	25,600	16,200	10,800	7,600	7,430	23,500	47,100	47,600	41,000	22,600	7,150	7,560
27	24,300	14,900	11,300	7,660	6,830	24,000	45,500	44,800	44,700	21,100	7,050	7,460
28	23,700	14,800	11,100	7,910	7,200	23,500	42,700	41,500	48,100	19,000	7,160	7,290
29	24,400	14,400	11,300	7,670	---	21,700	40,200	38,100	50,500	17,900	7,000	7,150
30	24,300	13,600	11,400	7,790	---	20,300	37,100	36,000	52,300	17,300	6,800	6,980
31	23,500	---	11,700	7,880	---	19,400	---	33,800	---	15,800	6,600	---
TOTAL	868,800	561,900	373,100	287,330	214,410	388,080	799,300	1,325,300	886,800	1,107,100	328,590	209,320
MEAN	28,030	18,730	12,040	9,269	7,658	12,520	26,640	42,750	29,560	35,710	10,600	6,977
MAX	38,200	23,100	13,400	11,800	7,980	24,000	47,100	58,900	52,300	53,900	16,300	8,700
MIN	14,700	13,600	10,200	7,600	6,830	6,910	15,300	27,000	18,700	15,800	6,600	5,560
AC-FT	1,723,000	1,115,000	740,000	569,900	425,300	769,800	1,585,000	2,629,000	1,759,000	2,196,000	651,800	415,200
CFSM	0.63	0.42	0.27	0.21	0.17	0.28	0.59	0.95	0.66	0.80	0.24	0.16
IN.	0.72	0.47	0.31	0.24	0.18	0.32	0.66	1.10	0.74	0.92	0.27	0.17

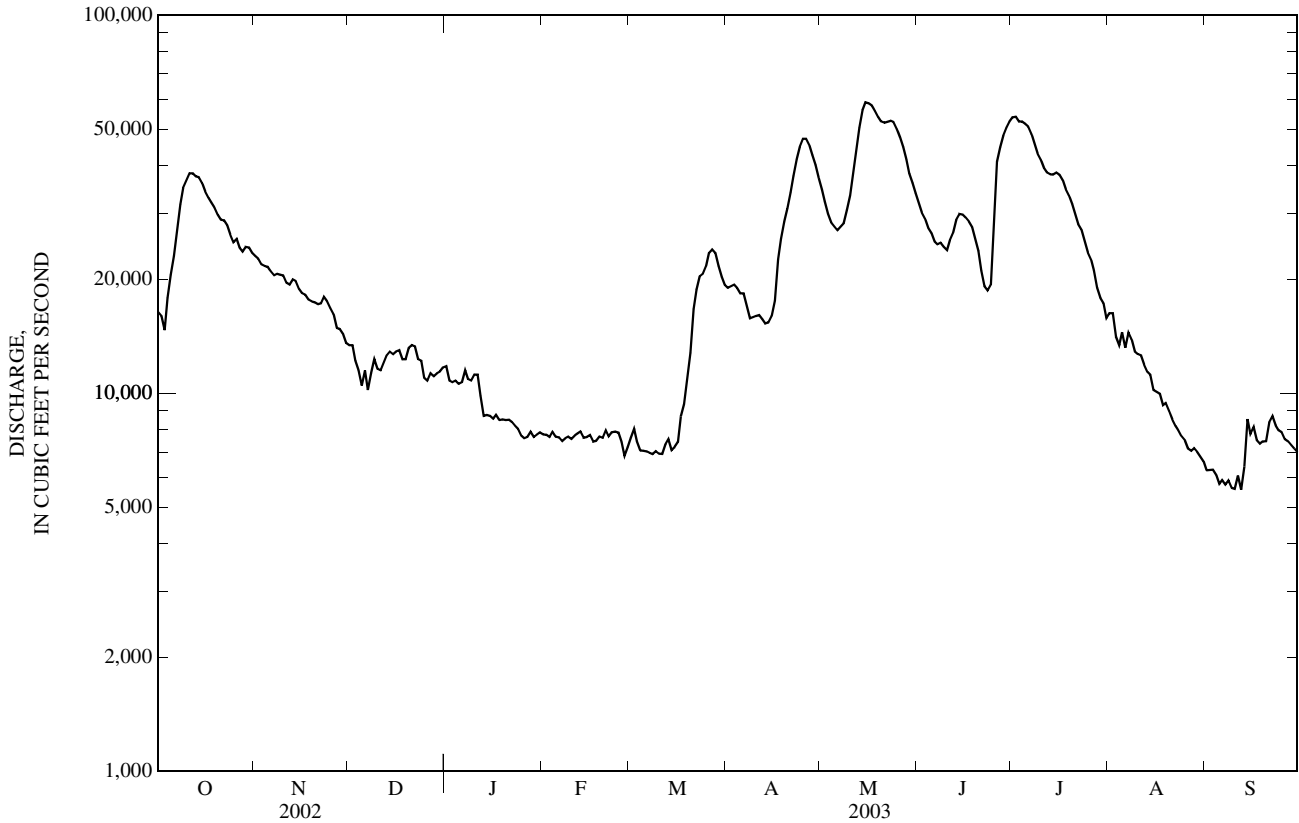
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1928 - 2003, BY WATER YEAR (WY)

MEAN	13,600	13,460	10,150	8,391	8,269	17,210	42,040	32,970	26,330	21,090	13,630	12,840
MAX	49,740	40,360	21,460	16,060	21,390	55,010	122,400	90,100	69,890	87,420	48,350	45,950
(WY)	(1987)	(1972)	(1983)	(1983)	(1966)	(1983)	(2001)	(1986)	(1993)	(1993)	(1993)	(1986)
MIN	3,526	3,874	3,379	3,153	3,519	4,369	7,215	6,304	4,185	3,197	2,366	3,002
(WY)	(1933)	(1977)	(1934)	(1935)	(1934)	(1934)	(1931)	(1931)	(1934)	(1934)	(1934)	(1976)

05344500 MISSISSIPPI RIVER AT PRESCOTT, WI—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1928 - 2003	
ANNUAL TOTAL	8,639,870		7,350,030		a18,380	
ANNUAL MEAN	23,670		20,140		38,540	
HIGHEST ANNUAL MEAN					4,367 1934	
LOWEST ANNUAL MEAN					226,000 Apr 18, 1965	
HIGHEST DAILY MEAN	67,400	Apr 18	58,900	May 15	1,380 Jul 13, 1940	
LOWEST DAILY MEAN	8,710	Feb 13	5,560	Sep 12	2,190 Aug 11, 1936	
ANNUAL SEVEN-DAY MINIMUM	8,840	Feb 11	5,760	Sep 6	228,000 Apr 18, 1965	
MAXIMUM PEAK FLOW			59,200	May 15	43.11 Apr 18, 1965	
MAXIMUM PEAK STAGE			32.04	May 15		
ANNUAL RUNOFF (AC-FT)	17,140,000		14,580,000		13,310,000	
ANNUAL RUNOFF (CFSM)	0.53		0.45		0.41	
ANNUAL RUNOFF (INCHES)	7.17		6.10		5.57	
10 PERCENT EXCEEDS	41,200		41,500		39,500	
50 PERCENT EXCEEDS	21,900		16,000		12,000	
90 PERCENT EXCEEDS	9,790		7,400		5,210	

a Median of annual mean discharges is 18,600 ft³/s.



05344850 STURGEON LAKE, WEST SIDE, AT PRAIRIE ISLAND, MN

LOCATION.--Lat 44°38'18", long 92°38'38", in NE¼NE¼SW¼ sec. 32, T. 114 N., R. 15 W., Goodhue County, Hydrologic Unit 07040001, on west bank of Sturgeon Lake, 0.7 miles above lake outlet to Mississippi River and 7 miles northwest of Red Wing.

PERIOD OF RECORD.--July 1998 to current year.

GAGE.--Water-stage recorder. Datum of gage is sea level (NAVD of 1988).

REMARKS.--Records good. Water level affected by U.S. Army Corp of Engineers Lock and Dam 3 on the Mississippi River above Red Wing and by seiche.

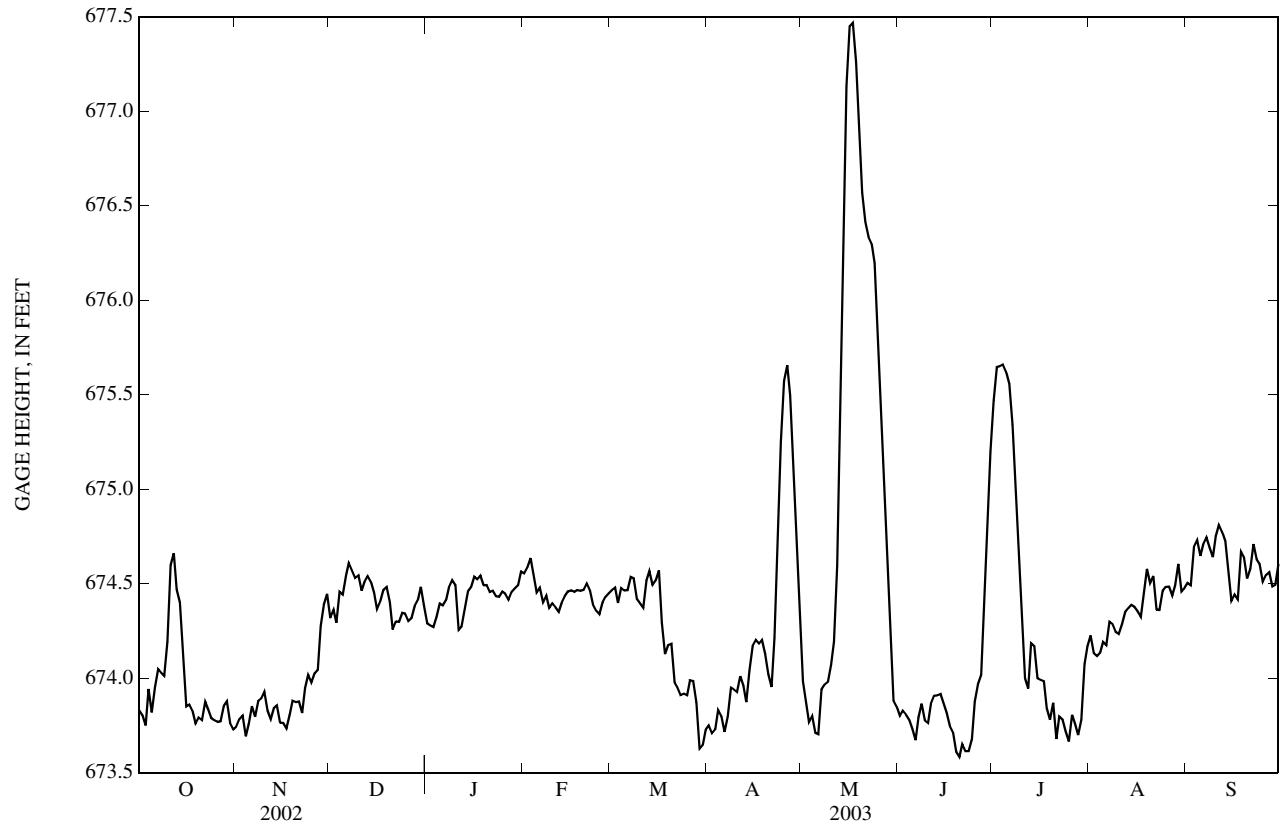
EXTREMES FOR PERIOD OF RECORD.--Maximum elevation, 685.90 ft, Apr. 28, 2001; maximum daily, 685.89 ft, Apr. 28, 2001; minimum elevation, 673.42 ft, Apr. 6, 2002; minimum daily, 673.49 ft, Apr. 6, 2002.

EXTREMES FOR CURRENT YEAR.--Maximum elevation, 677.51 ft, May 17; maximum daily, 677.47 ft, May 17; minimum elevation, 673.49 ft, July 21; minimum daily, 673.58 ft, June 20.

GAGE HEIGHT, FEET
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	673.83	673.74	674.32	674.29	674.55	674.47	673.75	673.98	673.80	675.47	674.23	674.50
2	673.80	673.78	674.36	674.28	674.59	674.48	673.71	673.88	673.83	675.65	674.13	674.49
3	673.75	673.80	674.29	674.27	674.64	674.40	673.73	673.77	673.81	675.65	674.12	674.70
4	673.94	673.69	674.46	674.32	674.55	674.48	673.83	673.80	673.78	675.66	674.14	674.73
5	673.82	673.76	674.44	674.40	674.45	674.47	673.80	673.71	673.73	675.62	674.19	674.65
6	673.95	673.85	674.54	674.38	674.48	674.47	673.72	673.70	673.67	675.56	674.17	674.71
7	674.05	673.80	674.61	674.41	674.40	674.54	673.80	673.94	673.79	675.34	674.30	674.74
8	674.03	673.88	674.57	674.48	674.44	674.53	673.95	673.97	673.87	675.00	674.29	674.69
9	674.01	673.89	674.53	674.52	674.37	674.42	673.94	673.98	673.78	674.68	674.24	674.64
10	674.19	673.93	674.54	674.49	674.40	674.40	673.93	674.07	673.76	674.35	674.24	674.75
11	674.60	673.83	674.46	674.26	674.37	674.37	674.01	674.19	673.87	674.00	674.28	674.81
12	674.66	673.78	674.51	674.27	674.35	674.52	673.96	674.60	673.91	673.94	674.35	674.77
13	674.47	673.84	674.54	674.36	674.40	674.57	673.87	675.47	673.91	674.19	674.37	674.73
14	674.40	673.86	674.51	674.46	674.43	674.49	674.04	676.41	673.92	674.17	674.39	674.55
15	674.13	673.77	674.45	674.48	674.46	674.52	674.17	677.13	673.86	674.00	674.38	674.41
16	673.85	673.76	674.37	674.54	674.47	674.57	674.20	677.45	673.82	673.99	674.35	674.44
17	673.86	673.74	674.41	674.52	674.46	674.30	674.18	677.47	673.75	673.98	674.33	674.42
18	673.83	673.81	674.47	674.54	674.47	674.13	674.20	677.26	673.72	673.84	674.46	674.67
19	673.76	673.88	674.48	674.49	674.46	674.17	674.13	676.94	673.61	673.78	674.58	674.64
20	673.79	673.87	674.40	674.49	674.47	674.18	674.02	676.57	673.58	673.87	674.50	674.53
21	673.78	673.88	674.26	674.46	674.50	673.98	673.95	676.41	673.65	673.68	674.54	674.58
22	673.88	673.82	674.30	674.46	674.47	673.95	674.21	676.33	673.62	673.80	674.36	674.71
23	673.84	673.95	674.30	674.43	674.39	673.91	674.72	676.30	673.62	673.78	674.36	674.63
24	673.79	674.02	674.35	674.43	674.36	673.92	675.25	676.20	673.68	673.72	674.46	674.61
25	673.78	673.98	674.34	674.46	674.34	673.91	675.57	675.97	673.88	673.67	674.48	674.51
26	673.77	674.03	674.30	674.45	674.40	673.99	675.66	675.67	673.97	673.81	674.49	674.55
27	673.77	674.04	674.32	674.42	674.43	673.99	675.50	675.34	674.02	673.76	674.44	674.56
28	673.85	674.28	674.38	674.46	674.45	673.87	675.15	674.84	674.36	673.70	674.49	674.48
29	673.88	674.39	674.42	674.48	---	673.63	674.80	674.31	674.82	673.78	674.61	674.49
30	673.76	674.45	674.48	674.49	---	673.65	674.36	673.88	675.20	674.08	674.46	674.61
31	673.73	---	674.38	674.56	---	673.73	---	673.85	---	674.17	674.48	---
MEAN	673.95	673.90	674.42	674.43	674.45	674.23	674.27	675.21	673.89	674.34	674.36	674.61
MAX	674.66	674.45	674.61	674.56	674.64	674.57	675.66	677.47	675.20	675.66	674.61	674.81
MIN	673.73	673.69	674.26	674.26	674.34	673.63	673.71	673.70	673.58	673.67	674.12	674.41

05344850 STURGEON LAKE, WEST SIDE, AT PRAIRIE ISLAND, MN—Continued



05345000 VERMILLION RIVER NEAR EMPIRE, MN

LOCATION.--Lat 44°40'00", long 93°03'17", in SW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 24, T.114 N., R.19 W., Dakota County, Hydrologic Unit 07040001, on right bank and just downstream from County Road 79, 2 mi west of Empire and 4 mi northeast of Farmington.

DRAINAGE AREA.--129 mi².

PERIOD OF RECORD.--May 1942 to June 1945 (no record during July, August, and September 1944), September 1969 to September 1973 (discharge measurements only), October 1973 to current year. Prior to October 1975 published as "near Empire City".

GAGE.--Water-stage recorder. Datum of gage is 851.99 ft above sea level (NGVD of 1929, levels by U.S. Army Corps of Engineers). April 12, 1942 to June 30, 1944, and October 1, 1944 to July 7, 1945, nonrecording gage at same site and present datum.

REMARKS.--Records good. Some regulation at lower flows by wastewater treatment plant upstream.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in April 1965, reached a stage of 7.5 ft, from information by local resident; discharge 6,200 ft³/s, from rating extended above 2,100 ft³/s.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	121	123	83	59	46	42	80	80	88	60	40	32
2	113	122	83	58	48	42	77	77	84	56	40	32
3	113	120	78	56	50	41	76	75	81	71	39	e33
4	206	119	78	57	48	40	74	76	79	98	39	33
5	498	116	76	57	47	39	71	121	78	108	38	34
6	686	114	75	58	47	40	70	120	79	81	38	34
7	763	111	77	60	47	40	70	105	89	73	38	34
8	647	109	75	62	47	41	66	96	89	67	37	34
9	490	109	73	62	46	44	64	172	88	64	36	34
10	410	110	73	59	45	41	63	285	85	63	35	e35
11	383	108	73	56	44	42	63	337	82	64	37	35
12	364	105	75	58	e44	42	63	685	80	65	35	47
13	315	105	75	56	43	41	63	498	77	60	34	47
14	272	106	76	55	43	52	65	367	73	58	34	41
15	234	102	75	54	43	131	70	321	69	79	33	e40
16	221	103	72	54	43	173	156	259	68	77	33	39
17	200	101	73	53	44	136	280	205	65	72	33	38
18	190	100	80	54	43	112	194	173	63	67	32	39
19	187	99	81	53	42	99	157	159	62	61	31	43
20	173	99	78	52	44	99	159	152	60	62	36	41
21	168	97	72	50	50	99	156	138	58	59	39	40
22	162	97	70	49	48	89	139	132	57	55	38	41
23	153	96	67	e48	46	85	123	137	60	52	35	39
24	147	92	64	45	43	84	112	127	60	50	34	38
25	145	89	61	46	41	81	103	119	69	47	34	39
26	142	87	59	46	41	76	98	110	74	46	34	39
27	137	85	60	46	41	80	94	106	68	44	33	39
28	134	85	60	45	41	120	90	101	66	43	32	39
29	131	86	60	45	---	105	88	96	71	42	31	39
30	127	85	62	45	---	91	83	97	64	41	31	38
31	125	---	60	46	---	85	---	92	---	41	31	---
TOTAL	8,157	3,080	2,224	1,644	1,255	2,332	3,067	5,618	2,186	1,926	1,090	1,136
MEAN	263	103	71.7	53.0	44.8	75.2	102	181	72.9	62.1	35.2	37.9
MAX	763	123	83	62	50	173	280	685	89	108	40	47
MIN	113	85	59	45	41	39	63	75	57	41	31	32
AC-FT	16,180	6,110	4,410	3,260	2,490	4,630	6,080	11,140	4,340	3,820	2,160	2,250
CFSM	2.04	0.80	0.56	0.41	0.35	0.58	0.79	1.40	0.56	0.48	0.27	0.29
IN.	2.35	0.89	0.64	0.47	0.36	0.67	0.88	1.62	0.63	0.56	0.31	0.33

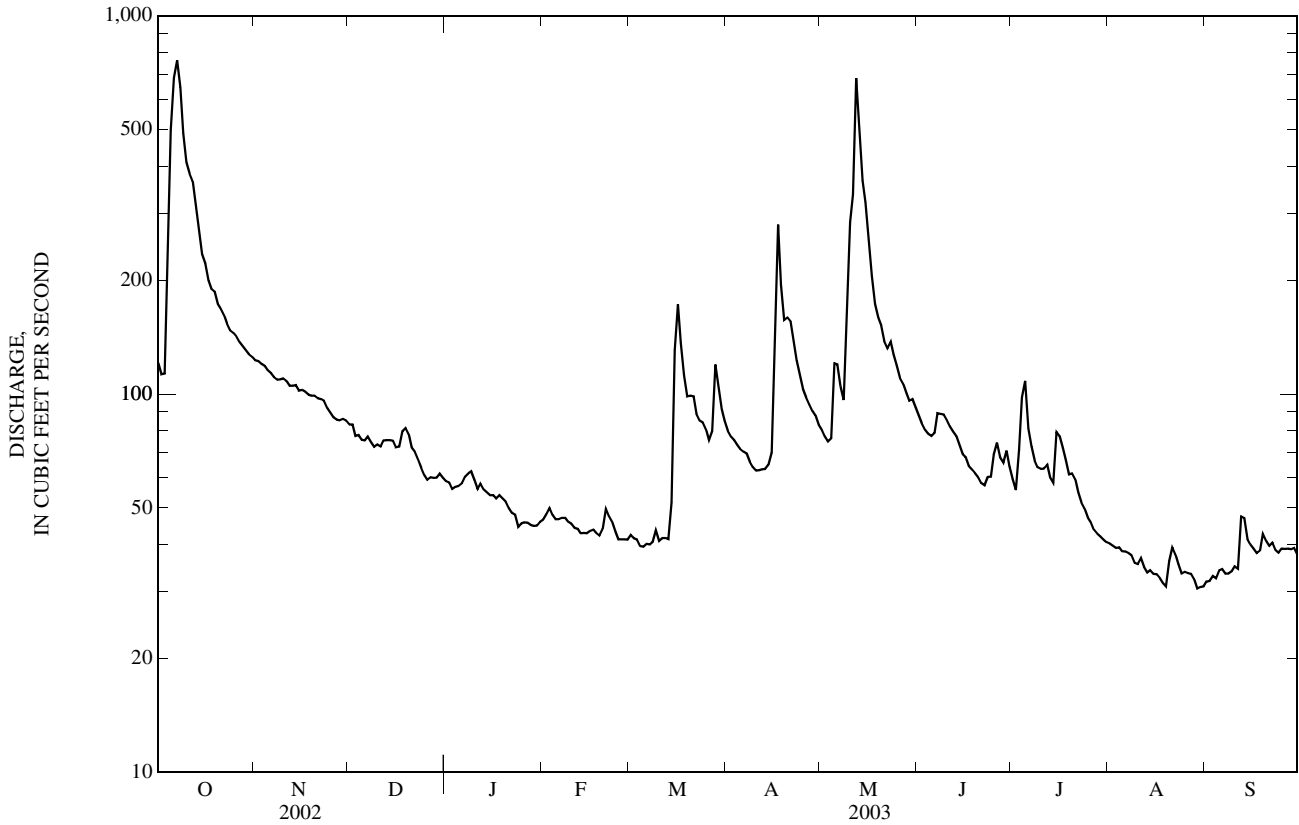
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1942 - 2003, BY WATER YEAR (WY)

MEAN	61.9	52.9	41.5	33.1	38.7	97.7	116	96.6	96.4	75.3	62.3	72.3
MAX	263	133	79.5	58.6	89.8	199	337	223	290	258	234	313
(WY)	(2003)	(1993)	(1993)	(1998)	(1998)	(1983)	(2001)	(1986)	(1993)	(1997)	(1997)	(1992)
MIN	14.9	15.6	12.4	11.0	13.1	25.4	35.2	29.3	23.0	16.0	14.3	14.6
(WY)	(1977)	(1977)	(1977)	(1977)	(1977)	(1975)	(1977)	(1977)	(1988)	(1988)	(1976)	(1976)

05345000 VERMILLION RIVER NEAR EMPIRE, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1942 - 2003	
ANNUAL TOTAL	42,031		33,715		70.7	
ANNUAL MEAN	115		92.4		23.6	
HIGHEST ANNUAL MEAN					147	1998
LOWEST ANNUAL MEAN					23.6	1977
HIGHEST DAILY MEAN	763	Oct 7	763	Oct 7	3,000	Sep 16, 1992
LOWEST DAILY MEAN	36	Jan 24	31	Aug 19, 29-31	8.4	Jan 15, 1975
ANNUAL SEVEN-DAY MINIMUM	36	Jan 24	32	Aug 27	9.0	Jan 13, 1975
MAXIMUM PEAK FLOW			857	Oct 7	6,570	Sep 16, 1992
MAXIMUM PEAK STAGE			7.18	Oct 7	10.00	Sep 16, 1992
INSTANTANEOUS LOW FLOW			25	Sep 3	a6.8	Aug 15, 1992
ANNUAL RUNOFF (AC-FT)	83,370		66,870		51,200	
ANNUAL RUNOFF (CFSM)	0.89		0.72		0.55	
ANNUAL RUNOFF (INCHES)	12.12		9.72		7.44	
10 PERCENT EXCEEDS	207		156		134	
50 PERCENT EXCEEDS	83		67		46	
90 PERCENT EXCEEDS	39		38		22	

a Result of regulation.
 e Estimated.



05346050 CLEAR LAKE, EAST SIDE, AT PRAIRIE ISLAND, MN

LOCATION.--Lat 43°38'11", long 92°58'26", in NE¼SE¼ sec. 15, T. 102 N., R. 18 W., Goodhue County, on east bank of Clear Lake and 0.9 miles above lake output to Vermillion River.

PERIOD OF RECORD.--July 1998 to current year.

GAGE.--Water-stage recorder. Datum of gage is sea level (NAVD of 1988).

REMARKS.--Records good except for period from Oct. 27 to Apr. 4, which is poor. Water level affected by U.S. Army Corp of Engineers Lock and Dam 3 on the Mississippi River.

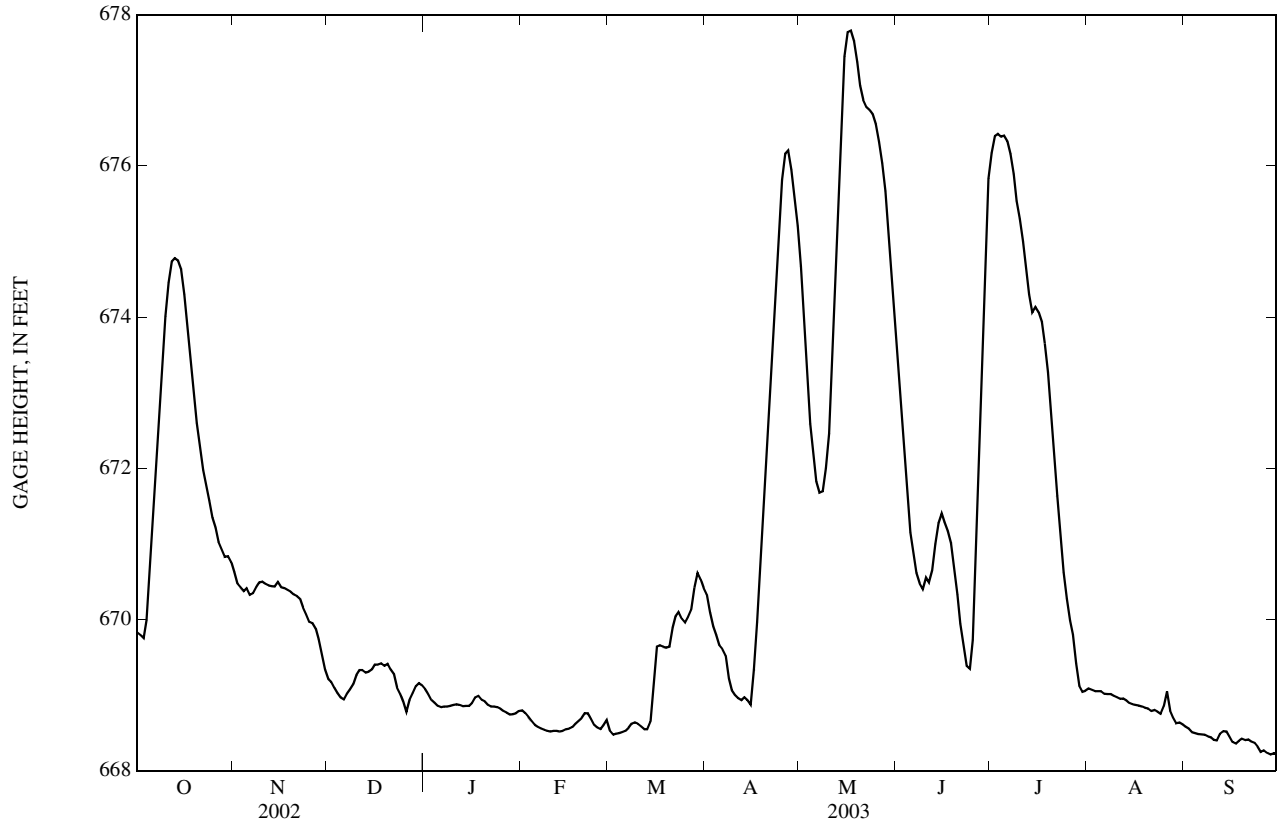
EXTREMES FOR PERIOD OF RECORD.--Maximum elevation, 685.88 ft (from floodmark), Apr. 28, 2001; maximum daily, 678.93 ft, May 22, 1999 (probably higher in April 2001); minimum elevation, 668.19 ft, Sep. 25, 2003; minimum daily, 668.22 ft, Sep. 28, 2003.

EXTREMES FOR CURRENT YEAR.--Maximum elevation, 677.81 ft, May 16; maximum daily, 677.79, May 17; minimum elevation, 668.19 ft, Sep. 25; minimum daily, 668.22 ft, Sep. 28.

GAGE HEIGHT, FEET
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	669.83	670.63	669.21	669.08	668.80	668.53	670.33	674.67	673.41	676.17	669.09	668.58
2	669.80	670.48	669.17	669.01	668.76	668.48	670.09	674.02	672.76	676.39	669.07	668.56
3	669.76	670.42	669.10	668.94	668.71	668.49	669.91	673.27	672.16	676.42	669.06	668.51
4	669.99	670.38	669.03	668.90	668.66	668.50	669.80	672.59	671.63	676.39	669.06	668.50
5	670.65	670.42	668.97	668.86	668.61	668.51	669.66	672.17	671.15	676.40	669.05	668.49
6	671.31	670.33	668.94	668.84	668.58	668.53	669.61	671.83	670.88	676.33	669.02	668.48
7	671.94	670.35	669.01	668.85	668.56	668.57	669.52	671.68	670.62	676.15	669.02	668.48
8	672.69	670.43	669.07	668.85	668.54	668.62	669.22	671.69	670.48	675.89	669.01	668.46
9	673.40	670.49	669.14	668.86	668.53	668.64	669.07	672.00	670.40	675.53	668.99	668.44
10	674.01	670.50	669.26	668.87	668.52	668.62	669.00	672.46	670.56	675.30	668.97	668.41
11	674.46	670.47	669.33	668.88	668.53	668.59	668.96	673.33	670.49	675.00	668.95	668.40
12	674.74	670.45	669.33	668.87	668.53	668.55	668.94	674.46	670.65	674.64	668.96	668.49
13	674.78	670.44	669.30	668.86	668.52	668.55	668.97	675.60	671.00	674.30	668.93	668.52
14	674.75	670.44	669.31	668.86	668.53	668.65	668.94	676.69	671.27	674.06	668.90	668.52
15	674.63	670.50	669.34	668.86	668.55	669.12	668.88	677.45	671.40	674.13	668.88	668.46
16	674.30	670.43	669.41	668.90	668.56	669.64	669.34	677.77	671.28	674.06	668.87	668.38
17	673.86	670.41	669.41	668.97	668.58	669.66	669.96	677.79	671.17	673.93	668.86	668.36
18	673.44	670.39	669.42	668.99	668.62	669.64	671.00	677.65	671.01	673.65	668.85	668.40
19	672.99	670.37	669.39	668.94	668.66	669.63	671.89	677.37	670.68	673.27	668.84	668.42
20	672.60	670.33	669.41	668.92	668.70	669.64	672.56	677.06	670.33	672.79	668.83	668.41
21	672.28	670.31	669.34	668.87	668.76	669.89	673.25	676.87	669.95	672.25	668.79	668.41
22	671.98	670.27	669.28	668.85	668.76	670.04	673.90	676.78	669.67	671.64	668.80	668.39
23	671.78	670.16	669.10	668.85	668.69	670.10	674.61	676.74	669.39	671.14	668.78	668.37
24	671.57	670.07	669.01	668.84	668.61	670.01	675.27	676.69	669.35	670.63	668.75	668.32
25	671.35	669.97	668.92	668.82	668.57	669.96	675.82	676.55	669.73	670.27	668.85	668.25
26	671.21	669.95	668.78	668.79	668.55	670.03	676.16	676.32	671.89	669.99	669.05	668.27
27	671.03	669.88	668.94	668.77	668.60	670.13	676.21	676.03	673.53	669.80	668.79	668.24
28	670.93	669.74	669.03	668.74	668.67	670.42	675.95	675.67	674.50	669.42	668.71	668.22
29	670.83	669.54	669.12	668.75	---	670.62	675.60	675.20	675.29	669.12	668.63	668.23
30	670.84	669.34	669.16	668.76	---	670.53	675.20	674.68	675.83	669.04	668.64	668.23
31	670.76	---	669.13	668.79	---	670.42	---	674.07	---	669.06	668.61	---
MEAN	672.21	670.26	669.17	668.87	668.62	669.33	671.59	675.07	671.42	673.33	668.89	668.41
MAX	674.78	670.63	669.42	669.08	668.80	670.62	676.21	677.79	675.83	676.42	669.09	668.58
MIN	669.76	669.34	668.78	668.74	668.52	668.48	668.88	671.68	669.35	669.04	668.61	668.22

05346050 CLEAR LAKE, EAST SIDE, AT PRAIRIE ISLAND, MN—Continued



05353800 STRAIGHT RIVER NEAR FARIBAULT, MN

LOCATION.--Lat 44°15'29", long 93°13'51", in NW¹/₄SE¹/₄ sec. 9, T.109 N., R.20 W., Rice County, Hydrologic Unit 07040002, on right bank 50 ft downstream from highway bridge, 2.8 mi upstream from Falls Creek and 3.2 mi southeast of Faribault.

DRAINAGE AREA.--435 mi².

PERIOD OF RECORD.--October 1965 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,034.58 ft above sea level (NGVD of 1929).

REMARKS.--Records good except those for estimated daily discharges, which are fair to poor.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,500 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Oct 6	1500	2,220	7.65	May 12	0000	*2,770	*8.34

Minimum discharge, 32 ft³/s, Sept. 8, gage height, 3.66 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	301	205	e118	e82	e41	e53	247	232	239	276	67	40
2	254	198	e115	e82	e42	e54	220	216	228	252	66	40
3	219	195	e113	e81	e43	e53	204	200	217	226	67	41
4	844	190	e111	e80	e43	e53	190	199	202	223	63	40
5	1,220	189	e108	e79	e42	e52	170	515	194	206	62	43
6	1,930	189	e107	e78	e43	e52	166	835	210	212	61	43
7	1,870	183	e108	e78	e43	e51	159	850	280	266	61	41
8	1,370	180	e109	e77	e43	e51	154	720	503	267	60	36
9	938	181	e110	e77	e43	e50	154	959	820	247	59	39
10	733	180	e110	e74	e42	e49	161	1,160	728	232	58	40
11	620	174	110	e65	e42	e49	170	2,130	610	216	71	42
12	553	164	e111	e60	e41	e50	174	2,720	514	197	60	61
13	485	161	e112	e56	e41	e51	170	2,380	453	174	58	48
14	440	160	e113	e53	e41	e56	175	1,860	439	165	55	39
15	404	157	e112	e52	e41	e350	185	1,360	378	250	54	37
16	370	150	e110	e51	e42	455	248	1,100	340	215	54	39
17	347	146	e109	e51	e43	373	359	920	313	163	53	43
18	336	146	e114	e50	e44	280	389	727	294	139	52	48
19	315	147	e113	e48	e46	235	363	616	276	126	64	57
20	296	144	e108	e47	e48	192	385	547	254	117	64	51
21	286	143	e98	e46	e50	156	426	490	235	115	62	43
22	272	140	e88	e44	e51	114	415	453	178	110	57	46
23	261	139	e85	e43	e49	104	377	424	176	103	55	50
24	256	135	e84	e41	e49	109	342	392	211	98	50	49
25	256	124	e83	e40	e50	101	315	361	262	92	50	49
26	252	e123	e82	e39	e50	95	291	336	356	85	56	50
27	241	e126	e83	e38	e51	149	272	313	414	81	49	52
28	236	e129	e84	e39	e52	452	255	299	382	77	46	50
29	234	e126	e84	e39	---	549	244	284	354	75	46	49
30	226	e123	e83	e40	---	387	234	272	307	72	45	49
31	214	---	e82	e40	---	291	---	256	---	69	41	---
TOTAL	16,579	4,747	3,157	1,770	1,256	5,116	7,614	24,126	10,367	5,146	1,766	1,355
MEAN	535	158	102	57.1	44.9	165	254	778	346	166	57.0	45.2
MAX	1,930	205	118	82	52	549	426	2,720	820	276	71	61
MIN	214	123	82	38	41	49	154	199	176	69	41	36
AC-FT	32,880	9,420	6,260	3,510	2,490	10,150	15,100	47,850	20,560	10,210	3,500	2,690
CFSM	1.21	0.36	0.23	0.13	0.10	0.37	0.57	1.76	0.78	0.38	0.13	0.10
IN.	1.40	0.40	0.27	0.15	0.11	0.43	0.64	2.03	0.87	0.43	0.15	0.11

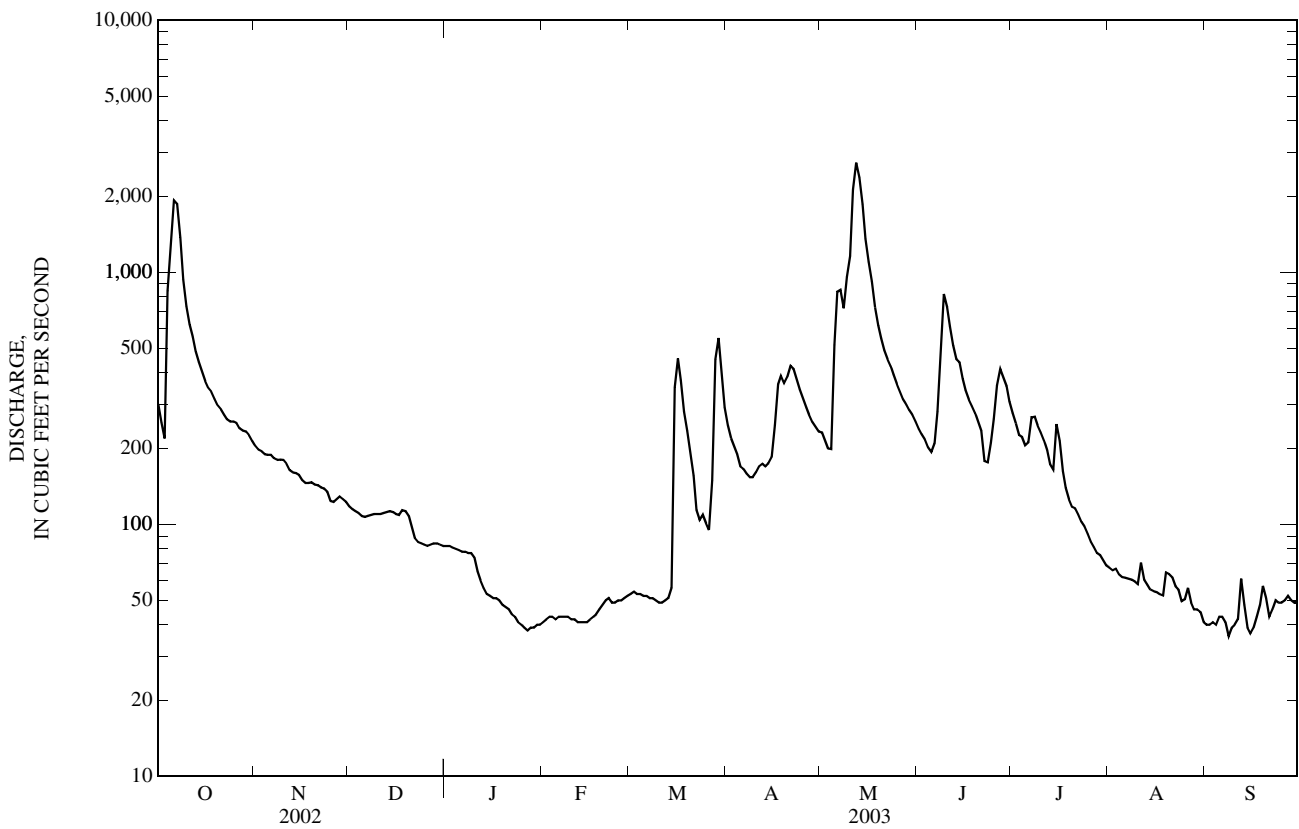
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1966 - 2003, BY WATER YEAR (WY)

MEAN	221	190	119	69.5	116	499	651	473	432	317	223	166
MAX	831	595	336	167	837	1,270	2,365	1,322	1,470	1,027	1,136	645
(WY)	(1969)	(1971)	(1983)	(1992)	(1984)	(1973)	(2001)	(1999)	(2001)	(1993)	(1979)	(1993)
MIN	17.0	15.1	11.0	11.0	12.9	26.4	70.2	58.1	45.8	26.2	16.2	16.0
(WY)	(1977)	(1977)	(1977)	(1977)	(1968)	(1968)	(1977)	(1976)	(1976)	(1988)	(1976)	(1976)

05353800 STRAIGHT RIVER NEAR FARIBAULT, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1966 - 2003	
ANNUAL TOTAL	88,428		82,999			
ANNUAL MEAN	242		227		290	
HIGHEST ANNUAL MEAN					754	1993
LOWEST ANNUAL MEAN					43.9	1977
HIGHEST DAILY MEAN	1,930	Oct 6	2,720	May 12	5,410	May 2, 1973
LOWEST DAILY MEAN	66	Sep 13	36	Sep 8	a11	Feb 18, 1968
ANNUAL SEVEN-DAY MINIMUM	72	Mar 2	39	Jan 25	11	Feb 18, 1968
MAXIMUM PEAK FLOW			2,770	May 12	6,030	Jul 7, 1990
MAXIMUM PEAK STAGE			8.34	May 12	b12.74	Mar 5, 1974
INSTANTANEOUS LOW FLOW			32	Sep 8	10	Oct 27, 1976
ANNUAL RUNOFF (AC-FT)	175,400		164,600		210,300	
ANNUAL RUNOFF (CFSM)	0.55		0.51		0.66	
ANNUAL RUNOFF (INCHES)	7.44		6.99		8.92	
10 PERCENT EXCEEDS	488		452		709	
50 PERCENT EXCEEDS	146		123		126	
90 PERCENT EXCEEDS	85		43		32	

a Many days in 1968, and 1977.
 b Backwater from ice.
 c Estimated.



05355200 CANNON RIVER AT WELCH, MN

LOCATION.--Lat 44°33'50", long 92°43'55", in NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 27, T. 113 N., R. 16 W., Goodhue County, on right bank 0.3 mile downstream from highway bridge at Welch and 1.8 miles upstream from Belle Creek.

DRAINAGE AREA.--1,340 mi².

PERIOD OF RECORD.--June 1909 to January 1914 (no winter records 1909-11), November 1930 to September 1971, October 1972 to September 1987 (annual maximum only), October 1991 to current year.

REVISED RECORDS.--WSP 1308: 1912(M). WSP 1508: 1933. WSP 1914: 1960. WRD MN-98: 1986 (M), 1997.

GAGE.--Water-stage recorder. Datum of gage is 699.16 ft above sea level (NGVD of 1929). Prior to Nov. 11, 1930, nonrecording gage on highway bridge at site 0.3 mile upstream at datum 3.00 ft lower. Nov. 11, 1930 to Oct. 11, 1938, water-stage recorder at site 0.3 mile upstream at present datum.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage known, 17.1 ft, present datum, in April 1888, from floodmark at mill about 2,400 ft upstream.

REMARKS.--Records good except those for estimated daily discharges, which are fair. Flow affected at lower stages by regulation from hydropower plant upstream.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	661	803	560	413	e310	e297	810	789	737	733	294	187
2	696	800	508	407	e322	e298	764	766	732	683	279	188
3	748	795	484	408	e320	e294	755	750	723	661	276	203
4	1,040	789	485	399	e310	e290	738	726	674	665	273	214
5	2,050	752	468	417	e300	e285	677	737	641	653	274	204
6	2,620	720	472	433	e298	e272	593	855	638	633	274	188
7	3,400	700	472	434	e295	e267	514	1,140	709	596	286	181
8	3,490	700	490	427	e294	e260	526	1,340	771	547	275	180
9	2,980	693	504	424	e293	e257	529	1,460	1,140	570	267	180
10	2,620	688	481	420	e290	e250	524	1,850	1,640	570	257	179
11	2,420	686	473	392	e290	e265	523	2,540	1,650	564	251	172
12	2,160	683	475	373	e290	e290	540	4,810	1,450	556	248	202
13	1,910	681	496	383	e290	306	530	5,230	1,240	565	253	290
14	1,710	681	506	e380	e290	383	523	4,660	1,110	562	254	274
15	1,540	677	505	e370	e290	815	543	3,920	1,070	589	249	245
16	1,390	676	479	e360	e290	954	624	3,280	989	594	243	203
17	1,300	676	447	e350	e292	902	790	2,920	831	664	228	175
18	1,240	668	472	e340	e294	822	823	2,650	727	614	217	178
19	1,180	651	503	e335	e298	766	942	2,370	692	491	213	186
20	1,110	615	515	e325	321	740	1,040	2,110	670	435	215	196
21	1,080	595	516	e315	420	730	1,090	1,870	669	407	216	224
22	1,050	589	482	e310	487	711	1,120	1,690	641	381	224	231
23	995	581	440	e300	392	612	1,160	1,460	605	398	263	224
24	909	576	388	e293	e335	525	1,130	1,150	598	385	274	197
25	927	562	383	e290	e320	508	1,070	1,160	621	363	259	184
26	939	559	383	e290	e305	511	1,010	1,120	741	369	240	176
27	870	538	404	e292	e300	524	940	1,040	753	375	213	196
28	826	518	443	e292	e297	633	883	892	752	324	209	189
29	822	529	479	e294	---	759	836	802	761	302	198	194
30	817	562	484	e297	---	811	806	794	748	298	195	210
31	812	---	466	e300	---	870	---	762	---	300	190	---
TOTAL	46,312	19,743	14,663	11,063	8,833	16,207	23,353	57,643	25,723	15,847	7,607	6,050
MEAN	1,494	658	473	357	315	523	778	1,859	857	511	245	202
MAX	3,490	803	560	434	487	954	1,160	5,230	1,650	733	294	290
MIN	661	518	383	290	290	250	514	726	598	298	190	172
AC-FT	91,860	39,160	29,080	21,940	17,520	32,150	46,320	114,300	51,020	31,430	15,090	12,000
CFSM	1.11	0.49	0.35	0.27	0.24	0.39	0.58	1.39	0.64	0.38	0.18	0.15
IN.	1.29	0.55	0.41	0.31	0.25	0.45	0.65	1.60	0.71	0.44	0.21	0.17

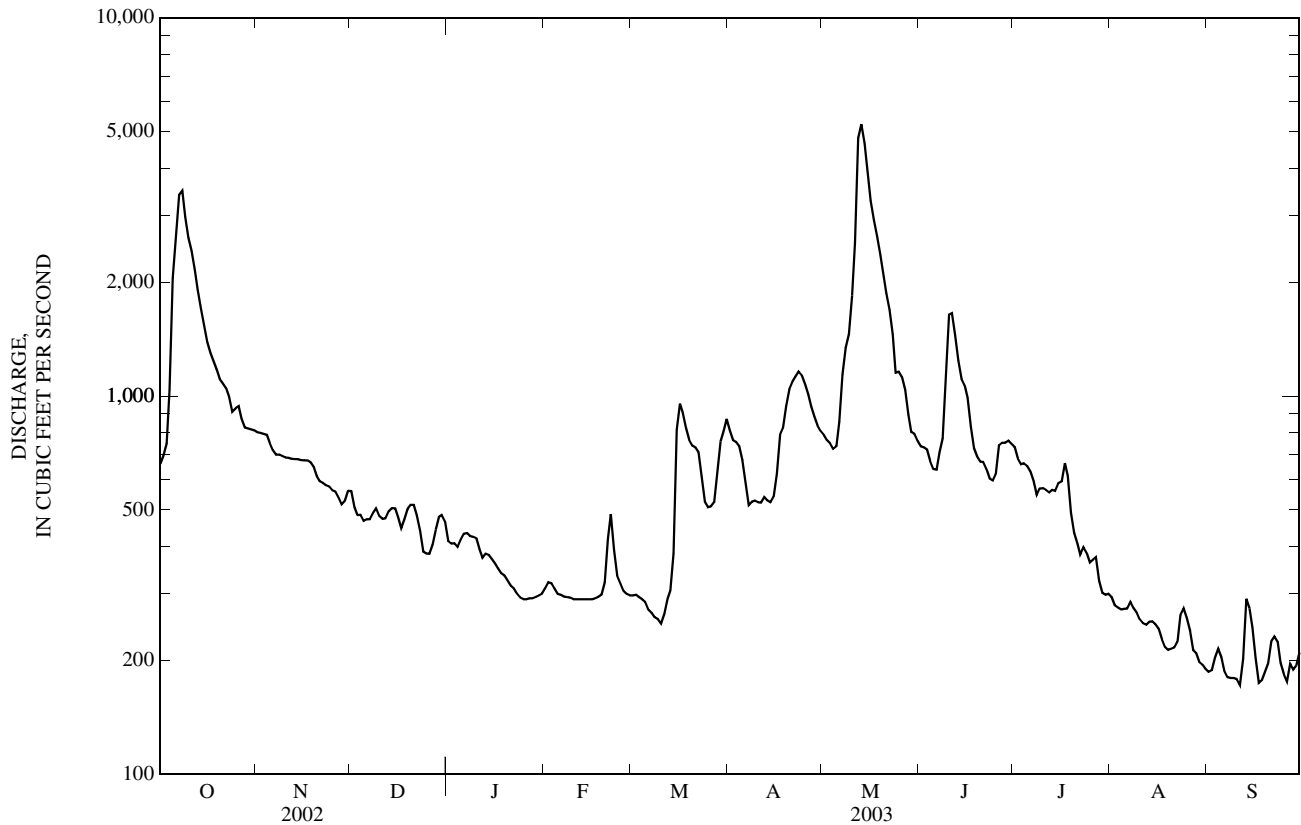
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 2003, BY WATER YEAR (WY)

MEAN	399	380	297	245	309	971	1,419	830	877	608	455	392
MAX	1,806	1,708	1,105	662	1,141	2,627	8,240	2,966	4,144	3,343	2,951	1,823
(WY)	(1969)	(1971)	(1992)	(1992)	(1966)	(1992)	(1965)	(1944)	(1993)	(1993)	(1993)	(1993)
MIN	65.5	78.8	75.0	76.9	110	149	145	84.9	80.0	71.2	78.1	72.8
(WY)	(1934)	(1934)	(1938)	(1938)	(1913)	(1911)	(1911)	(1934)	(1934)	(1934)	(1936)	(1933)

05355200 CANNON RIVER AT WELCH, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1909 - 2003	
ANNUAL TOTAL	289,939		253,044		621	
ANNUAL MEAN	794		693		137	
HIGHEST ANNUAL MEAN					2,132	1993
LOWEST ANNUAL MEAN					137	1934
HIGHEST DAILY MEAN	5,530	Jun 22	5,230	May 13	28,700	Apr 8, 1965
LOWEST DAILY MEAN	249	Mar 3	172	Sep 11	a19	Jan 2, 1950
ANNUAL SEVEN-DAY MINIMUM	268	Mar 2	183	Sep 6	42	Aug 12, 1936
MAXIMUM PEAK FLOW			5,410	May 13	36,100	Apr 8, 1965
MAXIMUM PEAK STAGE			8.04	May 13	15.05	Jun 27, 1998
INSTANTANEOUS LOW FLOW			164	Sep 18	a2.5	Jan 3, 1950
ANNUAL RUNOFF (AC-FT)	575,100		501,900		449,900	
ANNUAL RUNOFF (CFSM)	0.59		0.52		0.46	
ANNUAL RUNOFF (INCHES)	8.05		7.02		6.30	
10 PERCENT EXCEEDS	1,460		1,160		1,380	
50 PERCENT EXCEEDS	655		523		309	
90 PERCENT EXCEEDS	318		226		105	

a Result of ice jam upstream.
 e Estimated.



05372995 SOUTH FORK ZUMBRO RIVER AT ROCHESTER, MN

LOCATION.--Lat 44°03'42", long 92°27'58", in NW¹/₄NE¹/₄ sec. 23, T.107 N., R.14 W., Olmsted County, Hydrologic Unit 07040004, on left bank 50 ft downstream from 37th Street bridge, 0.2 mi upstream from wastewater treatment plant, and 2.0 mi downstream from Silver Lake Dam.

DRAINAGE AREA.--303 mi².

PERIOD OF RECORD.--March 1981 to current year.

GAGE.--Water-stage recorder. Datum of gage is 950.00 ft above sea level (NGVD of 1929). Prior to Mar. 1981, recording gage at site 0.6 miles downstream. Record published as "near Rochester, MN" and under downstream order number 05373000. Peak flow record is considered equivalent at both sites but daily-mean streamflows are not.

REMARKS.--Record good. Some regulation at times from Silver Lake.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of July 6, 1978, reached a stage of about 28.0 ft, on upstream side of bridge, discharge 30,500 ft³/s. This is the highest known stage since at least 1908.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,300 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
May 12	0500	*2,110	*7.49	Jul 14	2300	1,410	6.25

Minimum discharge, 22 ft³/s, Sept. 11, 17, gage height, 2.05 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	127	137	72	67	41	55	172	188	192	189	70	35
2	125	136	91	68	81	50	165	180	185	177	70	32
3	127	132	66	56	67	45	161	173	182	167	69	33
4	344	132	81	68	50	50	156	233	178	221	68	32
5	402	133	74	67	51	46	151	314	174	170	66	32
6	355	131	73	66	50	48	144	382	187	186	69	29
7	310	129	77	67	46	48	146	381	198	328	66	28
8	275	127	72	70	47	45	141	378	292	208	65	27
9	243	124	64	71	43	41	142	602	257	214	60	26
10	246	126	71	52	44	45	146	732	281	182	58	26
11	230	127	72	52	44	59	153	1,270	244	182	58	27
12	222	118	74	53	42	67	158	1,820	228	168	56	41
13	207	116	73	51	43	61	157	1,040	214	152	55	28
14	194	115	71	50	44	107	159	794	200	207	54	28
15	188	113	74	48	43	231	160	680	188	253	52	27
16	184	111	72	48	43	237	262	572	181	160	48	27
17	179	106	72	46	45	172	294	491	187	144	45	27
18	179	109	113	45	46	145	271	437	171	131	44	86
19	173	107	93	43	46	135	287	399	162	122	44	76
20	167	106	89	43	79	139	312	364	152	115	44	45
21	169	104	77	42	171	128	334	329	144	112	40	39
22	164	102	77	38	122	119	305	311	142	107	39	36
23	160	101	64	35	84	115	275	294	136	100	39	38
24	158	96	67	34	75	113	253	277	170	95	37	34
25	159	94	77	34	67	109	239	262	203	91	47	32
26	156	78	66	33	59	106	224	246	258	88	44	32
27	152	91	69	33	57	197	211	234	254	84	42	31
28	152	89	71	34	56	373	202	224	230	80	41	30
29	149	94	71	35	---	324	193	214	218	78	39	29
30	146	86	74	36	---	213	191	208	210	76	37	29
31	141	---	66	39	---	183	---	198	---	74	36	---
TOTAL	6,183	3,370	2,323	1,524	1,686	3,806	6,164	14,227	6,018	4,661	1,602	1,042
MEAN	199	112	74.9	49.2	60.2	123	205	459	201	150	51.7	34.7
MAX	402	137	113	71	171	373	334	1,820	292	328	70	86
MIN	125	78	64	33	41	41	141	173	136	74	36	26
AC-FT	12,260	6,680	4,610	3,020	3,340	7,550	12,230	28,220	11,940	9,250	3,180	2,070
CFSM	0.66	0.37	0.25	0.16	0.20	0.41	0.68	1.51	0.66	0.50	0.17	0.11

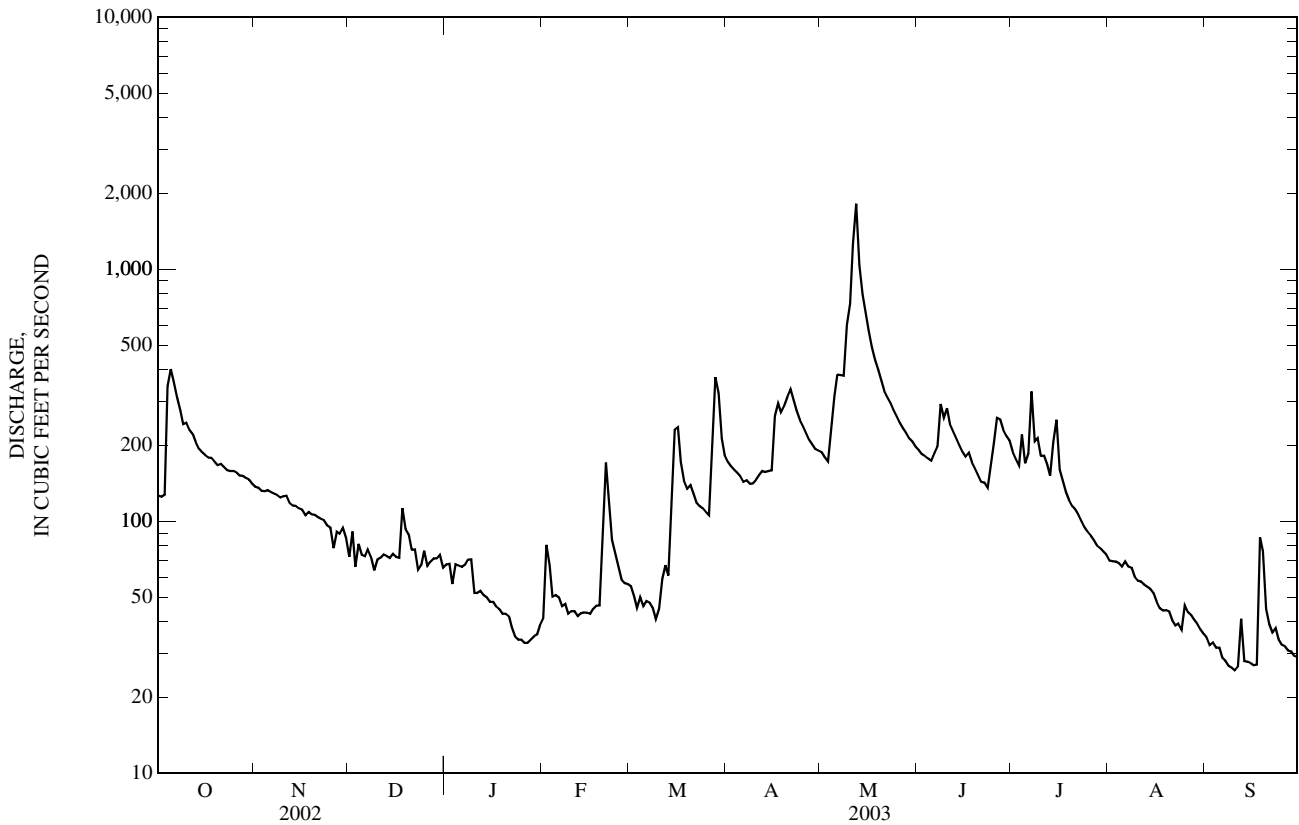
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1981 - 2003, BY WATER YEAR (WY)

MEAN	151	139	113	74.3	124	343	421	333	289	239	168	162
MAX	824	338	358	167	454	760	1,269	735	1,014	663	501	1,075
(WY)	(1987)	(1992)	(1992)	(1983)	(1984)	(1983)	(2001)	(2001)	(1993)	(1993)	(1990)	(1986)
MIN	20.0	24.5	21.0	22.5	23.8	109	79.4	88.3	49.0	23.2	24.6	31.5
(WY)	(1990)	(1990)	(1990)	(1990)	(1990)	(2001)	(2000)	(1989)	(1989)	(1988)	(1988)	(1988)

05372995 SOUTH FORK ZUMBRO RIVER AT ROCHESTER, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1981 - 2003	
ANNUAL TOTAL	61,886		52,606			
ANNUAL MEAN	170		144		214	
HIGHEST ANNUAL MEAN					431 1993	
LOWEST ANNUAL MEAN					87.3 1989	
HIGHEST DAILY MEAN	1,080	Jun 21	1,820	May 12	7,710	Sep 21, 1986
LOWEST DAILY MEAN	61	Jan 4	26	Sep 9, 10	12	Sep 12, 1988
ANNUAL SEVEN-DAY MINIMUM	65	Jan 1	28	Sep 5	14	Sep 8, 1988
MAXIMUM PEAK FLOW			2,110	May 12	10,000	Sep 21, 1986
MAXIMUM PEAK STAGE			7.49	May 12	20.77	Sep 21, 1986
INSTANTANEOUS LOW FLOW			a22	Sep 11, 17	a10	Oct 23, 1981
ANNUAL RUNOFF (AC-FT)	122,800		104,300		155,200	
ANNUAL RUNOFF (CFSM)	0.56		0.48		0.71	
10 PERCENT EXCEEDS	275		273		462	
50 PERCENT EXCEEDS	141		106		123	
90 PERCENT EXCEEDS	74		38		48	

a Due in part to regulation.



05378500 MISSISSIPPI RIVER AT WINONA, MN

LOCATION.--Lat 44°03'21", long 91°38'16", in sec. 23, T.107 N., R.7 W., Winona County, Hydrologic Unit 07040003, on right bank at Winona pumping station in Winona, 9.5 mi upstream from Trempealeau River, and at mile 725.7 upstream from the Ohio River.

DRAINAGE AREA.--59,200 mi² (approximately).

PERIOD OF RECORD.--June 1928 to current year. Gage-height records collected in this vicinity since 1878 are contained in reports of Mississippi River Commission.

GAGE.--Water-stage recorder. Datum of gage is 639.64 ft above sea level (NGVD of 1929). June 10, 1928 to Apr. 15, 1931, nonrecording gage at site 800 ft upstream. Prior to Oct. 1, 1929, at datum 0.20 ft higher and Oct. 1, 1929 to Apr. 15, 1931, at datum 0.12 ft lower. Apr. 16, 1931 to Nov. 12, 1934, nonrecording gage at present site and datum. Since Mar. 31, 1937, auxiliary water-stage recorder 2.7 mi upstream at tailwater of navigation dam 5A.

REMARKS.--Records are good to fair for Oct. 1 to 31 and Apr. 19 to July 23, fair to poor for Nov. 1 to Apr. 18, and poor for Aug. 25 to Sep. 30. Some regulation by reservoirs, navigation dams, and power plants at low and medium stages. Daily discharges for some days were based in part on instantaneous discharges obtained from the U.S. Army Corps of Engineers for Lock and Dam 5A.

EXTREMES FOR PERIOD OF RECORD.--Minimum gage height, -3.38 ft, Aug. 31, 1934 (prior to dam construction in 1936); minimum gage height since 1938, after completion of dam, 1.95 ft, Jan. 27, 1944.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	38,900	45,200	23,200	e22,200	e14,200	e13,600	37,300	66,900	51,200	56,000	23,000	12,000
2	39,400	43,700	23,000	e22,200	e14,200	e13,800	35,100	e62,500	47,500	60,900	22,200	12,200
3	39,300	40,900	e21,500	e21,300	e14,600	e13,800	32,300	e60,000	45,100	61,600	21,700	10,700
4	40,300	39,700	e19,900	e19,400	e15,400	e13,800	32,300	e56,100	44,100	63,100	22,700	9,930
5	42,000	38,800	e18,200	e18,400	e15,400	e13,700	34,500	e53,000	41,600	64,000	22,400	e9,200
6	47,700	37,800	e17,200	e18,500	e15,300	e13,700	34,100	e50,000	39,400	64,000	21,000	e9,400
7	53,100	37,200	e15,900	e18,500	e15,200	e13,000	30,300	e45,700	38,900	63,600	19,900	e9,600
8	57,100	36,500	e16,000	e18,500	e15,200	e12,700	28,600	45,600	38,700	62,600	20,000	e9,700
9	64,700	35,600	e17,400	e18,800	e15,100	e12,700	28,000	46,800	37,400	58,800	20,000	e10,800
10	70,900	34,600	e16,200	e19,000	e15,000	e12,800	26,400	48,600	36,900	56,500	19,700	e10,700
11	75,900	35,100	e19,700	e15,700	e15,000	e12,800	25,800	54,600	37,500	55,700	18,900	e10,000
12	77,700	35,300	e27,400	e17,800	e14,600	e12,800	26,700	63,900	39,600	52,900	17,500	e11,000
13	77,600	34,100	e27,800	e15,400	e14,300	e12,900	27,000	72,600	42,000	50,300	17,100	12,900
14	73,300	33,500	e25,800	e14,100	e14,000	e13,300	26,700	83,900	43,400	47,200	16,300	14,900
15	70,700	33,400	e23,500	e14,400	e14,000	e16,800	25,900	99,200	44,300	46,500	16,200	15,300
16	67,900	33,200	e23,100	e14,400	e14,100	23,300	26,200	114,000	43,600	47,500	16,400	14,500
17	64,400	32,400	e23,200	e14,400	e14,100	31,000	31,600	119,000	43,100	47,700	16,100	13,100
18	59,300	31,100	e22,900	e13,900	e14,100	33,600	41,300	115,000	41,600	48,300	13,100	11,900
19	56,800	30,400	e24,000	e14,000	e14,200	35,800	49,300	106,000	39,800	46,600	12,100	13,000
20	55,500	29,800	e24,500	e14,300	e14,100	38,300	60,300	97,800	38,900	44,100	14,400	13,200
21	53,200	29,400	e24,800	e14,400	e14,500	37,300	67,400	90,300	36,000	43,600	17,800	13,300
22	52,900	28,900	e25,700	e14,400	e14,900	36,900	70,500	85,400	32,700	40,400	17,300	12,900
23	52,000	28,400	e26,100	e14,800	e15,300	37,100	72,500	82,600	30,200	38,800	14,700	15,000
24	50,700	28,800	e24,700	e14,700	e15,200	36,000	76,100	80,500	29,200	35,600	11,600	14,200
25	49,400	28,700	e22,300	e14,600	e15,100	35,200	80,400	78,000	31,500	34,900	11,000	13,200
26	48,100	27,500	e20,400	e14,600	e14,900	35,400	81,600	74,700	35,600	34,200	10,800	10,900
27	47,800	26,100	e17,800	e14,500	e14,800	35,600	78,100	72,500	42,200	30,000	11,400	10,500
28	46,700	26,200	e16,800	e13,800	e14,700	36,700	74,800	70,100	46,400	29,200	11,700	11,600
29	45,900	25,100	e17,100	e13,800	---	38,000	71,900	67,600	49,600	28,900	11,400	11,600
30	45,800	23,800	e18,100	e13,800	---	39,200	68,800	63,400	54,100	25,600	11,800	10,700
31	46,100	---	e22,400	e13,800	---	38,900	---	56,400	---	23,700	12,300	---
TOTAL	1,711,100	991,200	666,600	502,400	411,500	770,500	1,401,800	2,282,700	1,222,100	1,462,800	512,500	357,930
MEAN	55,200	33,040	21,500	16,210	14,700	24,850	46,730	73,640	40,740	47,190	16,530	11,930
MAX	77,700	45,200	27,800	22,200	15,400	39,200	81,600	119,000	54,100	64,000	23,000	15,300
MIN	38,900	23,800	15,900	13,800	14,000	12,700	25,800	45,600	29,200	23,700	10,800	9,200
AC-FT	3,394,000	1,966,000	1,322,000	996,500	816,200	1,528,000	2,780,000	4,528,000	2,424,000	2,901,000	1,017,000	710,000
CFSM	0.93	0.56	0.36	0.27	0.25	0.42	0.79	1.24	0.69	0.80	0.28	0.20
IN.	1.08	0.62	0.42	0.32	0.26	0.48	0.88	1.43	0.77	0.92	0.32	0.22

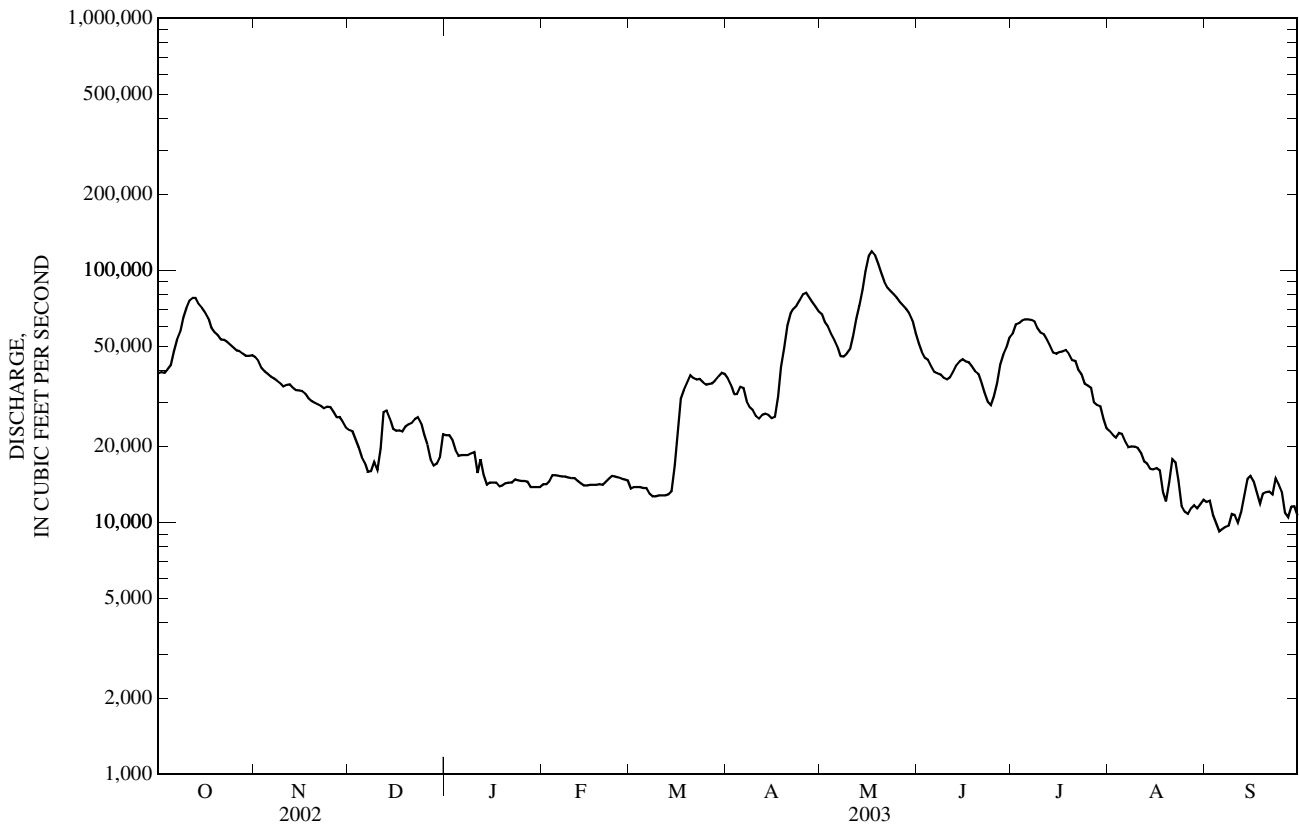
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1928 - 2003, BY WATER YEAR (WY)

MEAN	22,810	23,190	17,920	15,470	15,730	30,420	62,450	49,970	40,070	32,520	21,920	22,490
MAX	85,950	50,040	40,440	30,480	35,900	86,420	152,600	119,800	100,200	118,800	67,560	69,490
(WY)	(1987)	(1972)	(1992)	(1983)	(1984)	(1983)	(1965)	(2001)	(1993)	(1993)	(1993)	(1986)
MIN	6,774	7,367	6,286	6,742	7,874	9,023	12,810	11,930	8,450	7,063	5,391	6,790
(WY)	(1934)	(1934)	(1934)	(1940)	(1977)	(1934)	(1931)	(1931)	(1934)	(1934)	(1934)	(1933)

05378500 MISSISSIPPI RIVER AT WINONA, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1928 - 2003	
ANNUAL TOTAL	15,381,800		12,293,130		29,610	
ANNUAL MEAN	42,140		33,680		56,850	
HIGHEST ANNUAL MEAN					9,742	
LOWEST ANNUAL MEAN					1934	
HIGHEST DAILY MEAN	124,000	Apr 19	119,000	May 17	264,000	Apr 20, 1965
LOWEST DAILY MEAN	15,900	Dec 7	9,200	Sep 5	2,250	Dec 29, 1933
ANNUAL SEVEN-DAY MINIMUM	17,200	Dec 5	9,900	Sep 3	3,210	Dec 27, 1933
MAXIMUM PEAK FLOW			119,000	May 17	268,000	Apr 19, 1965
MAXIMUM PEAK STAGE			13.11	May 17	a20.77	Apr 19, 1965
INSTANTANEOUS LOW FLOW					b1,940	Dec 12, 1980
ANNUAL RUNOFF (AC-FT)	30,510,000		24,380,000		21,450,000	
ANNUAL RUNOFF (CFSM)	0.71		0.57		0.50	
ANNUAL RUNOFF (INCHES)	9.67		7.72		6.80	
10 PERCENT EXCEEDS	66,100		64,500		60,700	
50 PERCENT EXCEEDS	41,500		28,400		21,400	
90 PERCENT EXCEEDS	18,500		13,000		10,000	

- a From highwater mark.
- b Result of ice jam upstream.
- c Estimated.

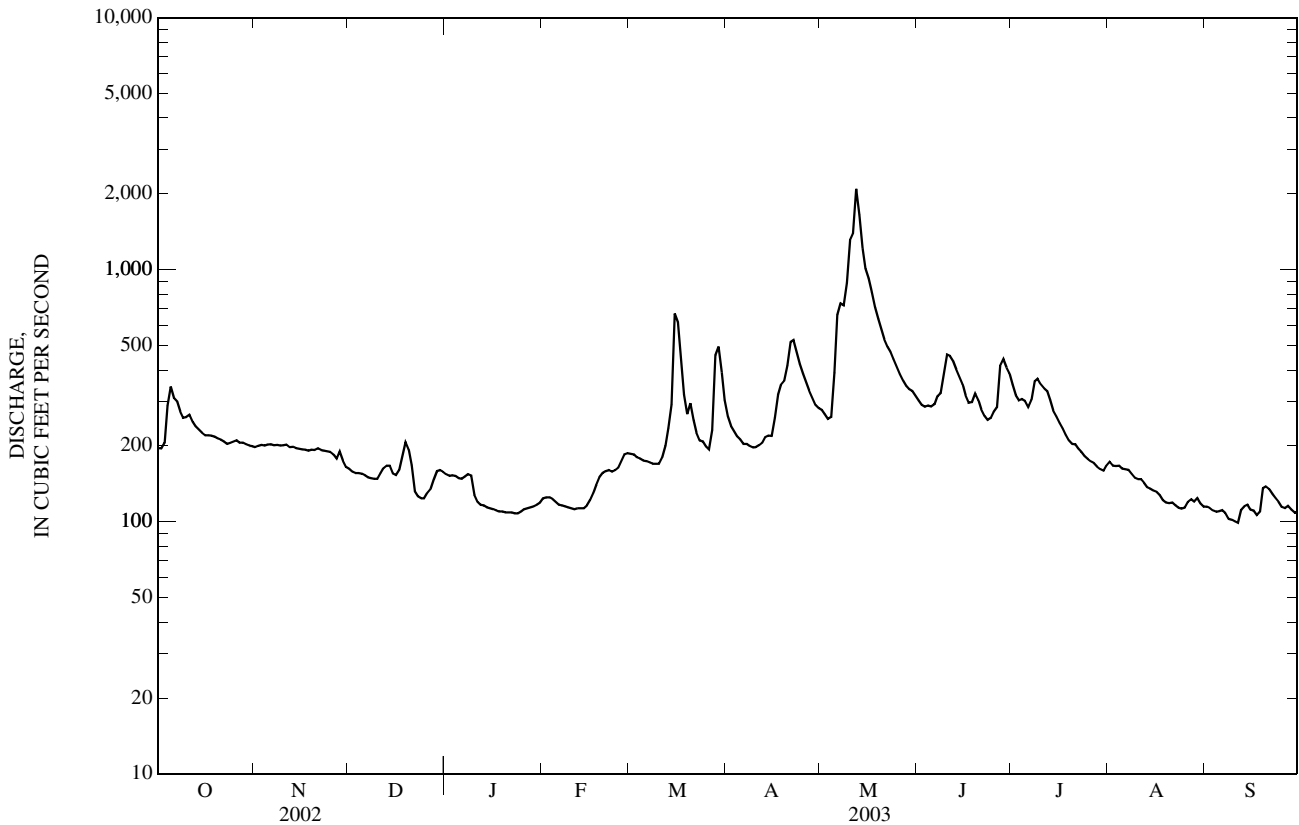


05383950 ROOT RIVER NEAR PILOT MOUND, MN—Continued

SUMMARY STATISTICS

	FOR 2003 WATER YEAR		WATER YEARS 2002 - 2003	
ANNUAL TOTAL	89,487			
ANNUAL MEAN	245		245	
HIGHEST ANNUAL MEAN			245	2003
LOWEST ANNUAL MEAN			245	2003
HIGHEST DAILY MEAN	2,090	May 12	2,090	May 12, 2003
LOWEST DAILY MEAN	99	Sep 11	99	Sep 11, 2003
ANNUAL SEVEN-DAY MINIMUM	105	Sep 5	105	Sep 5, 2003
MAXIMUM PEAK FLOW	2,230	May 12	26,000	Jun 2, 2000
MAXIMUM PEAK STAGE	11.41	May 12	25.90	Jun 2, 2000
INSTANTANEOUS LOW FLOW	97	Sep 10	97	Sep 10, 2003
ANNUAL RUNOFF (AC-FT)	177,500		177,600	
ANNUAL RUNOFF (CFSM)	0.43		0.43	
ANNUAL RUNOFF (INCHES)	5.89		5.90	
10 PERCENT EXCEEDS	406		406	
50 PERCENT EXCEEDS	193		193	
90 PERCENT EXCEEDS	113		113	

e Estimated.



05457000 CEDAR RIVER NEAR AUSTIN, MN

LOCATION.--Lat 43°38'11", long 92°58'26", in NE¼SE¼ sec. 15, T.102 N., R.18 W., Mower County, Hydrologic Unit 07080201, on left bank 200 ft upstream from abandoned powerhouse, 500 ft downstream from highway bridge, 1.1 mi downstream from Turtle Creek, and 1.1 mi south of Austin.

DRAINAGE AREA.--399 mi².

PERIOD OF RECORD.--May 1909 to September 1914, October 1944 to current year.

REVISED RECORDS.--WSP 1145: 1945, 1948.

GAGE.--Water-stage recorder. Datum of gage is 1,162.10 ft above sea level (NGVD of 1929). May 1909 to April 1912, nonrecording gage in tailwater of power plant 200 ft downstream at datum 3.1 ft lower. May 1912 to September 1914, nonrecording gage on highway bridge 500 ft downstream at datum 1.1 ft lower.

REMARKS.--Records good except those for estimated daily discharges, which are fair. Some regulation at lower flows by wastewater treatment plant upstream.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 1,500 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
May 12	0530	*2,820	*8.62	No other peak greater than base discharge.			

Minimum discharge, 40 ft³/s, Feb. 5, gage height, 2.17 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	82	128	88	71	53	60	225	219	224	359	75	58
2	89	124	93	69	58	59	202	203	212	310	71	57
3	85	122	80	67	62	63	188	189	207	274	71	59
4	381	128	84	67	60	59	179	242	201	268	69	57
5	719	127	79	68	53	e57	161	864	194	245	72	56
6	645	127	78	69	56	57	148	1,200	230	248	71	55
7	539	121	76	71	e56	57	151	1,010	311	304	69	55
8	452	122	74	74	55	57	156	898	482	272	66	52
9	368	123	76	72	54	e58	156	1,340	546	264	63	52
10	318	121	74	60	54	e61	164	1,550	533	282	61	51
11	309	121	78	e65	e54	63	195	2,220	512	287	64	55
12	305	119	81	e62	e54	67	205	2,760	446	240	64	71
13	281	116	83	e58	53	68	193	2,040	390	207	63	63
14	256	116	79	57	56	88	190	1,560	340	193	62	60
15	239	113	78	58	56	156	193	1,710	302	227	61	55
16	222	107	78	56	55	250	e230	1,210	278	216	59	56
17	210	102	80	55	57	204	e300	910	257	179	54	54
18	202	105	113	53	57	150	326	739	240	163	55	79
19	191	106	99	e53	59	133	332	637	222	144	54	71
20	179	105	88	e53	88	134	370	555	198	135	56	59
21	174	105	77	e53	128	127	437	482	181	131	56	55
22	167	102	80	e50	130	107	425	432	207	123	57	56
23	159	102	71	e55	97	99	369	396	202	115	55	54
24	155	97	77	e48	87	107	330	362	216	107	54	63
25	152	88	71	e48	e72	106	304	334	378	100	155	57
26	146	92	71	e48	e62	97	277	311	731	98	108	58
27	140	90	72	e49	61	188	255	291	686	92	75	60
28	143	91	72	50	61	629	239	280	600	88	65	56
29	138	95	73	50	---	578	222	267	520	82	64	55
30	136	79	77	51	---	360	222	272	429	79	58	56
31	131	---	73	52	---	259	---	248	---	77	56	---
TOTAL	7,713	3,294	2,473	1,812	1,848	4,558	7,344	25,731	10,475	5,909	2,083	1,745
MEAN	249	110	79.8	58.5	66.0	147	245	830	349	191	67.2	58.2
MAX	719	128	113	74	130	629	437	2,760	731	359	155	79
MIN	82	79	71	48	53	57	148	189	181	77	54	51
AC-FT	15,300	6,530	4,910	3,590	3,670	9,040	14,570	51,040	20,780	11,720	4,130	3,460
CFSM	0.62	0.28	0.20	0.15	0.17	0.37	0.61	2.08	0.88	0.48	0.17	0.15
IN.	0.72	0.31	0.23	0.17	0.17	0.42	0.68	2.40	0.98	0.55	0.19	0.16

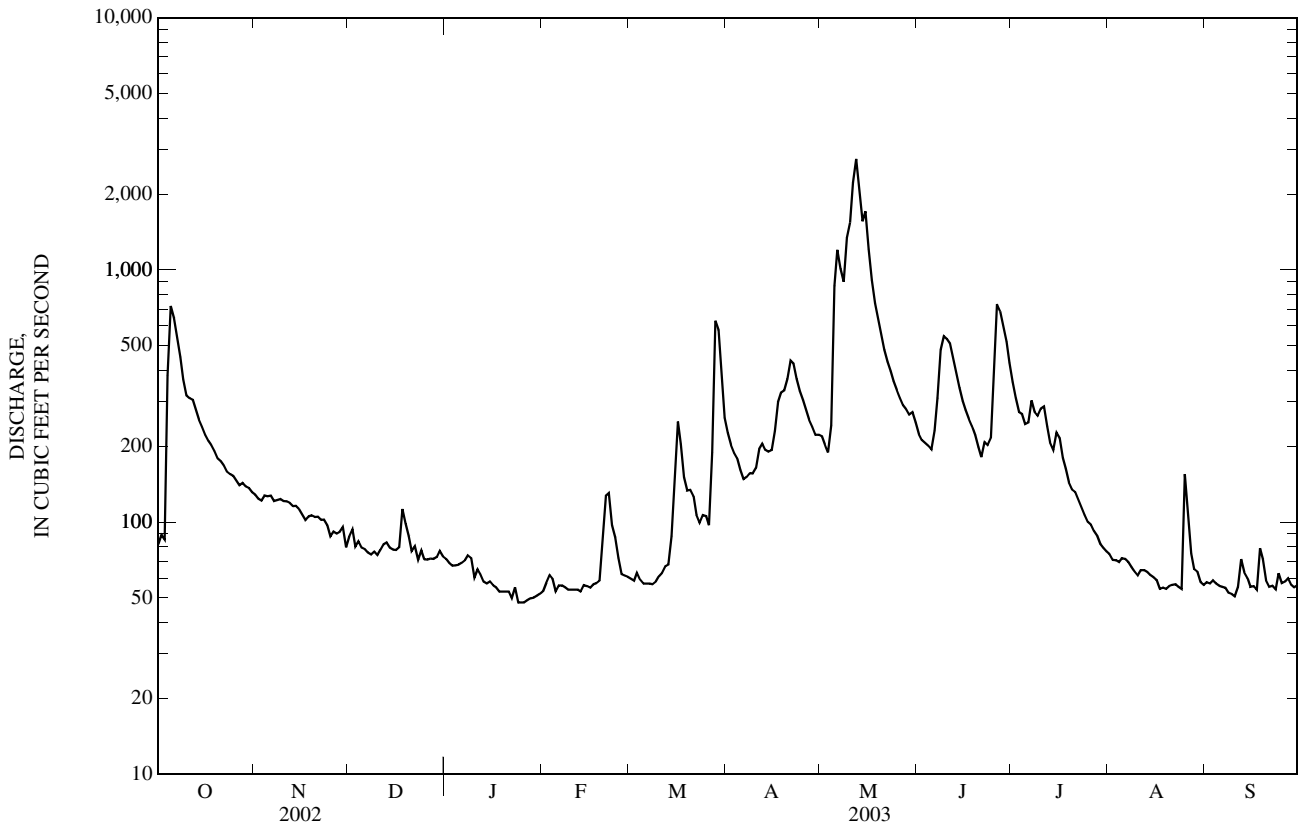
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1909 - 2003, BY WATER YEAR (WY)

MEAN	164	160	107	75.1	109	464	538	342	328	275	184	144
MAX	884	997	431	261	701	1,428	2,328	1,387	1,624	1,456	1,720	734
(WY)	(1974)	(1910)	(1992)	(1973)	(1984)	(1973)	(2001)	(1999)	(1993)	(1978)	(1993)	(1993)
MIN	37.3	35.7	26.6	26.5	25.0	53.3	52.9	67.9	48.9	22.6	32.3	30.9
(WY)	(1959)	(1959)	(1913)	(1913)	(1913)	(1968)	(1911)	(1910)	(1950)	(1911)	(1948)	(1911)

05457000 CEDAR RIVER NEAR AUSTIN, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1909 - 2003	
ANNUAL TOTAL	60,548		74,985		a241	
ANNUAL MEAN	166		205		824	
HIGHEST ANNUAL MEAN					58.1 1977	
LOWEST ANNUAL MEAN					11,100 Jul 10, 2000	
HIGHEST DAILY MEAN	1,570	Jun 5	2,760	May 12	b0.00	Jan 15, 1911
LOWEST DAILY MEAN	59	Sep 13	48	Jan 24	13	Sep 1, 1912
ANNUAL SEVEN-DAY MINIMUM	64	Sep 7	49	Jan 24	15,300	Jul 10, 2000
MAXIMUM PEAK FLOW			2,820	May 12	c21.49	Jul 10, 2000
MAXIMUM PEAK STAGE			8.62	May 12	b0.00	Jan 15, 1911
INSTANTANEOUS LOW FLOW			d40	Feb 5		
ANNUAL RUNOFF (AC-FT)	120,100		148,700		174,900	
ANNUAL RUNOFF (CFSM)	0.42		0.51		0.60	
ANNUAL RUNOFF (INCHES)	5.65		6.99		8.22	
10 PERCENT EXCEEDS	321		408		500	
50 PERCENT EXCEEDS	111		105		97	
90 PERCENT EXCEEDS	74		55		45	

- a Median of annual mean discharges is 223 ft³/s.
- b Occurred on several days in 1911, result of regulation.
- c From floodmark.
- d Result of freezeup.
- e Estimated.



05476000 DES MOINES RIVER AT JACKSON, MN

LOCATION.--Lat 43°37'10", long 94°59'10", in SE¼SW¼ sec. 24, T.102 N., R.35 W., Jackson County, Hydrologic Unit 07100001, on right bank at old dam structure in Jackson.

DRAINAGE AREA.--1,250 mi².

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.

REVISED RECORDS.--WSP 1115: 1942. WSP 1175: Drainage area. WSP 1238: 1950. WSP 1308: 1938(M).

GAGE.--Water-stage recorder. Datum of gage is 1,287.75 ft above sea level (NGVD of 1929). May 31, 1909 to Dec. 20, 1913, nonrecording gage at site 0.6 mi downstream at datum 0.99 ft lower. Aug. 22, 1930 to Sept. 30, 1944, nonrecording gage at site 7 mi upstream at datum 17.10 ft higher. Oct. 1, 1944 to Oct. 26, 1949, nonrecording gage at site 600 ft upstream at datum 10.64 ft higher. Oct. 27, 1949 to Dec. 15, 1965, water-stage recorder 200 ft downstream at present datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair to poor. Regulation at times from Yankton, Long, Shetek, and Heron Lakes.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 540 ft³/s and maximum (*):

Date	Time	Discharge (ft ³ /s)	Gage height (ft)	Date	Time	Discharge (ft ³ /s)	Gage height (ft)
Apr 24	1300	1,170	6.92	Jun 29	0030	902	6.14
May 15	1430	*1,380	*7.52	Jul 10	1300	718	5.55
Jun 11	1400	938	6.25				

Minimum discharge, 2.1 ft³/s, Sep 8, gage height, 2.21 ft.

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003
DAILY MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	31	173	e120	e76	e19	e13	e220	815	743	829	82	7.2
2	35	153	e118	e75	e18	e14	e185	778	749	783	72	5.6
3	37	207	e115	e73	e17	e14	e165	745	722	729	65	5.6
4	59	190	e112	e68	e16	e15	e150	747	693	678	55	5.8
5	56	207	e108	e67	e16	e14	e155	783	663	628	60	5.4
6	83	236	e100	e68	e15	e14	e150	791	652	596	65	4.4
7	111	236	e88	e67	e15	e14	e150	771	657	551	65	3.2
8	159	236	e84	e65	e14	e15	e155	777	691	534	65	2.7
9	181	212	e82	e64	e14	e15	e155	816	774	604	60	3.5
10	207	193	e82	e61	e14	e16	e160	871	867	690	62	5.1
11	209	184	e82	e52	e13	e17	e170	962	925	667	61	10
12	216	164	e82	e47	e14	e19	e190	1,170	914	675	56	35
13	211	165	e83	e49	e14	23	e195	1,250	895	651	51	37
14	198	178	e84	e41	e14	47	194	1,330	852	612	48	26
15	199	180	e84	e37	e14	75	197	1,370	806	560	38	24
16	194	176	e86	e34	e14	118	194	1,340	766	495	28	53
17	200	155	e88	e31	e15	159	236	1,330	729	453	22	51
18	216	174	e90	e28	e15	194	297	1,290	697	422	20	49
19	209	176	e85	e25	e15	288	490	1,310	652	390	50	49
20	209	170	e87	e23	e16	356	856	1,330	605	353	42	42
21	212	e230	e88	e21	e16	349	1,010	1,270	570	313	25	43
22	208	e220	e78	e19	e15	303	1,080	1,210	563	282	19	36
23	199	e210	e72	e18	e14	277	1,120	1,160	542	240	15	28
24	198	e160	e77	e18	e13	217	1,150	1,110	600	227	14	22
25	195	e110	e74	e18	e13	207	1,140	1,070	735	217	18	23
26	194	e84	e73	e18	e13	197	1,080	1,040	848	212	18	19
27	190	e115	e72	e18	e13	e210	1,010	997	868	196	14	18
28	185	e200	e72	e18	e13	e450	949	961	885	170	12	19
29	189	e185	e74	e18	---	e430	870	918	887	157	10	13
30	199	e130	e76	e18	---	e360	833	875	853	149	9.4	9.9
31	194	---	e77	e19	---	e280	---	824	---	112	8.8	---
TOTAL	5,183	5,409	2,693	1,254	412	4,720	14,906	32,011	22,403	14,175	1,230.2	655.4
MEAN	167	180	86.9	40.5	14.7	152	497	1,033	747	457	39.7	21.8
MAX	216	236	120	76	19	450	1,150	1,370	925	829	82	53
MIN	31	84	72	18	13	13	150	745	542	112	8.8	2.7
AC-FT	10,280	10,730	5,340	2,490	817	9,360	29,570	63,490	44,440	28,120	2,440	1,300
CFSM	0.13	0.14	0.07	0.03	0.01	0.12	0.40	0.83	0.60	0.37	0.03	0.02
IN.	0.15	0.16	0.08	0.04	0.01	0.14	0.44	0.95	0.67	0.42	0.04	0.02

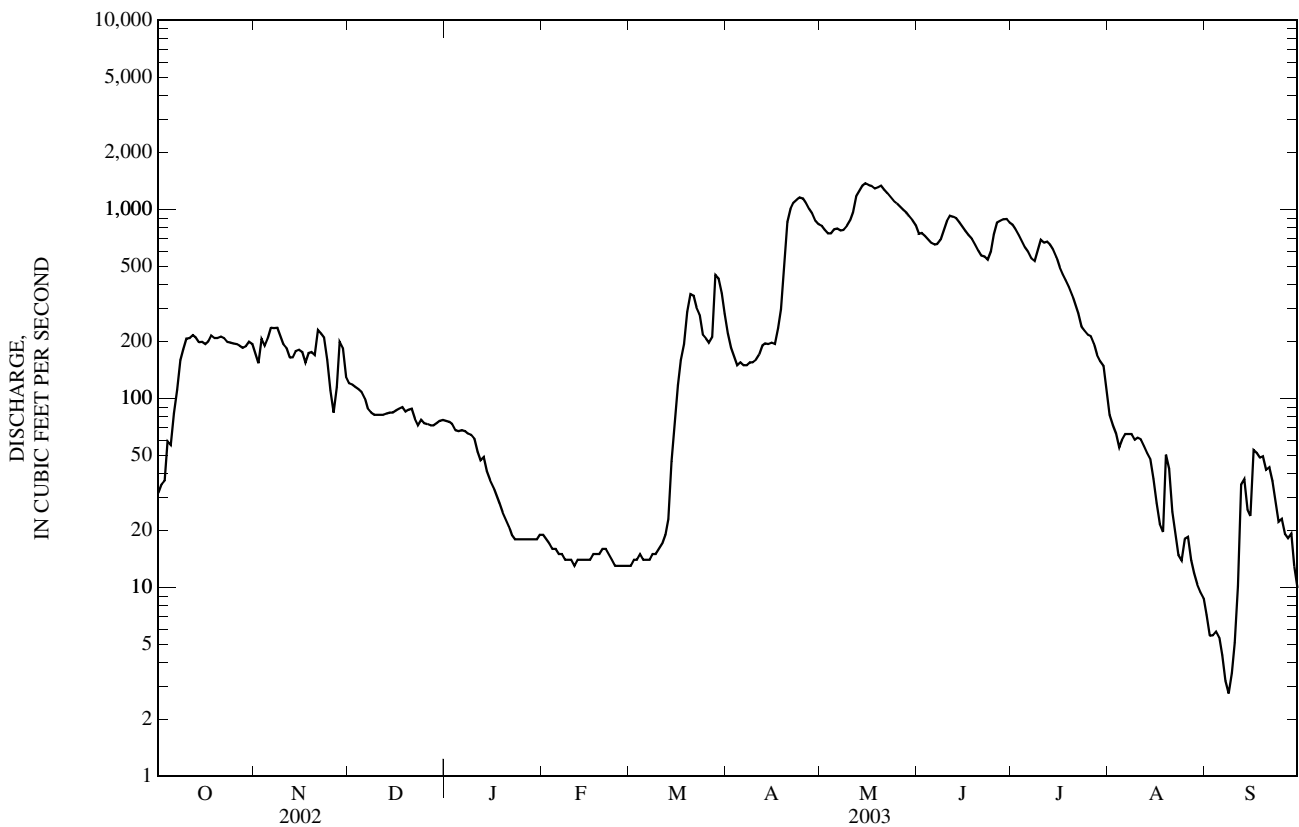
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1930 - 2003, BY WATER YEAR (WY)

MEAN	162	180	109	50.1	68.9	448	1,096	681	638	535	227	169
MAX	1,724	1,833	792	298	504	2,250	6,045	3,923	4,892	6,018	2,192	2,243
(WY)	(1987)	(1980)	(1980)	(1980)	(1983)	(1983)	(1969)	(1993)	(1993)	(1993)	(1993)	(1942)
MIN	0.000	0.000	0.000	0.000	0.000	11.8	9.37	2.59	3.76	1.04	0.13	0.000
(WY)	(1956)	(1956)	(1956)	(1956)	(1936)	(1959)	(1959)	(1934)	(1931)	(1931)	(1955)	(1931)

05476000 DES MOINES RIVER AT JACKSON, MN—Continued

SUMMARY STATISTICS	FOR 2002 CALENDAR YEAR		FOR 2003 WATER YEAR		WATER YEARS 1930 - 2003	
ANNUAL TOTAL	74,376.8		105,051.6			
ANNUAL MEAN	204		288		a384	
HIGHEST ANNUAL MEAN					2,098	1993
LOWEST ANNUAL MEAN					15.1	1956
HIGHEST DAILY MEAN	687	May 13	1,370	May 15	15,500	Apr 11, 1969
LOWEST DAILY MEAN	5.0	Aug 2	2.7	Sep 8	b0.00	Jul 19, 1931
ANNUAL SEVEN-DAY MINIMUM	9.3	Jul 28	4.3	Sep 4	0.00	Jul 19, 1931
MAXIMUM PEAK FLOW			1,380	May 15	15,700	Apr 11, 1969
MAXIMUM PEAK STAGE			7.52	May 15	19.45	Apr 11, 1969
INSTANTANEOUS LOW FLOW			2.1	Sep 8	b0.00	Jul 19, 1931
ANNUAL RUNOFF (AC-FT)	147,500		208,400		278,100	
ANNUAL RUNOFF (CFSM)	0.16		0.23		0.31	
ANNUAL RUNOFF (INCHES)	2.21		3.13		4.17	
10 PERCENT EXCEEDS	507		867		1,060	
50 PERCENT EXCEEDS	120		150		96	
90 PERCENT EXCEEDS	45		14		4.3	

- a Median of annual mean discharges is 260 ft³/s.
- b Many days, several years.
- c Estimated.



Discharge at
High-Flow Partial-Record Stations,
Low-Flow Sites, and
Miscellaneous Sites

Discharge at High-Flow Partial-Record Stations

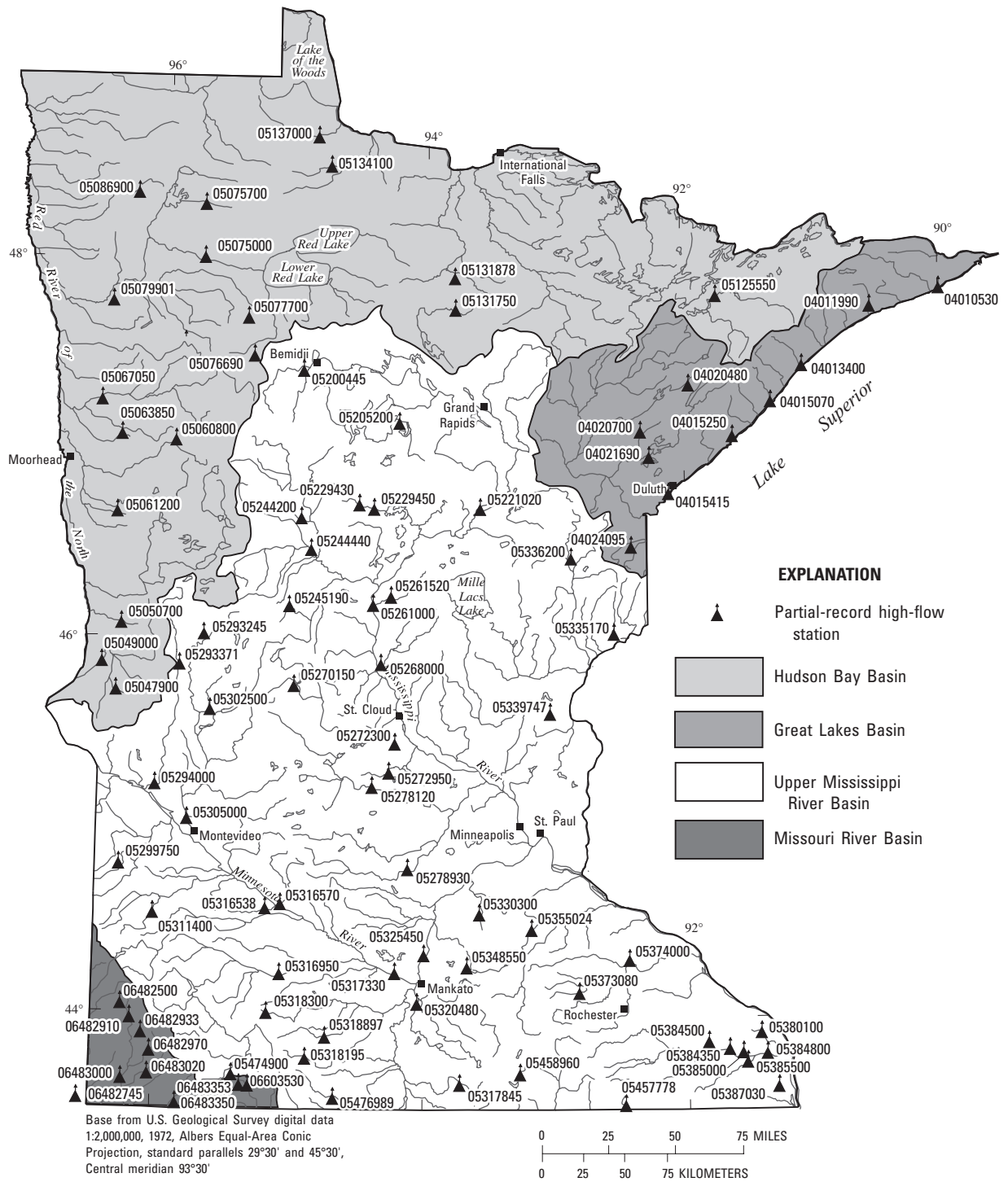


Figure 7. Location of high-flow partial-record stations.

DISCHARGE AT HIGH-FLOW PARTIAL-RECORD STATIONS

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 U.S. 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 high-flow partial-record stations are presented in a table of annual maximum stage and discharge. Discharge measurements made at miscellaneous sites for both low flows and high flows are given in a second table.

The following table contains annual maximum discharges for high-flow (crest-stage) partial-record stations. A crest-stage gage 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. The years given in the period of record represent water years for which the annual maximum has been determined.

Annual maximum discharge at high-flow sites during water year 2003
[--, data not available; mi², square miles]

Station name and [Station number]	Location and [Drainage area]	Period of record	Water year 2003 maximum			Period of record maximum		
			Date	Gage height (feet)	Discharge (ft ³ /s)	Date	Gage height (feet)	Discharge (ft ³ /s)
Reservation River near Hovland [04010530]	Lat 47°52'38", long 89°51'45", in SE ¹ / ₄ SW ¹ / ₄ sec. 6, T.62 N., R.5 E., Cook County, Hydrologic Unit 04010101, at bridge on U.S. Highway 61, on Grand Portage Indian Reserva- tion, 1,200 feet upstream from mouth, and 5.5 miles northeast of Hovland [Drainage area: 16.5 mi ²].	1991-92#, 2000- current year	04-14-03	ab3.49	251	04-24-01	a3.58	928
Cascade River near Grand Marais [04011990]	Lat 47°47'24", long 90°31'35", in SE ¹ / ₄ SW ¹ / ₄ sec. 1., T.61 N., R.2 W., Cook County, Hydrologic Unit 04010101, at bridge on Forest Road 45, 6.6 miles upstream from mouth, 9.5 miles west of Grand Marais [Drainage area: 87.6 mi ²].	1985- current year	04-21-03	b12.46	705	04-24-01	13.36	1,810
Little Marais River near Little Marais [04013400]	Lat 47°24'58", long 91°06'08", in SW ¹ / ₄ SW ¹ / ₄ sec. 16, T.57 N., R.6 W., Lake County, Hydrologic Unit 04010101, at bridge on U.S. Highway 61, 0.5 mile northeast of Little Marais [Drainage area: 4.47 mi ²].	2000- current year	04-10-03	a18.34	c71	11-07-00	a18.14	c400
Lake Superior Tributary at Split Rock State Park [04015070]	Lat 47°11'33', long 91°23'29", in SE ¹ / ₄ NE ¹ / ₄ sec. 6, T.54 N., R.8 W., Lake County, Hydrologic Unit 04010102, at culvert on U.S. Highway 61, 1 mile northeast of Split Rock River, 1.5 mile southwest of Split Rock Lighthouse State Park entrance, and 6 miles southwest of Beaver River [Drainage area: 3.27 mi ²].	2001- current year	05-09-03	15.76	146	11-07-00	16.68	197
Silver Creek Tributary near Two Harbors [04015250]	Lat 47°04'40", long 91°36'49", in SW ¹ / ₄ NE ¹ / ₄ sec. 16, T.53 N., R.10 W., Lake County, Hydrologic Unit 04010102, at culvert on County High- way 3, 1.0 mile upstream from mouth, 4.5 miles northeast of Two Harbors [Drainage area: 3.62 mi ²].	1965- current year	04-10-03	d	<186	9-20-72	17.08	1,880
Lake Superior Tributary on West 9th Street in Duluth [04015415]	Lat 46°45'27", long 92°09'25", in NE ¹ / ₄ SE ¹ / ₄ sec. 6, T.49 N., R.14 W., St. Louis County, Hydrologic Unit 04010201, at culvert on West 9th St. in Duluth, 1.0 mile above mouth, locally called Merrit Creek [Drain- age area: 1.81 mi ²].	2001- current year	10-04-02	9.66	132	10-04-02	9.66	132

Annual maximum discharge at high-flow sites during water year 2003--Continued

Station name and [Station number]	Location and [Drainage area]	Period of record	Water year 2003 maximum			Period of record maximum		
			Date	Gage height (feet)	Discharge (ft ³ /s)	Date	Gage height (feet)	Discharge (ft ³ /s)
North Branch Whiteface River near Fairbanks [04020480]	Lat 47°22'20", long 91°56'28", in NW ¹ / ₄ NW ¹ / ₄ sec. 1, T.56 N., R.13 W., St. Louis County, Hydrologic Unit 04010201, at culvert on County High- way 16, 2 miles upstream from the mouth of Jenkins Creek, 0.7 mile west of Fairbanks [Drainage area: 17.1 mi ²].	1979- current year	07-03-03	11.19	35	04-23-79	13.67	660
Bug Creek at Shaw [04020700]	Lat 47°06'40", long 92°21'03", in SW ¹ / ₄ SE ¹ / ₄ sec. 34, T.54 N., R.16 W., St. Louis County, Hydrologic Unit 04010201, at culverts on County Road 15 at Shaw, 7.5 miles upstream from mouth [Drainage area: 24.8 mi ²].	1979- current year	05-21-03	bf11.03	31	07-05-99	18.00	1,350
Cloquet River near Toimi [04021690]	Lat 47°21'00", long 91°39'30", in NE ¹ / ₄ SW ¹ / ₄ sec. 7, T.56 N., R.10 W., Lake County, Hydrologic Unit 04010202, at bridge on County High- way 2, 5.8 miles southeast of Toimi, 23 miles north of Two Harbors [Drainage area: 40.8 mi ²].	1986- current year	07-08-03	bd	<190	07-04-93	9.06	1,540
Nemadji River near Holyoke [04024095]	Lat 46°31'04", long 92°23'22", in NE ¹ / ₄ NE ¹ / ₄ sec. 32, T.47 N., R.16 W., Carlton County, Hydrologic Unit 04010301, at bridge on State Highway 23, 3.5 miles north of Holyoke and 7 miles south of Wrenshall [Drainage area: 127 mi ²].	1972- current year	06-23-03	11.87	1,880	09-03-85	17.38	4,420
Twelvemile Creek near Dumont [05047900]	Lat 45°42'58", long 96°20'54", in SE ¹ / ₄ SW ¹ / ₄ sec. 17, T.126 N., R.45 W., Traverse County, Hydrologic Unit 09020102, at bridge on Traverse County Road 6, 3 miles east of Dumont.	1996- current year	06-25-03	8.68	536	04-06-97	13.63	c3,720
Mustinka River above Wheaton [05049000]	Lat 45°49'15", long 96°29'25", in SW ¹ / ₄ SW ¹ / ₄ sec. 8, T.127 N., R.46 W., Traverse County, Hydrologic Unit 09020102, at bridge on U.S. Highway 75, 1 mile upstream from Chicago, Milwaukee and St. Paul railroad bridge, 0.5 mile north of Wheaton, about 8 miles above Lake Traverse. Prior to 2002 WY at datum 73.77 ft lower [Drainage area: 810 mi ²].	1915-24 [#] , 1930-58 [#] , 1985- current year	06-26-03	85.49	2,040	04-07-97 04-09-01	g97.40 g94.45	8,800 11,000
Rabbit River near Nashua [05050700]	Lat 46°04'30", long 96°18'24", in SE ¹ / ₄ NE ¹ / ₄ sec. 15, T.130 N., R.45 W., Wilkin County, Hydrologic Unit 09020101, at bridge on County Road 19, 2.6 miles north of Nashua, 4.8 miles upstream from mouth of South Fork Rabbit River [Drainage area: 99.2 mi ²].	1979- current year	06-25-03	14.11	689	04-05-97	a15.76	c1,640
Buffalo River near Callaway [05060800]	Lat 47°01'17", long 95°54'43", in SW ¹ / ₄ SW ¹ / ₄ sec. 17, T.141 N., R.41 W., Becker County, Hydrologic Unit 09020106, at culvert on U.S. Highway 59, 2.7 miles north of Callaway [Drainage area: 76.4 mi ²].	1960- current year	06-25-03	b12.69	153	07-16-93	24.90	1,630

DISCHARGE AT HIGH-FLOW PARTIAL-RECORD STATIONS--Continued

Annual maximum discharge at high-flow sites during water year 2003--Continued

Station name and [Station number]	Location and [Drainage area]	Period of record	Water year 2003 maximum			Period of record maximum		
			Date	Gage height (feet)	Discharge (ft ³ /s)	Date	Gage height (feet)	Discharge (ft ³ /s)
Whiskey Creek at Barnesville [05061200]	Lat 46°39'35", long 96°23'54", in SE ¹ / ₄ SW ¹ / ₄ sec. 20, T.137 N., R.45 W., Clay County, Hydrologic Unit 09020106, at culvert on State High- way 34, 0.7 mile upstream from Blue Eagle Lake, 1.0 mile northeast of Barnesville [Drainage area: 76.3 mi ²].	1961-64, 1965-66#, 1967- current year	06-25-03	4.66	122	05-31-85	7.12	660
State Ditch 45 Tributary near Ulen [05063850]	Lat 47°06'28", long 96°25'03", in SE ¹ / ₄ SW ¹ / ₄ sec.17, T.142 N., R.45 W., Clay County, Hydrologic Unit 09020108, at culvert on 180th Ave. North, 7.5 miles northwest of Ulen [Drainage area: 3.26 mi ²].	2002- current year	06-09-02 06-25-03	18.27 b16.57	i386 184	06-09-02	18.27	h386
Marsh River Ditch near Ada [05067050]	Lat 47°17'46", long 96°26'09", in NE ¹ / ₄ NE ¹ / ₄ sec. 13, T.144 N., R. 46 W., Norman County, Hydrologic Unit 09020108, at bridge on County High- way 24, 3.5 miles southeast of Ada.	1985- current year	06-25-03	12.55	0	06-24-02	19.64	2,000
Red Lake River at High Landing near Goodridge [05075000]	Lat 48°02'34", long 95°48'28", in NW ¹ / ₄ NW ¹ / ₄ sec. 28, T.153 N., R.40 W., Pennington County, Hydrologic Unit 09020303, on left bank 50 ft upstream from County Highway 24 bridge at High Landing, 7 miles south of Goodridge and 33 miles upstream from Thief River Falls [Drainage area: 2,300 mi ²].	1929- 2000#, 2001- current year	10-01-02	7.17	1,020	07-07-75	13.39	4,060
Mud River near Grygla [05075700]	Lat 48°19'31", long 95°44'35", in NE ¹ / ₄ NE ¹ / ₄ sec. 23, T.156 N., R.40 W., Hydrologic Unit 09020304, Mar- shall County, at bridge on State Highway 89, 6 miles west of Grygla [Drainage area: 150 mi ²].	1979- current year	03-17-03	a12.58	217	06-22-02	18.54	2,840
Clearwater River Tributary near Bagley [05076690]	Lat 47°30'34", long 95°24'15", in SE ¹ / ₄ NE ¹ / ₄ sec. 31, T.147 N., R.37 W., Clearwater County, Hydrologic Unit 09020305, at culvert on County State Aid Highway 28, 0.5 mile south of Bagley.	2001- current year	06-25-03	b6.77	1.8	06-23-02	e13.50	--
Ruffy Brook near Gonvick [05077700]	Lat 47°44'50", long 95°24'45", in SE ¹ / ₄ SE ¹ / ₄ sec. 5, T.149 N., R.37 W., Clearwater County, Hydrologic Unit 09020305, at culvert on County High- way 67, 4.0 miles upstream from mouth, 4.8 miles east of Gonvick [Drainage area: 46.2 mi ²].	1960-78#, 1979-85, 1986#, 1987- current year	06-25-03	b2.58	137	04-19-96	5.78	455
Burnham Creek near Crookston [05079901]	Lat 47°43'59", long 96°39'52", in SE ¹ / ₄ SW ¹ / ₄ sec. 10, T.149 N., R.47 W., Polk County, Hydrologic Unit 09020303, at triple box culvert on U.S. Highway 75, 0.75 mile northeast of Girard, 3 miles southwest of Crookston, 7 miles above mouth [Drainage area: 134 mi ²].	1986- current year	06-23-03	17.10	900	04-15-97	22.63	3,000
Middle River near Newfolden [05086900]	Lat 48°22'04", long 96°16'47", in NE ¹ / ₄ NE ¹ / ₄ sec. 3, T.156 N., R.44 W., Marshall County, Hydrologic Unit 09020309, at bridge on township road, 2.0 miles northeast of New- folden [Drainage area: 88.8 mi ²].	1979- current year	06-14-03	15.39	160	06-11-02 05-18-96	20.12 18.31	-- 2,300

Annual maximum discharge at high-flow sites during water year 2003--Continued

Station name and [Station number]	Location and [Drainage area]	Period of record	Water year 2003 maximum			Period of record maximum		
			Date	Gage height (feet)	Discharge (ft ³ /s)	Date	Gage height (feet)	Discharge (ft ³ /s)
Stoney River near Babbitt [05125550]	Lat 47°41'36", long 91°45'38", in SW ¹ / ₄ SW ¹ / ₄ sec. 8, T.60 N., R.11 W., Lake County, Hydrologic Unit 09030001, in Superior National For- est, at bridge on Forest Road 424, 4.7 miles upstream from mouth, 8.5 miles east of Babbitt [Drainage area: 215 mi ²].	1975-80 [#] , 1986- current year	07-02-03	4.54	326	04-19-76	8.71	2,490
Big Fork River near Bigfork [05131750]	Lat 47°44'56", long 93°46'31", in SE ¹ / ₄ SE ¹ / ₄ sec. 1, T.149 N., R.25 W., Itasca County, Hydrologic Unit 09030006, at bridge on State Highway 6, 5.5 miles west of Bigfork [Drainage area: 606 mi ²].	1973- current year	06-27-03	d	<451	04-22-79	15.48	2,830
Bowerman Brook near Craigville [05131878]	Lat 47°55'29", long 93°45'34", in NE ¹ / ₄ NW ¹ / ₄ sec. 26, T.63 N., R.27 W., Koochiching County, Hydrologic Unit 09030006, at culvert on State High- way 6, 2.4 miles upstream from mouth, 7.0 miles west of Craigville [Drainage area: 25.7 mi ²].	1979- current year	06-26-03	10.39	40	06-23-02	15.83	937
North Branch Rapid River near Baudette [05134100]	Lat 48°31'56", long 94°38'50", in NW ¹ / ₄ SW ¹ / ₄ sec. 4, T.158 N., R.31 W., Lake of the Woods County, Hydrologic Unit 09030007, at bridge on County Highway 1, 12.7 miles southwest of Baudette [Drainage area: 174 mi ²].	1986- current year	06-25-03	7.50	275	06-11-02	e18.34	6,380
Winter Road River near Baudette [05137000]	Lat 48°42'39", long 94°41'52", in NW ¹ / ₄ NE ¹ / ₄ sec. 1, T.160 N., R.32 W., Lake of the Woods County, Hydrologic Unit 09030008, at bridge on State Highway 11, 4.5 miles west of Bau- dette, 1.8 miles east of Pitt, 5 miles upstream of mouth [Drainage area: 140 mi ²].	1986- current year	06-25-03	8.90	268	06-11-02	de19.35	9,900
Mississippi River at Bemidji [05200445]	Lat 47°27'04", long 94°54'23", in NW ¹ / ₄ NW ¹ / ₄ sec. 20, T.146 N., R.33 W., Beltrami County, Hydrologic Unit 07010101, at bridge on County High- way 11, 1.4 miles southwest of intersection of State Highway 197 and County Highway 7 in Bemidji [Drainage area: 358 mi ²].	1973-87, 1988-89 [#] , 1990- current year	06-25-03	b10.58	273	04-18-97	13.17	1,820
Boy River near Remer [05205200]	Lat 47°04'51", long 94°05'54", in NE ¹ / ₄ NE ¹ / ₄ sec. 33, T.142 N., R.27 W., Cass County, Hydrologic Unit 07010102, at bridge on County High- way 53, 1.9 miles upstream from Boy Lake and 9 miles northwest of Remer [Drainage area: 289 mi ²].	1986- current year	07-10-03	bd	<213	04-10-96 07-23-87	a11.59 11.64	c660 660
Willow River below Palisade [05221020]	Lat 46°42'36", long 93°33'21", in NW ¹ / ₄ NE ¹ / ₄ sec. 30, T.49 N., R.25 W., Aitkin County, Hydrologic Unit 07010103, at bridge on County High- way 3, 3.2 miles west of Palisade [Drainage area: 523 mi ²].	1972- current year	07-11-03	d	<673	04-25-79	17.25	3,730
Hoblin Creek near Pine River [05229430]	Lat 46°41'06", long 94°30'49", in SE ¹ / ₄ NE ¹ / ₄ sec. 18, T.137 N., R.30 W., Cass County, Hydrologic Unit 07010105, at culvert on township road, 3.4 miles upstream from mouth, 5.6 miles southwest of Pine River.	2002- current year	07-10-03	7.59	--	07-08-02	8.38	--

Annual maximum discharge at high-flow sites during water year 2003--Continued

Station name and [Station number]	Location and [Drainage area]	Period of record	Water year 2003 maximum			Period of record maximum		
			Date	Gage height (feet)	Discharge (ft ³ /s)	Date	Gage height (feet)	Discharge (ft ³ /s)
Pine River near Pine River [05229450]	Lat 46°41'39", long 94°22'11", in NE ¹ / ₄ SE ¹ / ₄ sec. 8, T.137 N., R.29 W., Cass County, Hydrologic Unit 07010105, at bridge on U.S. Highway 371, 2.3 miles southeast of Pine River, 4.9 miles upstream of Upper Whitefish Lake [Drainage area: 261 mi ²].	1986- current year	07-10-03	3.38	313	05-14-99	5.15	1,520
Cat River near Nimrod [05244200]	Lat 46°37'49", long 94°55'51", in SW ¹ / ₄ SW ¹ / ₄ sec. 36, T.137 N., R.34 W., Wadena County, Hydrologic Unit 07010106, at bridge on State Highway 227, 2.5 miles west of Nimrod, 3.0 miles upstream from mouth [Drainage area: 57.1 mi ²].	1961- current year	06-25-03	bd	<74	10-12-73	9.43	560
Leaf River near Aldrich [05244440]	Lat 46°27'25", long 94°50'29", in SW ¹ / ₄ SW ¹ / ₄ sec. 34, T.135 N., R.33 W., Wadena County, Hydrologic Unit 07010107, at bridge on County High- way 29, 3.3 miles upstream from mouth, 7.0 miles northeast of Ald- rich [Drainage area: 870 mi ²].	1972- current year	06-26-03	11.77	988	04-12-01	16.40	5,800
Eagle Creek Tributary near Eagle Bend [05245190]	Lat 46°48'01", long 94°01'36", in NW ¹ / ₄ NE ¹ / ₄ sec. 24, T.131 N., R.35 W., Todd County, at culvert on township road, 1.0 mile upstream from mouth, 1.0 mile south of Eagle Bend.	2003- current year	06-24-03	8.52	--	06-24-03	8.52	--
Mississippi River near Fort Ripley [05261000]	Lat 46°10'50", long 94°21'56", in SE ¹ / ₄ NW ¹ / ₄ sec. 27, T.43 N., R.32 W., Crow Wing County, on left bank 600 feet. Upstream from Nokasippi River and 1.0 mile north of Ft. Ripley. [Drainage area 10,840 mi ²].	1987-00#, 2001- current year	06-29-03	8.59	11,500	04-08-97	14.15	32,200
Nokasippi River near Fort Ripley [05261520]	Lat 46°12'02", long 94°19'03", in NE ¹ / ₄ NE ¹ / ₄ sec. 24, T.43 N., R.32 W., Crow Wing County, Hydrologic Unit 07010104, at bridge on County High- way 2, 3 miles northeast of Fort Ripley [Drainage area: 193 mi ²].	1967-70†, 1974†, 1976†, 1986- current year	06-26-03	15.17	1,160	06-26-03	15.17	1,160
Platte River at Royalton [05268000]	Lat 45°50'43", long 94°17'40", in SE ¹ / ₄ NW ¹ / ₄ sec. 26, T.39 N., R.32 W., Morrison County, Hydrologic Unit 07010201, at bridge on County High- way 27, 0.6 mile north of Royalton, 6.6 miles upstream from mouth [Drainage area: 432 mi ²].	1929-36, 1972- current year	06-26-03	13.39	2,760	07-26-72	--	6,850
Ashley Creek near Sauk Centre [05270150]	Lat 45°46'46", long 94°58'52", in NW ¹ / ₄ SE ¹ / ₄ sec. 29, T.127 N., R.34 W., Todd County, Hydrologic Unit 07010202, at bridge on County High- way 11, 3 miles north of Sauk Centre [Drainage area: 119 mi ²].	1963- 70†,74†, 1976†, 1986-88, 1989#, 1990- current year	06-26-03	16.38	686	04-08-01	18.00	1,020
Johnson Creek near St. Augusta [05272300]	Lat 45°27'49", long 94°09'19", in NW ¹ / ₄ SW ¹ / ₄ sec. 13, T.123 N., R.28 W., Stearns County, Hydrologic Unit 07010203, at bridge on County High- way 7, 1.0 mile south of St. Augusta, 3.3 miles upstream from mouth [Drainage area: 45.6 mi ²].	1964- current year	04-20-03	b12.70	246	09-09-85	16.37	2,350

Annual maximum discharge at high-flow sites during water year 2003--Continued

Station name and [Station number]	Location and [Drainage area]	Period of record	Water year 2003 maximum			Period of record maximum		
			Date	Gage height (feet)	Discharge (ft ³ /s)	Date	Gage height (feet)	Discharge (ft ³ /s)
Clearwater River near South Haven [05272950]	Lat 45°16'45", long 94°15'04", in NE ¹ / ₄ NW ¹ / ₄ sec. 19, T.121 N., R.28 W., Wright County, Hydrologic Unit 07010203, at culvert 3.4 miles southeast of Kimball, 0.25 mile downstream of Scott Lake Outlet, 2.0 miles southwest of South Haven [Drainage area: 78.8 mi ²].	1985- current year	06-26-03	14.65	241	09-09-85	17.11	1,040
North Fork Crow River near Kingston [05278120]	Lat 45°12'13", long 94°23'16", in SW ¹ / ₄ SE ¹ / ₄ sec. 13, T.120 N., R.30 W., Meeker County, Hydrologic Unit 07010204, at bridge on State Highway 24, 3.7 miles west of Kingston, 3.9 miles east of Forest City [Drainage area: 779 mi ²].	1986- current year	06-30-03	14.95	2,410	05-01-86	17.82	4,850
Buffalo Creek near Glencoe [05278930]	Lat 44°45'50", long 94°05'27", in SW ¹ / ₄ SW ¹ / ₄ sec. 16, T.115 N., R.27 W., McLeod County, Hydrologic Unit 07010205, at bridge on County High- way 1, 2.6 miles east of Glencoe [Drainage area: 373 mi ²].	1972-95, 1998- current year	06-30-03	14.32	815	09-12-91	11.78	4,300
Lake Ina Tribu- tary near Melby [05293245]	Lat 46°03'50", long 95°43'40", in NW ¹ / ₄ NW ¹ / ₄ sec. 21, T.130 N., R.40 W., Douglas County, Hydrologic unit 07020002, upstream from culvert on County Road 24, at Lake Ina, 0.3 mile east of Melby.	2003- current year	06-24-03	9.95	f43	06-24-03	9.95	f43
Pomme de Terre River near Elbow Lake [05293371]	Lat 45°57'47", long 95°53'07", in SE ¹ / ₄ SW ¹ / ₄ sec. 19, T.129 N., R.41 W., Grant County, Hydrologic Unit 07020002, at bridge on County Road 47, 4 miles southeast of Elbow Lake, 2.5 miles south of the outlet of Pomme de Terre Lake [Drainage area: 340 mi ²].	1986- current year	06-25-03	5.21	238	06-15-01	6.85	600
Pomme de Terre River near Appleton [05294000]	Lat 45°12'10", long 96°01'20", in SW ¹ / ₄ NW ¹ / ₄ sec. 14, T.120 N., R.43 W., Swift County, Hydrologic Unit 07020002, on left bank 60 feet upstream from bridge on U.S. Highway 59 and State Highway 119 at Apple- ton, 8 miles upstream from mouth [Drainage area: 864 mi ²].	1931-35' 1935-99 [#] , 2000- current year	06-30-03	7.19	795	04-07-97	18.13	8,890
Florida Creek near Burr [05299750]	Lat 44°44'10", long 96°25'10", in SE ¹ / ₄ SE ¹ / ₄ sec. 29, T.115 N., R.46 W., Yellow Medicine County, Hydro- logic Unit 07020003, at culvert on County Road 15, 3.0 miles west of Burr, 7.6 miles northwest of Canby [Drainage area: 77.3 mi ²].	1982, 1983-84 [#] , 1991- current year	03-16-03	a5.83	63	04-01-97	26.57	2,490
Little Chippewa River near Starbuck [05302500]	Lat 45°36'52", long 95°37'12", in NW ¹ / ₄ NE ¹ / ₄ sec. 30, T.125 N., R.39 W., Pope County, Hydrologic Unit 07020005, at culvert on State High- way 28, 4.4 miles west of Starbuck [Drainage area: 96.2 mi ²].	1979- current year	06-24-03	13.76	348	04-08-01	14.02	980

DISCHARGE AT HIGH-FLOW PARTIAL-RECORD STATIONS--Continued

Annual maximum discharge at high-flow sites during water year 2003--Continued

Station name and [Station number]	Location and [Drainage area]	Period of record	Water year 2003 maximum			Period of record maximum		
			Date	Gage height (feet)	Discharge (ft ³ /s)	Date	Gage height (feet)	Discharge (ft ³ /s)
Chippewa River near Watson [05305000]	Lat 45°01'18", long 95° 47'25 ", in NE ¹ / ₄ NW ¹ / ₄ sec. 22, T.118 N., R.41 W., Chippewa County, Hydrologic Unit 07020005, 150 feet downstream from County Road 13 bridge and dam, one mile north of Watson, 5.5 miles northwest of Montevideo, and 12.1 miles above confluence with Minne- sota River in Montevideo [Drainage area: 2,050 mi ²].	1910-17, 1931-36, 2001- current year	07-01-03	39.61	793	04-11-01	45.41	4,600
South Branch Yellow Medicine River near Minneota [05311400]	Lat 44°33'50", long 95°59'50", in SE ¹ / ₄ SE ¹ / ₄ , sec. 26, T.113 N., R.43 W., Lyon County, Hydrologic Unit 07020004, at bridge on State Highway 68, on northwest edge of Minneota and 6 miles upstream from mouth [Drainage area: 115 mi ²].	1960-81 [#] , 1981-87, 1998- current year	04-19-03	b15.32	150	04-18-69	13.41	4,430
Ramsey Creek near Redwood Falls [05316538]	Lat 44°33'08", long 95°10'38", in SE ¹ / ₄ NE ¹ / ₄ sec. 33, T.113 N., R.36 W., Redwood County, Hydrologic Unit 07020006 at bridge on township road 2.3 miles northeast of KLGR radio towers, on west side of Redwood Falls [Drainage area: 629 mi ²].	1991-93, 1995 - current year	04-17-03	19.24	138	06-17-93	25.94	920
Beaver Creek at Beaver Falls [05316570]	Lat 44°35'03", long 95°02'49", in NE ¹ / ₄ NW ¹ / ₄ sec. 22, T.113 N., R.35 W., Renville County, Hydrologic Unit 07020004, at bridge on County High- way 2 in Beaver Falls, 2.2 miles upstream from mouth, 3.8 miles northwest of Morton [Drainage area: 191 mi ²].	1972- current year	05-21-03	b7.98	186	04-02-97	14.73	3,300
Cottonwood River near Springfield [05316950]	Lat 44°12'12", long 95°02'53", in SW ¹ / ₄ NW ¹ / ₄ sec. 34, T.109 N., R.35 W., Brown County, Hydrologic Unit 07020008, at bridge on County High- way 2, 1.3 miles downstream from Mound Creek, 1.0 mile upstream from Coal Mine Creek, 3.5 miles southwest of Springfield [Drainage area: 777 mi ²].	1973- current year	04-21-03	17.11	1,100	06-18-93	31.40	14,500
Minnesota River Tributary at State High- way 68 near Jud- son [05317330]	Lat 44°11'40", long 94°12'27", in NW ¹ / ₄ NW ¹ / ₄ sec. 4, T.108 N., R.28 W., Blue Earth County, Hydrologic Unit 07020007, at culvert on State High- way 68, 0.5 mile southwest of Jud- son, 0.4 mile above mouth [Drainage area: 0.97 mi ²].	2001- current year	05-15-03	d	--	06-22-02	8.84	--
East Branch Blue Earth River near Walters [05317845]	Lat 43°37'58", long 93°42'28", in SE ¹ / ₄ SE ¹ / ₄ sec. 16, T.102 N., R.24 W., Faribault County, Hydrologic Unit 07020009, at culvert on State Highway 22, 2.5 miles northwest of Walters [Drainage area: 30.2 mi ²].	1979- current year	05-17-03	15.73	323	08-15-93	18.73	657
Elm Creek at County Road 103 near Trimont [05318195]	Lat 43°45'27", long 94°50'30", in NW ¹ / ₄ NW ¹ / ₄ sec. 5, T.103 N., R.33 W., Martin County, Hydrologic Unit 07020009, at bridge on County Road 103, 12.5 miles northeast of Jack- son, 5 miles west of Trimont.	1991- current year	06-25-03	d	<371	06-04-91	22.92	2,000

Annual maximum discharge at high-flow sites during water year 2003--Continued

Station name and [Station number]	Location and [Drainage area]	Period of record	Water year 2003 maximum			Period of record maximum		
			Date	Gage height (feet)	Discharge (ft ³ /s)	Date	Gage height (feet)	Discharge (ft ³ /s)
Watowan River near Delft [05318300]	Lat 43°59'55", long 95°07'11", in NE ¹ / ₄ SE ¹ / ₄ sec. 11, T.106 N., R.36 W., Cottonwood County, Hydrologic Unit 07020010, at culvert on U.S. Highway 71, 1.7 miles northwest of Delft [Drainage area: 13.5 mi ²].	1960-2003	05-11-03	14.63	49	06-18-93	17.70	1,000
South Fork Watowan River near Ormsby [05318897]	Lat 43°53'08", long 94°41'27", in SE ¹ / ₄ NW ¹ / ₄ sec.21, T.105 N., R.32 W., Watowan County, Hydrologic Unit 07020010, at bridge on township road, 2.6 miles north of Ormsby, 5.0 miles upstream from Willow Creek [Drainage area: 107 mi ²].	1979- current year	06-25-03	11.07	216	05-31-80	18.40	1,920
Maple River near Rapidan [05320480]	Lat 44°03'54", long 94°01'32", in SW ¹ / ₄ SW ¹ / ₄ sec. 13, T.107 N., R.27 W., Blue Earth County, Hydrologic Unit 07020011, at bridge on County High- way 35, 3.0 miles southeast of Rapi- dan, 3.3 miles upstream from mouth [Drainage area: 338 mi ²].	1972- current year	05-12-03	9.74	1,500	04-12-01	13.79	5,540
Minnesota River Tributary below St. Peter [05325450]	Lat 44°20'13", long 93°54'45", in NE ¹ / ₄ NE ¹ / ₄ sec. 14, T.110 N., R.26 W., Le Sueur County, Hydrologic Unit 07020007, at culvert on County State Aid Highway 23, 1.8 miles east of St. Peter [Drainage area: 2.13 mi ²].	2001- current year	05-15-03	d	--	02-25-01	7.20	--
Sand Creek near New Prague [05330300]	Lat 44°32'37", long 93°32'16", in NE ¹ / ₄ NW ¹ / ₄ sec. 1, T.112 N., R.23 W., Le Sueur County, Hydrologic Unit 07020012, at culvert on State High- way 13 and 19, 1.9 miles east of New Prague [Drainage area: 62.2 mi ²].	1960- current year	05-12-03	10.80	296	05-21-60	14.84	1,100
Crooked Creek near Hinckley [05335170]	Lat 46°00'42", long 92°31'45", in NE ¹ / ₄ NE ¹ / ₄ sec. 30, T.41 N., R.17 W., Pine County, Hydrologic Unit 07030001, at culvert on State High- way 48, 2.7 miles upstream from mouth, 8 miles south of Duxbury, 19 miles east of Hinckley [Drainage area: 94.4 mi ²].	1966- 70†,74†, 76†, 79- 80†, 1986- current year	06-23-03	14.14	1,060	04-23-01	16.65	2,100
Glaisby Brook near Kettle River [05336200]	Lat 46°27'19", long 92°51'34", in SE ¹ / ₄ NW ¹ / ₄ sec. 22, T.46 N., R.20 W., Carlton County, Hydrologic Unit 07030003, at bridge on State High- ways 27 and 73, 1.0 mile upstream from mouth, 2.4 miles south of Ket- tle River [Drainage area: 27.0 mi ²].	1960-70#, 1971- current year	06-23-03	15.12	134	07-22-72	10.18	1,370
Goose Creek at Harris [05339747]	Lat 45°35'11", long 92°58'39", in SW ¹ / ₄ SW ¹ / ₄ sec. 21, T.36 N., R.21 W., Chisago County, Hydrologic Unit 07030005, at culverts on County Highway 9, 0.15 mile west of County Highway 30 in Harris, 8 miles above mouth [Drainage area: 47.3 mi ²].	1986- current year	06-26-03	6.93	241	04-23-01	8.11	360
Cannon River below Sabre Lake near Kilkenny [05348550]	Lat 44°17'50", long 93°37'44", in NE ¹ / ₄ NE ¹ / ₄ sec. 31, T.110 N., R.23 W., Le Sueur County, Hydrologic Unit 07040002, at bridge on township road, 0.25 mile downstream of Sabre Lake, 3 miles southwest of Kilkenny [Drainage area: 87.9 mi ²].	1985- current year	05-12-03	12.12	205	04-12-01	13.83	563

Annual maximum discharge at high-flow sites during water year 2003--Continued

Station name and [Station number]	Location and [Drainage area]	Period of record	Water year 2003 maximum			Period of record maximum		
			Date	Gage height (feet)	Discharge (ft ³ /s)	Date	Gage height (feet)	Discharge (ft ³ /s)
Cannon River at Northfield [05355024]	Lat 44°27'19", long 93°09'46", in NE ¹ / ₄ NE ¹ / ₄ sec. 1, T.111 N., R.20 W., Rice County, Hydrologic Unit 07040002, at Fifth Street bridge in Northfield [Drainage area: 929 mi ²].	1980- current year	05-13-03	903.36	3,540	04-12-01	905.40	8,370
Milliken Creek near Concord [05373080]	Lat 44°07'13", long 92°49'08", in NW ¹ / ₄ NW ¹ / ₄ sec. 36, T.108 N., R.17 W., Dodge County, Hydrologic Unit 07040004, at bridge on County Road 9, 8.0 miles upstream from mouth, 2.1 miles southeast of Concord [Drainage area: 22.1 mi ²].	1979- current year	05-11-03	12.54	343	06-13-01	15.80	3,470
Zumbro River at Zumbro Falls [05374000]	Lat 44°17'12", long 92°25'56", in NE ¹ / ₄ SE ¹ / ₄ sec. 36, T.110 N., R.14 W., Wabasha County, Hydrologic Unit 07040004, in Zumbro Falls, 1,000 feet downstream from Cold Creek, 0.7 mile upstream from bridge on U.S. Highway 63, and 6.3 miles downstream from North Fork [Drainage area: 1,150 mi ²].	1909-17 [#] , 1929-80 [#] , 1990- current year	05-12-03	14.69	7,630	07-21-51	30.80	35,900
Cedar River near Ridgeway [05380100]	Lat 43°56'49", long 91°33'59", in NW ¹ / ₄ NE ¹ / ₄ sec. 32, T.106 N., R.6 W., Winona County, Hydrologic Unit 07040003, at bridge on County Road 9, 2.9 miles northeast of Witoka, 6 miles southeast of Winona [Drainage area: 7.16 mi ²].	2001- current year	02-21-03	a12.16	--	02-21-03	a12.16	--
Root River at Rushford [05384350]	Lat 43°48'11", long 91°45'10", in NE ¹ / ₄ NE ¹ / ₄ sec. 23, T.104 N., R.8 W., Fillmore County, Hydrologic Unit 07040008, at U.S. Highway 16 bridge on south side of Rushford, 0.2 mile upstream from Rush Creek [Drainage area: 992 mi ²].	1985- current year	05-12-03	17.52	2,770	06-02-00	26.35	32,400
Rush Creek near Rushford [05384500]	Lat 43°50'00", long 91°46'40", in SW ¹ / ₄ SW ¹ / ₄ sec. 3, T.104 N., R.8 W., Fillmore County, Hydrologic Unit 07040008, at bridge, 1.5 miles northwest of Rushford, 3.0 miles upstream from mouth [Drainage area: 132 mi ²].	1942-79 [#] , 1980- current year	02-21-03	3.11	432	03-26-50	13.54	11,600
Cambell Valley Creek near Money Creek [05384800]	Lat 43°49'54", long 91°34'53", in NE ¹ / ₄ NW ¹ / ₄ sec. 8, T.104 N., R.6 W., Houston County, Hydrologic Unit 07040008, at triple box culvert on County State Aid Highway 26, 1.8 miles northwest of Money Creek [Drainage area: 6.82 mi ²].	2001- current year	03-16-03	3.11	--	03-16-03	3.11	--
Root River near Houston [05385000]	Lat 43°46'07", long 91°35'11", in SW ¹ / ₄ NW ¹ / ₄ sec. 33, T.104 N., R.6 W., Houston County, Hydrologic Unit 07040008, on right bank 0.2 mile north of Houston, 1.6 miles upstream from confluence with South Fork Root River and 1.2 miles upstream from mouth [Drainage area: 1,250 mi ²].	1909-17, 1929, 1930-83 [#] , 1983-90 1991-00 [#] , 2001- current year	05-13-03	7.00	2,650	04-01-52 03-02-65	-- 18.32	37,000 --
South Fork Root River near Houston [05385500]	Lat 43°44'19", long 91°33'50", in NE ¹ / ₄ SW ¹ / ₄ sec. 9, T.103 N., R.6 W., Houston County, Hydrologic Unit 07040008, at bridge on State Highway 76, 0.5 mile upstream from Badger Creek, 1.5 mile south of Houston [Drainage area: 275 mi ²].	1953-83 [#] , 1985- current year	06-04-02 03-16-03	h4.88 b3.09	h681 348	06-01-00	14.90	13,800

Annual maximum discharge at high-flow sites during water year 2003--Continued

Station name and [Station number]	Location and [Drainage area]	Period of record	Water year 2003 maximum			Period of record maximum		
			Date	Gage height (feet)	Discharge (ft ³ /s)	Date	Gage height (feet)	Discharge (ft ³ /s)
Crooked Creek at Freeburg [05387030]	Lat 43°36'37", long 91°21'39", in SW ¹ / ₄ NE ¹ / ₄ sec. 30, T.102 N., R.4 W., Houston County, Hydrologic Unit 07060001, at bridge on State Highway 249 at Freeburg 6.5 miles upstream from mouth [Drainage area: 44.8 mi ²].	1979- current year	03-16-03	d	<275	03-04-92	19.02	2,200
Little Cedar River near Johnsburg [05457778]	Lat 43°30'52", long 92°45'19", in NW ¹ / ₄ NE ¹ / ₄ sec. 33, T.101 N., R.16 W., Mower County, Hydrologic Unit 07080201, at bridge on County Road 6, 1 mile northeast of Johnsburg, 1 mile north of Minnesota-Iowa border [Drainage area: 45.8 mi ²].	1986- current year	05-11-03	10.94	348	08-16-93	17.58	9,280
Bancroft Creek at Bancroft [05458960]	Lat 43°42'09", long 93°21'23", in SW ¹ / ₄ SE ¹ / ₄ sec. 21, T.103 N., R.21 W., Freeborn County, Hydrologic Unit 07080202, at bridge on County Road 14, 1.6 miles northeast of Fountain Lake, 1 mile north of Interstate 90 [Drainage area: 28.7 mi ²].	1985†, 1986- current year	05-11-03	f6.05	230	06-14-01	8.81	1,070
Elk Creek near Brewster [05474900]	Lat 43°40'43", long 95°27'10", in NE ¹ / ₄ SE ¹ / ₄ sec. 36, T.102 N., R.39 W., Nobles County, Hydrologic Unit 07100001, at bridge on County High- way 1, 0.7 miles south of Brewster.	1996- current year	05-12-03	18.23	335	05-30-01	25.29	4,000
East Fork Des Moines River near Ceylon [05476989]	Lat 43°33'53", long 94°39'15", in NW ¹ / ₄ SW ¹ / ₄ sec. 11, T.101 N., R.32 W., Martin County, Hydrologic Unit 07010003, at bridge on County Road 23, 2.4 miles northwest of Ceylon [Drainage area: 128 mi ²].	1986- current year	05-11-03	15.44	204	07-05-93	21.65	1,350
North Branch Pipestone Creek near Pipestone [06482500]	Lat 44°04'54", long 96°18'27", in SE ¹ / ₄ SE ¹ / ₄ sec. 12, T.107 N., R.46 W., Pipestone County, Hydrologic Unit 10170203, at bridge on U.S. Highway 75, 5.5 miles north of Pipe- stone. Formerly "Pipestone Creek near Pipestone" [Drainage area: 31.5 mi ²].	1991- current year	04-16-03	17.10	260	05-08-93	20.28	2,650
Beaver Creek at Valley Springs, South Dakota [06482745]	Lat 43°35'10", long 96°28'20", in NW ¹ / ₄ NW ¹ / ₄ sec. 3, T.101 N., R.47 W., Minnehaha County, South Dakota, Hydrologic Unit 10170203, at bridge on County Road 103 (Valley Drive), 1 mile west of South Dakota-Minnesota border, 2.5 miles south of Inter- state 90 [Drainage area: 104 mi ²].	1986- current year	04-07-03	14.66	141	06-13-94	24.89	2,280
Rock River Tribu- tary at County Highway 18 near Hatfield [06482910]	Lat 43°56'38", long 96°06'13", in SW ¹ / ₄ NW ¹ / ₄ sec. 35, T.106 N., R.44 W., Pipestone County, Hydrologic Unit 10170204, at culvert on County State Aid Highway 18, 1.5 miles upstream of mouth, 4 miles east of Hatfield, 5 miles north of Edgerton [Drainage area: 3.28 mi ²].	2001- current year	03-16-03	3.98	17	06-26-01	6.16	186
Chanarambi Creek near Edgerton [06482933]	Lat 43°53'59", long 96°03'39", in NW ¹ / ₄ SW ¹ / ₄ sec. 18, T.105 N., R.43 W., Murray County, Hydrologic Unit 10170204, at bridge on township road, 3.8 miles northeast of Edger- ton, 7.4 miles upstream from mouth [Drainage area: 57.3 mi ²].	1979- current year	03-16-03	d	<169	04-23-01 05-03-01	16.79 18.14	928 850

DISCHARGE AT HIGH-FLOW PARTIAL-RECORD STATIONS--Continued

Annual maximum discharge at high-flow sites during water year 2003--Continued

Station name and [Station number]	Location and [Drainage area]	Period of record	Water year 2003 maximum			Period of record maximum		
			Date	Gage height (feet)	Discharge (ft ³ /s)	Date	Gage height (feet)	Discharge (ft ³ /s)
Champepadan Creek at County Road 18 near Leota [06482970]	Lat 43°47'24", long 96°00'40", in NW ¹ / ₄ NW ¹ / ₄ sec. 28, T.104 N., R. 43 W., Nobles County, Hydrologic Unit 10170204, at bridge on County Road 18, near junction with County Road 19, 3 miles south of Leota [Drainage area: --].	1996- current year	03-16-03	a12.73	157	04-23-01	17.54	895
Rock River at Luverne [06483000]	Lat 43°39'15", long 96°12'03", in SW ¹ / ₄ NE ¹ / ₄ sec. 11, T.102 N., R45 W., Rock County, Hydrologic Unit 10170204, at bridge on Main Street (County Highway 4) in Luverne [Drainage area: 419 mi ²].	1911-14 [#] , 1968-69, 1971- current year	03-16-03	6.09	1,410	05-08-93	14.23	c35,400
Elk Creek near Lismore [06483020]	Lat 43°41'38", long 96°00'46", in NE ¹ / ₄ SE ¹ / ₄ sec. 29, T.103 N., R. 43 W., Nobles County, Hydrologic Unit 10170204, at bridge on County Road 19, 4.6 miles southwest of Lismore [Drainage area: 4.62 mi ²].	1996- current year	03-16-03	a14.08	--	06-14-01	15.62	--
Little Rock River near Rushmore [06483350]	Lat 43°32'36", long 95°48'58", in NE ¹ / ₄ NE ¹ / ₄ sec. 24, T.101 N., R.42 W., Nobles County, Hydrologic Unit 10170204, at bridge #4967, on County Road 6, 1.5 miles west of Ransom, 5.1 miles south of Rushmore [Drainage area: 45.8 mi ²].	1991- current year	05-11-03	b22.82	108	07-11-93	27.04	4,290
Little Rock Creek near Rushmore [06483353]	Lat 43°32'37", long 95°50'50", in NE ¹ / ₄ NW ¹ / ₄ sec. 23, T.101 N., R.42 W., Nobles County, Hydrologic Unit 10170204, at bridge on County Road 6, 5.5 miles southwest of Rushmore [Drainage area: 32.1 mi ²].	1996- current year	05-11-03	21.26	102	05-30-01	27.99	3,070
Little Sioux River near Spafford [06603530]	Lat 43°36'08", long 95°15'27", in NE ¹ / ₄ NE ¹ / ₄ sec. 34, T.102 N., R.37 W., Jackson County, Hydrologic Unit 10230003, at bridge on township road, 1.6 miles downstream from Jackson County ditch No. 11, 5.8 miles east of Spafford [Drainage area: 40.5 mi ²].	1962- current year	06-09-03	7.80	113	06-29-69	12.06	4,500

< less than

c Estimated.

g Backwater from Lake Traverse.

Operated as a continuous-record
gaging station.

d Did not reach bottom of gage

h Peak flow determined from indirect
measurement.

† Operated as a low-flow site.

e From high-water mark.

i Revised.

a Backwater from ice.

f Backwater from beaver dam

j Stage from downstream gage.

b Not annual maximum.

Low-Flow Investigations

LOW-FLOW INVESTIGATIONS
Low-flow Investigations in Minnesota River Basin

Discharge measurements and estimates of flow below were made for a seepage study of the Minnesota River Basin from Jordan, MN to the mouth. Base flow conditions for the period of Sept. 8-9 were excellent. The most recent rainfalls of significance were on Aug. 20 with amounts of 0.10 to 0.20 inches being typical. Prior to that no significant rainfall events occurred until about Aug. 2-3.

Stream name and [Station no.]	Tributary to	Location	Drainage area (mi ²)	Measured previously (water years)	Measurements	
					Date	Discharge (ft ³ /s)
Minnesota River Basin						
Minnesota River near Jordan (05330000)	Mississippi River	Lat 44°41'35", long 93°38'30", in NW1/4 SW1/4 sec. 7, T.114 N., R.23 W., Carver County, Hydrologic Unit 07020012, on right bank 100 ft downstream from bridge on Scott County Highway 9, 1.5 mile north west of Jordan, and at mile 39.4 upstream from Mississippi River.	a 16,200	1934- current year #	09-08-03	547
Minnesota River below Carver Rap- ids near Carver (05330050)	Mississippi River	Lat 44°44'19", long 93°37'51", in NW1/4 NW1/4 SE1/4 sec.30, T.115 N., R.23 W., Carver County, Hydrologic Unit 07020012, 0.9 mile below Carver Rapids, 1.7 miles south west of Carver.	--	--	09-08-03	569
Sand Creek at U.S. Hwy. 169 in Jordan (05330610)	Minnesota River	Lat 44°40'20", long 93°38'06", in SE1/4 NE1/4 NW1/4 sec. 19, T.114 N., R.23 W., Scott County, Hydro- logic 07020012, at U.S. Highway 169, above sewage treatment plant in Jordan (2003, measured 300 ft below U.S. Hwy 169).	--	1936, 1960, 1966, 1968, 1985, 1987, 1988	09-08-03	e0.6
Sand Creek below WWTP near Jordan (05330614)	Minnesota River	Lat 44°41'22", long 93°36'42", in SW1/4 SW1/4 SE1/4 sec. 8, T.114 N., R.23 W., Scott County, Hydrologic Unit 07020012, below Waste Water Treatment Plant, at Lynville Drive in Jordan.	--	--	09-08-03	e <0.1
Sand Creek Trib. at U.S. Hwy. 169 near Jordan (05330617)	Sand Creek	Lat 44°43'47", long 93°35'15", in SW1/4 NE1/4 NE1/4 sec. 33, T.115 N., R.23 W., Scott County, Hydro- logic Unit 07020012, at culvert on U.S. Highway 169, 0.2 mile south County Road 14, north of Jordan.	--	--	09-08-03	e0.02
Carver Creek near Carver (05330650)	Minnesota River	Lat 44°45'01", long 93°39'00", in SW1/4 SE1/4 sec. 24, T.115 N., R.24 W., Carver County, Hydrologic Unit 07020012, at bridge on County Road 40, 1.5 miles above mouth and 1.5 miles southwest of Carver, at MWCC gage, (2003 measured 0.35 miles below bridge).	--	1968-72, 1988	09-08-03	2.75
Minnesota River Trib. at mouth in Carver (05330670)	Minnesota River	Lat 44°45'44", long 93°37'29", in NE1/4 NE1/4 NE1/4 sec. 19, T.115 N., R.23 W., Carver County, Hydro- logic unit 07020012, below culvert on County Road 40, 0.1 mile above mouth, in Carver (2003 measured 100 ft below culvert on Co. Rd. 40).	--	1968	09-08-03	0.41
Minnesota River above Chaska Creek near Chaska (05330680)	Mississippi River	Lat 44°46'40", long 93°35'42", in SW1/4 SE1/4 SW1/4 sec. 9, T.115 N., R.23 W., Scott County, Hydrologic Unit 07020012, 0.4 mile above State Highway 41, 2 miles below mouth of Carver Creek, 0.4 mile south east of Chaska (2003 measured 0.1 mile above site).	--	1998	09-08-03	593

DISCHARGE AT LOW-FLOW SITES--Continued

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Stream name and [Station no.]	Tributary to	Location	Drainage area (mi ²)	Measured previously (water years)	Measurements	
					Date	Discharge (ft ³ /s)
Chaska Creek at mouth in Chaska (05330701)	Minnesota River	Lat 44°46'54", long 93°36'05", in NW1/4 SW1/4 sec. 9, T.115 N., R.23 W., Carver County, Hydrologic Unit 07020012, at mouth below U.S. High- way 212, 0.1 mile above mouth, in Chaska (2003 measured 300 feet above downstream end of causeway, 0.45 mile above mouth).	--	1968, 1979	09-08-03	0.5
East Chaska Creek at U.S. Hwy. 212 in Chaska (05330706)	Minnesota River	Lat 44°47'28", long 93°35'52", in SE1/4 SW1/4 SW1/4 sec. 4, T.115 N., R.23 W., Carver County, Hydrologic Unit 07020012, at bridge on U.S. Highway 212 in Chaska, 1 mile upstream from mouth (2003 measured 500 ft above U.S. Highway 212).	--	1979-80	09-08-03	0.0
East Chaska Creek bypass at U.S. Hwy. 212 in Chaska (05330708)	Minnesota River	Lat 44°48'05', long 93°34'52", in SW1/4 NW1/4 NW1/4 sec. 3, T.115 N., R.23 W., Carver County, Hydrologic Unit 07020012, at U.S. Hwy 212 near Old Audubon Road, in northeast side of Chaska.	--	--	09-08-03	e 0.2
Minnesota River below Nyssens Lake outlet in Shakopee (05330710)	Minnesota River	Lat 44°47'44", long 93°32'51", in SE1/4 NW1/4 SE1/4 sec. 2, T.115 N., R.23 W., Scott County, Hydrologic Unit 07020012, 1.05 miles above State Highway 101, at Nyssens Lake outlet, in north west corner of Shakopee.	--	--	9-08-03	651
Minnesota River Trib. at St. Hwy. 101 and Co. Rd. 17 in Shakopee (05330730)	Minnesota River	Lat 44°48'06", long 93°30'16", in NW1/4 SE1/4 NE1/4 sec.6 T.115 N., R.22 W., Scott County, Hydrologic Unit 07020012, upstream of Mill Pond, below culvert on State High- way 101, east of County Highway 17 in Shakopee.		1968	09-08-03	1.25
Bluff Creek at U.S. Hwy. 101 near Chaska (05330740)	Minnesota River	Lat 44°48'44", long 93°32'25", in SE1/4 SE1/4 NE1/4 sec. 35, T.116 N., R.23 W., Carver County, Hydro- logic Unit 07020012, at State High- way 101, 2 miles east of Chaska (2003 measured 500 ft above U.S. Highway 101 bridge).	--	1968	09-08-03	0.64
Riley Creek at U.S. Hwy. 212 in Eden Prairie (05330746)	Minnesota River	Lat 44°49'03", long 93°28'45", in NW1/4 NW1/4 NW1/4 sec. 33, T.116 N., R.22 W., Carver County, Hydro- logic Unit 07020012, at U.S. High- way 212, at site of MWCC gage, in Eden Prairie.	--	--	09-08-03	0.84
Minnesota River above Blue Lake WWT Plant near Shakopee (05330755)	Mississippi River	Lat 44°48'13", long 93°26'53", in NW1/4 NW1/4 NE1/4 sec. 3, T.115 N., R.22 W., Scott County, Hydrologic Unit 07020012, 0.25 miles above Blue Lake outlet, and Blue Lake Waste Water Treatment plant, 3.1 miles above U.S. Highway 169, down- stream of Valley Fair, 2.4 miles northeast of Shakopee.	--	1998	09-08-03	621
Purgatory Creek at River View Road in Eden Prairie (05330809)	Minnesota River	Lat 44°48'32", long 93°24'11", in NE1/4 SE1/4 sec. 36, T.116 N., R.22 W., Hennepin County, Hydrologic Unit 07020012, at culvert under Riverview Road, 1.3 miles west of the intersection of Bush Lake Road and Old Shakopee Road in Bloomington, 4 miles east of Eden Prairie.	--	1979	09-08-03	1.87

DISCHARGE AT LOW-FLOW SITES--Continued

Stream name and [Station no.]	Tributary to	Location	Drainage area (mi ²)	Measured previously (water years)	Measurements	
					Date	Discharge (ft ³ /s)
Eagle Creek at St. Hwy 101 near Savage (05330858)	Minnesota River	Lat 44°46'46", long 93°23'03", in SE1/4 NW1/4 SE1/4 sec. 7, T.115 N., R.21 W., Scott County, Hydrologic Unit 07020012, upstream of State Highway 101, 0.4 mile above mouth, 1.75 miles northwest of Savage.	--	1968	09-08-03	7.92
Credit River at 123rd St. in Savage (05330875)	Minnesota River	Lat 44°46'42", long 93°20'35", in SW1/4 SE1/4 SW1/4 sec. 31, T.115 N., R.24 N., Scott County, Hydro- logic Unit 07020012, at bridge on 123rd St., 0.67 miles from mouth in Savage.	--	1968-69, 1979, 1988, 2000	09-08-03	1.78
Willow Creek above mouth in Burnesville (05330894)	Minnesota River	Lat 44°47'20", long 93°18'51", in NE1/4 NE1/4 NE1/4 sec.32, T.27 N., R.21 W., Dakota County, Hydrologic Unit 07020012, 0.2 mile north of Waste Management Inc. Weight sta- tion, 1.2 mile west of I-35 W bridge, in Burnsville.	--	--	09-08-03	0.00
Nine Mile Creek near James Circle at Bloomington (05330902)	Minnesota River	Lat 44°48'26", long 93°18'05", in SE1/4 SW1/4 sec. 21, T.27 N., R.21 W., Hennepin County, Hydrologic Unit 07020012, 1/4 mile downstream of 106th street near Metro Council Gage in Bloomington.	--	1995-99	09-08-03	1.03

also published as a continuous record station,
e estimated.
< greater than.

Discharge at Miscellaneous Sites

DISCHARGE AT MISCELLANEOUS SITES

Discharge measurements made at miscellaneous sites during the 2003 water year are listed in the following table. Those measurements of base flow are designated by an asterisk (*) and measurements from earlier water years but not previously published by an (a). Stations previously published as Continuous Record Sites are designated by an (#), those sites published as an High-Flow Partial-Record are designated by an (+).

Stream name and [Station no.]	Tributary to	Location	Drainage area (mi ²)	Measured previously (water years)	Measurements	
					Date	Discharge (ft ³ /s)
Lake Superior Basin						
Brule River near Hovland (04011000)	Lake Superior	Lat 47°49'06", long 90°03'04", in SE1/4 SW1/4 sec. 27, T.62 N., R.03 W., Cook County, Hydrologic Unit 04010101, at bridge on U.S. Highway 61, 0.3 mile upstream from mouth, 4.5 miles southwest of Hovland.		1912, 1970- 71, 74-76, 1980, 1983, 1986-87, 2002	04-15-03 04-23-03 05-20-03	390 853 426
Popular River at Superior National Golf Course near Lutsen (04012500)	Lake Superior	Lat 47°38'29", long 90°42'36" in SW1/4 NE1/4 sec. 33, T.60 N., R.03 W., Cook County, Hydrologic Unit 04010101, at golf course 500 ft upstream from U.S. Highway 61, 2 miles southwest of Lutsen.	112	#1912-17, #1928-47, #1952-61, +1972-80, 2001-02	04-15-03 05-20-03	145 239
Sucker Creek at Co. Rd. 290 near Palmers (04015339)	Lake Superior	Lat 46°55'57", long 91°51'29", in NW1/4 SE1/4 sec. 4, T.05 N., R.12 W., St. Louis County, Hydrologic Unit 04010102, at culvert on County Road 290, 1 mile northwest of Palmers, 0.4 mile above U.S. Highway 61 and 0.7 mile above site 04015340.	--	2001-02	04-14-03 05-20-03	85.6 219
Talmadge River at Co. Rd. 281 near Duluth (04015368)	Lake Superior	Lat 46°53'49", long 91°56'30", in SE1/4 SE1/4 sec. 14, T.51 N., R.13 W., St. Louis County, Hydro- logic Unit 04010102, at bridge on County Road 281, 1.1 miles above site 04015370, 1.3 miles north- west of Clifton.	--	2001-02	04-14-03 05-20-03	11.5 63.1
Amity Creek at Duluth (04045900)	Lake Superior	Lat 46°50'39", long 92°00'36", in SE1/4 NE1/4 sec. 5, T.50 N., R.13 W., St. Louis County, Hydrologic Unit 04010102, at bridge on Park- way Road, 0.4 mile upstream from Lester River, 6 miles northeast of aerial lift bridge in Duluth.	16.2	1970-71, 1974, 1976, 1980, 1983, 1986, 2002	04-14-03 05-20-03	29.4 161
Sauk River Basin						
Sauk River above Mill Creek at Rockville (05270446)	Mississippi River	Lat 45°28'28", long 94°20'24", in SW1/4 SW1/4 sec. 9, T.123 N., R.29 W., Stearns County, Hydro- logic Unit 07010202, at bridge on County Road 139 (Sauk River Road), in Rockville.	--	1998	06-16-03	457
Sauk River at mouth in St. Cloud (05270530)	Mississippi River	Lat 45°35'29", long 94°10'38", in SE1/4 NW1/4 SW1/4 sec. 35, T.125 N., R.28 W., Stearns County, Hydrologic Unit 07010202, at bridge on County Road 1, 400 feet above mouth, in St. Cloud.	--	--	06-16-03	478
Mississippi River Basin						
Mississippi River at Frank- lin Ave in Minneapolis (05288930)	Gulf of Mexico	Lat 44°57'49", long 93°13'22", in SW1/4 SW1/4 sec. 30, T.29 N., R.23 W., Hennepin County, Hydrologic Unit 07010206, at Franklin Ave. Bridge, at River mile 853.2 above mouth of Ohio River, in Minneapo- lis.		1976-82, 84-86, 90-93, 95-97, 99-00	10-18-02	15,850

DISCHARGE AT MISCELLANEOUS SITES--Continued

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Stream name and [Station no.]	Tributary to	Location	Drainage area (mi ²)	Measured previously (water years)	Measurements	
					Date	Discharge (ft ³ /s)
Mississippi River at Ford Plant in St. Paul (05288950)	Gulf of Mexico	Lat 44°54'57", long 93°21'59", in NE1/4 NW1/4 sec. 17, T.28 N., R.23 W., Ramsey County, Hydrologic unit 07010206, at Ford plant, 800 ft downstream from Ford Parkway bridge in St. Paul, 3.5 miles upstream from Minnesota River, and at River mile 847.6 upstream from Ohio River.	a 19,700	1924,1935, 1938-39, 1941, 1943, 1945-50, 1954, 1957, 1959, 1961-62, 1964-70, 1972-85, 1987-88	10-18-02 04-11-03	15,800 6,450
		Minnesota River Basin				
Chippewa River Diversion at Watson Sag Weir (05304980)	Minnesota River	Lat 45°01'30", long 95°47'49", in SE1/4 SE1/4 sec. 16, T.118 N., R.41 W., Chippewa County, Hydrologic Unit 07020005, at bridge on County Road 13, 1 mile north of Watson.		1945-80, 1983-84, 1987-88, 1990-91, 2001-02	05-21-03	499
North Branch Rush River at Sibley County Rd. 9 near New Rome (05326090)	Rush Creek	Lat 44°30'48", long 94°05'26", in NE1/4 SE1/4 sec. 17, T.112 N., R.27 W., Sibley County, Hydrologic Unit 07020012, at bridge on County Road 9, 6 miles south of Arlington, 2 miles south of New Rome.	--	2002	05-20-03	228
Middle Branch Rush River at Co. Rd. 13 near New Sweden (05326105)	Rush River	Lat 44°28'32", long 94 09'00", in NW1/4 SW1/4 sec. 25, T.112 N., R.28 W., Sibley County, Hydrologic Unit 07020012, at bridge on County Road 13, 5 miles northeast of New Swe- den.	--	2002	05-19-03	105
South Branch Rush River at Co. Rd. 13, near Norseland (05326189)	Rush River	Lat 44°27'55", long 94°09'00", in SE1/4 SE1/4 NE1/4 sec. 35, T.112 N., R.28 W., Sibley County, Hydro- logic Unit, 07020012, at bridge on County Road 13, 3.3 miles north west of Norseland.	--	--	05-20-03	206
Judical Ditch 1A near Norseland (05326205)	South Branch Rush River	Lat 44°26'36", long 94°07'12, in SE1/4 SW1/4 sec. 6, T.111 N., R.27 W., Nicollet County, Hydrologic Unit 07020012, at bridge on County Road 3, 2.2 miles north of Norse- land.	--	2002	05-20-03	213
Rush River near Henderson (05326400)	Minnesota River	Lat 44°29'57", long 93°54'18", in NW1/4 NW1/4 sec. 24, T.112 N., R.26 W., Sibley County, Hydrologic Unit 07020012, at bridge on State High- way 93, 0.4 mile upstream from mouth, and 2.0 miles south of Hend- erson.	397	1970-71, 1976, 1979-80, 1984-85, 1987-92, 2000-02	05-19-03	652

Water Quality at Miscellaneous Sites

VOYAGEURS NATIONAL PARK WATER QUALITY

Trophic Indicator Sites

MISCELLANEOUS STATION ANALYSES

Date	Time	Sample type	Trans- parency Secchi disc, meters (00078)	Dis- solved oxygen, mg/L (00300)	Dis- solved oxygen, percent of sat- uration (00301)	pH, water, unfltrd field, std units (00400)	Specif. conduc- tance, wat unf uS/cm 25 deg C (00095)	Temper- ature, deg C (00010)	Alka- linity, wat flt end lab, mg/L as CaCO3 (00421)	Alka- linity, wat flt inc tit field, mg/L as CaCO3 (39086)	Bicar- bonate, wat flt fixed end pt, mg/L (29805)
483511093092801 RAINY LAKE AT BLACK BAY NARROWS NR INT FALLS MN (LAT 48°35'38"N LONG 093°09'13"W)											
OCT 2002											
02...	1115	Environmental	0.75	6.1	58	7.3	66	11.4	--	--	--
15...	1530	Environmental	0.80	12.0	96	7.6	58	5.5	--	--	--
MAY 2003											
13...	1125	Environmental	0.70	10.7	103	7.8	86	13.8	--	26	--
28...	1105	Environmental	0.90	10.3	100	7.3	55	14.5	--	22	--
JUN											
09...	1230	Environmental	0.90	7.3	77	--	79	18.0	42	--	51
23...	1330	Environmental	0.90	9.2	101	7.6	61	19.5	25	--	30
JUL											
07...	1300	Environmental	0.50	8.4	94	7.9	103	21.3	42	--	51
21...	1320	Environmental	0.90	7.7	90	7.8	79	22.7	29	--	35
AUG											
04...	1010	Environmental	0.90	7.7	88	8.3	78	22.6	26	--	31
18...	1400	Environmental	0.70	8.5	101	8.5	73	24.3	25	--	30
SEP											
02...	0945	Environmental	0.30	7.3	76	7.1	97	18.0	36	--	44
15...	0940	Environmental	0.80	7.4	77	7.1	61	17.5	--	20	--
28...	1100	Environmental	0.25	9.9	86	7.4	70	8.8	--	24	--
483012093035001 KABETOGAMA LAKE AT CEMETARY ISLAND NEAR RAY, MN (LAT 48°30'12"N LONG 093°03'50"W)											
OCT 2002											
16...	1000	Environmental	4.00	10.0	84	7.6	64	8.0	--	--	--
MAY 2003											
14...	0945	Environmental	1.70	10.6	100	8.0	106	12.7	--	34	--
29...	0945	Environmental	1.70	10.2	103	7.4	92	15.6	--	42	--
JUN											
10...	0930	Environmental	2.60	8.9	94	7.4	93	17.6	38	--	47
24...	1100	Environmental	3.80	8.6	97	7.9	95	21.1	39	--	48
JUL											
08...	1515	Environmental	3.00	8.3	90	7.8	100	19.8	41	--	51
22...	1110	Environmental	2.30	8.7	99	8.1	101	21.4	39	--	48
AUG											
05...	0925	Environmental	2.80	8.7	102	8.8	101	22.9	41	--	50
19...	1035	Environmental	1.50	8.2	99	9.1	103	25.0	43	--	52
SEP											
03...	0920	Environmental	1.50	8.3	90	8.0	101	19.6	42	--	51
17...	0940	Environmental	2.40	5.9	64	6.8	102	19.0	--	41	--
29...	0930	Environmental	3.10	8.0	75	7.1	99	12.6	--	38	--
483341093111501 RAINY LK AT BLACK BAY (WEST) NR INTERNATIONAL FLLS (LAT 48°32'30"N LONG 093°11'15"W)											
OCT 2002											
02...	1140	Environmental	0.75	4.8	44	7.3	72	10.9	--	--	--
15...	1430	Environmental	0.75	11.6	91	7.0	61	5.5	--	--	--
MAY 2003											
13...	1025	Environmental	0.60	10.3	97	7.7	98	13.0	--	33	--
28...	0945	Environmental	--	8.4	88	7.2	85	18.1	--	38	--
JUN											
09...	0905	Environmental	0.40	7.5	81	--	91	19.6	42	--	51
23...	1045	Environmental	0.45	7.3	85	7.3	98	22.6	39	--	48
JUL											
07...	1130	Environmental	0.10	7.9	86	7.5	157	20.6	60	--	74
21...	1025	Environmental	0.30	6.9	78	7.2	114	22.0	42	--	52
AUG											
04...	0945	Environmental	0.30	9.2	109	8.8	108	23.8	44	--	54
18...	1420	Environmental	0.20	9.3	118	9.1	115	27.3	46	--	56
SEP											
02...	0925	Environmental	0.20	6.6	71	6.4	109	18.9	44	--	53

VOYAGEURS NATIONAL PARK WATER QUALITY—Continued

MISCELLANEOUS STATION ANALYSES

Date	Bicar- bonate, wat flt incrm. titr., field, mg/L (00453)	Carbon- ate, wat flt fixed end pt, lab, mg/L (29808)	Carbon- ate, wat flt incrm. titr., field, mg/L (00452)	Ammonia + org-N, water, fltrd, mg/L as N (00623)	Ammonia + org-N, water, unfltrd mg/L as N (00625)	Ammonia water, fltrd, mg/L as N (00608)	Nitrite + nitrate water fltrd, mg/L as N (00631)	Nitrite water, fltrd, mg/L as N (00613)	Ortho- phos- phate, water, fltrd, mg/L as P (00671)	Phos- phorus, water, fltrd, mg/L (00666)	Phos- phorus, water, unfltrd mg/L (00665)	Chloro- phyll a phyto- plank- ton, fluoro, ug/L (70953)	Chloro- phyll b phyto- plank- ton, fluoro, ug/L (70954)
483511093092801 RAINY LAKE AT BLACK BAY NARROWS NR INT FALLS MN (LAT 48°35'38"N LONG 093°09'13"W)													
OCT 2002													
02...	--	--	--	--	--	--	--	--	--	--	0.048	12.9	<0.1
15...	--	--	--	--	--	--	--	--	--	--	0.042	2.4	<0.1
MAY 2003													
13...	32	--	0.0	--	--	--	--	--	--	--	0.047	3.3	<0.1
28...	27	--	0.0	0.35	0.49	<0.015	0.025	E.002	<0.007	0.006	0.026	--	--
JUN													
09...	--	0.0	--	--	--	--	--	--	--	--	0.038	--	--
23...	--	0.0	--	--	--	--	--	--	--	--	0.038	3.6	0.2
JUL													
07...	--	0.0	--	--	--	--	--	--	--	--	0.071	--	--
21...	--	0.0	--	--	--	--	--	--	--	--	0.045	3.5	<0.1
AUG													
04...	--	0.0	--	--	--	--	--	--	--	--	0.046	--	--
18...	--	0.0	--	--	--	--	--	--	--	--	0.043	E8.9	<0.1
SEP													
02...	--	0.0	--	--	--	--	--	--	--	--	0.079	E2.2	<0.1
15...	24	--	0.0	--	--	--	--	--	--	--	0.042	E4.4	E.1
28...	29	--	0.0	--	--	--	--	--	--	--	--	--	--
483012093035001 KABETOGAMA LAKE AT CEMETARY ISLAND NEAR RAY, MN (LAT 48°30'12"N LONG 093°03'50"W)													
OCT 2002													
16...	--	--	--	--	--	--	--	--	--	--	0.032	1.5	<0.1
MAY 2003													
14...	42	--	0.0	--	--	--	--	--	--	--	0.024	1.7	<0.1
29...	51	--	0.0	0.39	0.54	<0.015	<0.022	<0.002	<0.007	0.004	--	--	--
JUN													
10...	--	0.0	--	--	--	--	--	--	--	--	0.014	--	--
24...	--	0.0	--	--	--	--	--	--	--	--	0.019	2.3	<0.1
JUL													
08...	--	0.0	--	--	--	--	--	--	--	--	0.024	--	--
22...	--	0.0	--	--	--	--	--	--	--	--	0.021	3.1	<0.1
AUG													
05...	--	0.0	--	--	--	--	--	--	--	--	0.018	--	--
19...	--	0.0	--	--	--	--	--	--	--	--	0.035	E13.0	<0.1
SEP													
03...	--	0.0	--	--	--	--	--	--	--	--	0.054	20.6	<0.1
17...	50	--	0.0	--	--	--	--	--	--	--	0.050	E7.6	<0.1
29...	47	--	0.0	--	--	--	--	--	--	--	--	--	--
483341093111501 RAINY LK AT BLACK BAY (WEST) NR INTERNATIONAL FLLS (LAT 48°32'30"N LONG 093°11'15"W)													
OCT 2002													
02...	--	--	--	--	--	--	--	--	--	--	0.045	3.4	<0.1
15...	--	--	--	--	--	--	--	--	--	--	0.062	3.0	<0.1
MAY 2003													
13...	40	--	0.0	--	--	--	--	--	--	--	0.052	3.2	<0.1
28...	46	--	0.0	0.47	0.65	0.019	E.013	E.002	<0.007	0.011	0.046	--	--
JUN													
09...	--	0.0	--	--	--	--	--	--	--	--	0.071	--	--
23...	--	0.0	--	--	--	--	--	--	--	--	0.060	2.6	0.2
JUL													
07...	--	0.0	--	--	--	--	--	--	--	--	0.23	--	--
21...	--	0.0	--	--	--	--	--	--	--	--	0.088	13.5	<0.1
AUG													
04...	--	0.0	--	--	--	--	--	--	--	--	0.072	--	--
18...	--	0.0	--	--	--	--	--	--	--	--	0.095	E12.8	<0.1
SEP													
02...	--	0.0	--	--	--	--	--	--	--	--	0.096	E3.8	<0.1

VOYAGEURS NATIONAL PARK WATER QUALITY—Continued

MISCELLANEOUS STATION ANALYSES

Date	Time	Sample type	Trans- parency Secchi disc, meters (00078)	Dis- solved oxygen, mg/L (00300)	Dis- solved oxygen, percent of sat- uration (00301)	pH, water, unfltrd field, std units (00400)	Specif. conduc- tance, wat unf uS/cm 25 deg C (00095)	Temper- ature, water, deg C (00010)	Alka- linity, wat flt fxd end lab, mg/L as CaCO3 (00421)	Alka- linity, wat flt inc tit field, mg/L as CaCO3 (39086)	Bicar- bonate, wat flt fixed end pt, lab, mg/L (29805)	Bicar- bonate, wat flt incrm. titr., field, mg/L (00453)
483341093111501 RAINY LK AT BLACK BAY (WEST) NR INTERNATIONAL FLLS (LAT 48°32'30"N LONG 093°11'15"W)												
SEP 2003												
15...	0925	Environmental	0.20	7.0	72	6.5	103	17.1	--	38	--	46
28...	1045	Environmental	0.10	9.6	81	6.7	94	8.0	--	35	--	43
482607092511701 KABETOGAMA LK AT MOUTH OF MEADWOOD BAY NR RAY MN (LAT 48°26'07"N LONG 092°51'17"W)												
OCT 2002												
16...	1125	Environmental	2.75	10.1	89	7.7	57	9.9	--	--	--	--
MAY 2003												
14...	1100	Environmental	2.00	12.2	107	7.4	105	9.9	--	35	--	43
29...	1120	Environmental	108	11.9	120	8.0	90	15.7	--	40	--	49
JUN												
10...	1050	Environmental	2.60	9.7	100	--	85	17.2	28	--	34	--
24...	1315	Environmental	3.70	8.1	88	7.7	86	19.1	28	--	34	--
JUL												
08...	1415	Environmental	3.20	8.4	84	7.7	86	20.6	32	--	40	--
22...	1236	Environmental	2.60	8.2	93	8.3	95	22.1	38	--	46	--
AUG												
05...	1020	Environmental	2.70	8.5	99	8.8	98	23.3	40	--	48	--
19...	1200	Environmental	1.80	8.8	107	9.2	99	25.3	39	--	48	--
SEP												
03...	1050	Environmental	1.40	7.2	80	7.7	97	20.6	40	--	48	--
17...	1125	Environmental	2.20	8.2	88	7.7	98	19.2	--	40	--	49
29...	1100	Environmental	2.10	8.9	86	7.6	97	14.0	--	39	--	48
482731092574701 KABETOGAMA LAKE NEAR GRAVE ISLAND NEAR RAY, MN (LAT 48°27'31"N LONG 092°57'47"W)												
OCT 2002												
16...	1035	Environmental	3.25	10.2	89	7.6	65	9.6	--	--	--	--
MAY 2003												
14...	1020	Environmental	1.70	11.6	107	7.8	108	11.8	--	35	--	43
29...	1040	Environmental	1.70	11.6	113	7.5	92	13.9	--	41	--	50
JUN												
10...	1010	Environmental	2.80	9.6	99	--	92	17.0	37	--	45	--
24...	1140	Environmental	--	9.0	102	8.2	93	21.5	54	--	65	--
JUL												
08...	1440	Environmental	2.70	8.0	87	7.6	97	19.5	40	--	49	--
22...	1142	Environmental	2.60	8.5	96	8.4	98	21.6	39	--	48	--
AUG												
05...	0955	Environmental	2.90	9.2	108	9.0	98	23.4	39	--	47	--
19...	1120	Environmental	1.80	8.8	108	9.2	101	25.6	40	--	48	--
SEP												
03...	1000	Environmental	1.80	7.1	78	7.7	100	20.0	40	--	49	--
17...	1040	Environmental	2.90	7.1	77	7.4	100	19.2	--	40	--	49
29...	1015	Environmental	3.00	8.8	84	7.5	99	13.5	--	39	--	48
483304093062701 RAINY LAKE AT BLACK BAY NR INT FALLS MN (LAT 48°33'04"N LONG 093°06'27"W)												
OCT 2002												
02...	1200	Environmental	0.75	3.9	36	7.3	72	11.9	--	--	--	--
15...	1500	Environmental	0.50	11.0	89	7.5	61	6.1	--	--	--	--
MAY 2003												
13...	1055	Environmental	0.60	10.1	97	7.7	100	13.9	--	35	--	43
28...	1025	Environmental	0.30	8.7	93	7.4	85	18.0	--	39	--	48
JUN												
09...	1200	Environmental	0.70	4.5	40	--	86	17.4	34	--	42	--

VOYAGEURS NATIONAL PARK WATER QUALITY—Continued

MISCELLANEOUS STATION ANALYSES

Date	Carbonate, wat flt fixed end pt, lab, mg/L (29808)	Carbonate, wat flt incrm. titr., field, mg/L (00452)	Ammonia + org-N, water, fltrd, mg/L as N (00623)	Ammonia + org-N, water, unfltrd, mg/L as N (00625)	Ammonia water, fltrd, mg/L as N (00608)	Nitrite + nitrate water fltrd, mg/L as N (00631)	Nitrite water, fltrd, mg/L as N (00613)	Ortho-phosphate, water, fltrd, mg/L as P (00671)	Phosphorus, water, fltrd, mg/L (00666)	Phosphorus, water, unfltrd, mg/L (00665)	Chlorophyll a phytoplankton, fluoro, ug/L (70953)	Chlorophyll b phytoplankton, fluoro, ug/L (70954)
483341093111501 RAINY LK AT BLACK BAY (WEST) NR INTERNATIONAL FLLS (LAT 48°32'30"N LONG 093°11'15"W)												
SEP 2003												
15...	--	0.0	--	--	--	--	--	--	--	0.099	E3.1	E.1
28...	--	0.0	--	--	--	--	--	--	--	--	--	--
482607092511701 KABETOGAMA LK AT MOUTH OF MEADWOOD BAY NR RAY MN (LAT 48 26 07"N LONG 092 51 17"W)												
OCT 2002												
16...	--	--	--	--	--	--	--	--	--	0.035	2.7	<0.1
MAY 2003												
14...	--	0.0	--	--	--	--	--	--	--	0.016	2.7	<0.1
29...	--	0.0	0.39	0.64	<0.015	<0.022	<0.002	<0.007	0.010	--	--	--
JUN												
10...	0.0	--	--	--	--	--	--	--	--	0.013	--	--
24...	0.0	--	--	--	--	--	--	--	--	0.018	1.3	<0.1
JUL												
08...	0.0	--	--	--	--	--	--	--	--	0.015	--	--
22...	0.0	--	--	--	--	--	--	--	--	0.018	4.1	<0.1
AUG												
05...	0.0	--	--	--	--	--	--	--	--	0.017	--	--
19...	0.0	--	--	--	--	--	--	--	--	0.027	E8.9	<0.1
SEP												
03...	0.0	--	--	--	--	--	--	--	--	0.053	E7.5	<0.1
17...	--	0.0	--	--	--	--	--	--	--	0.042	E7.8	<0.1
29...	--	0.0	--	--	--	--	--	--	--	--	--	--
482731092574701 KABETOGAMA LAKE NEAR GRAVE ISLAND NEAR RAY, MN (LAT 48°27'31"N LONG 092°57'47"W)												
OCT 2002												
16...	--	--	--	--	--	--	--	--	--	0.038	4.5	<0.1
MAY 2003												
14...	--	0.0	--	--	--	--	--	--	--	0.020	2.1	<0.1
29...	--	0.0	0.39	0.57	<0.015	<0.022	<0.002	<0.007	E.004	--	--	--
JUN												
10...	0.0	--	--	--	--	--	--	--	--	0.012	--	--
24...	0.0	--	--	--	--	--	--	--	--	0.014	2.1	0.1
JUL												
08...	0.0	--	--	--	--	--	--	--	--	0.021	--	--
22...	0.0	--	--	--	--	--	--	--	--	0.027	4.2	<0.1
AUG												
05...	0.0	--	--	--	--	--	--	--	--	0.021	--	--
19...	0.0	--	--	--	--	--	--	--	--	0.033	E6.5	<0.1
SEP												
03...	0.0	--	--	--	--	--	--	--	--	0.051	E3.4	<0.1
17...	--	0.0	--	--	--	--	--	--	--	0.042	E9.9	<0.1
29...	--	0.0	--	--	--	--	--	--	--	--	--	--
483304093062701 RAINY LAKE AT BLACK BAY NR INT FALLS MN (LAT 48°33'04"N LONG 093°06'27"W)												
OCT 2002												
02...	--	--	--	--	--	--	--	--	--	0.050	3.5	<0.1
15...	--	--	--	--	--	--	--	--	--	0.101	2.8	<0.1
MAY 2003												
13...	--	0.0	--	--	--	--	--	--	--	0.069	4.1	<0.1
28...	--	0.0	0.44	1.1	E.008	E.014	E.002	<0.007	0.010	0.076	--	--
JUN												
09...	0.0	--	--	--	--	--	--	--	--	0.049	--	--

VOYAGEURS NATIONAL PARK WATER QUALITY—Continued

MISCELLANEOUS STATION ANALYSES

Date	Time	Sample type	Trans- parency Secchi disc, meters (00078)	Dis- solved oxygen, mg/L (00300)	Dis- solved oxygen, percent of sat- uration (00301)	pH, water, unfltrd field, std units (00400)	Specif. conduc- tance, wat unf uS/cm 25 deg C (00095)	Temper- ature, water, deg C (00010)	Alka- linity, wat flt fxd end lab, mg/L as CaCO ₃ (00421)	Alka- linity, wat flt inc tit field, mg/L as CaCO ₃ (39086)	Bicar- bonate, wat flt fixed end pt, lab, mg/L (29805)	Bicar- bonate, wat flt incrm. titr., field, mg/L (00453)
483622092560701 RAINY LK AT BRULE NARROWS NR INTERNTNL FALLS, MN (LAT 48°36'22"N LONG 092°56'07"W)												
MAY 2003												
13...	1213	Environmental	2.20	12.1	104	6.6	52	10.5	12	--	15	--
28...	0800	Blank	--	--	--	--	--	--	--	--	--	--
28...	1240	Environmental	2.20	12.1	116	7.1	47	13.4	--	16	--	20
JUN												
09...	1310	Environmental	2.00	9.8	100	--	44	15.9	--	--	--	--
23...	1415	Environmental	2.80	9.3	100	7.5	46	19.0	14	--	18	--
JUL												
21...	1400	Environmental	2.20	8.3	93	7.7	48	21.0	15	--	18	--
AUG												
04...	1050	Environmental	2.50	7.8	89	7.3	47	22.1	14	--	17	--
18...	1200	Environmental	2.30	7.7	91	6.8	48	23.7	14	--	17	--
SEP												
02...	1022	Environmental	2.50	7.8	85	6.5	48	19.2	15	--	18	--
15...	1030	Environmental	3.00	7.2	77	7.1	48	18.3	--	14	--	17
28...	1140	Environmental	3.00	9.2	86	6.9	48	12.1	--	15	--	19
482616092372201 NAMAKAN LAKE NEAR RAY, MN (LAT 48°26'16"N LONG 092°37'22"W)												
MAY 2003												
14...	1205	Environmental	3.00	12.0	96	7.1	55	5.9	14	--	16	--
29...	1455	Environmental	--	12.4	117	7.0	46	16.0	--	16	--	20
JUN												
10...	1145	Environmental	--	10.4	107	7.4	46	16.7	12	--	15	--
24...	1555	Environmental	3.50	9.2	102	7.6	46	20.1	14	--	17	--
JUL												
22...	1340	Environmental	3.00	8.2	94	7.9	48	21.9	14	--	16	--
AUG												
05...	1100	Environmental	4.00	7.4	87	7.2	47	23.3	14	--	17	--
19...	1330	Environmental	3.00	7.7	93	7.3	48	25.3	13	--	16	--
SEP												
19...	1005	Environmental	4.10	8.0	85	6.7	48	18.2	15	--	18	--
29...	1230	Environmental	3.50	9.0	8,600	7.1	49	13.6	14	--	17	--
482226092283301 SANDPOINT LK BL HARRISON NARROWS NR CRANE LK, MN (LAT 48°22'26"N LONG 092°28'33"W)												
MAY 2003												
14...	1305	Environmental	2.20	11.7	98	7.2	76	7.6	18	--	22	--
29...	1340	Environmental	1.90	11.5	113	7.3	66	14.8	--	21	--	25
JUN												
10...	1320	Environmental	2.20	10.2	107	7.1	66	2.2	20	--	24	--
24...	1425	Environmental	2.90	8.8	98	7.6	67	20.6	20	--	24	--
JUL												
23...	1135	Environmental	2.95	8.0	92	7.5	71	22.0	19	--	24	--
AUG												
05...	1155	Environmental	3.30	7.7	90	7.5	72	23.6	20	--	24	--
19...	1430	Environmental	2.50	7.7	93	7.7	73	25.2	20	--	25	--
SEP												
19...	1145	Environmental	3.30	--	--	--	--	--	20	--	24	--
29...	1330	Environmental	3.10	9.4	90	7.1	72	13.3	20	--	24	--

WATER QUALITY DATA

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GLACIAL RIDGE WATER QUALITY

MISCELLANEOUS STATION ANALYSES

Date	Time	Sample type	Instantaneous discharge, cfs (00061)	Barometric pressure, mm Hg (00025)	Dissolved oxygen, mg/L (00300)	pH, water, unfltrd field, std units (00400)	pH, water, unfltrd lab, std units (00403)	Specific conductance, wat unfl lab, uS/cm 25 deg C (90095)	Specific conductance, wat unfl lab, uS/cm 25 deg C (00095)	Temperature, water, deg C (00010)	Calcium water, fltrd, mg/L (00915)	Magnesium, water, fltrd, mg/L (00925)
05078470 JUDICIAL DITCH 64 NEAR MENTOR, MN (SW4) (LAT 47°44'16"N LONG 096°12'08"W)												
OCT 2002												
16...	1745	Environmental	--	737	12.3	8.2	--	--	584	3.9	--	--
NOV												
26...	1220	Environmental	0.55	747	11.0	8.0	7.7	700	730	0.0	102	38.1
JAN 2003												
08...	1330	Environmental	0.10	724	11.8	7.9	--	--	592	0.0	--	--
APR												
01...	1540	Environmental	0.90	730	11.2	7.9	8.0	418	424	5.0	48.4	20.5
MAY												
01...	0830	Environmental	2.6	736	8.3	7.8	8.0	609	638	8.2	83.2	37.0
JUN												
04...	1030	Environmental	1.5	734	9.4	8.0	8.1	644	668	16.7	82.3	38.4
11...	1350	Environmental	17	731	6.7	7.8	7.9	506	525	18.8	59.2	29.2
JUL												
02...	1250	Environmental	6.2	727	5.3	7.6	7.9	558	599	24.8	71.3	33.9
AUG												
05...	1230	Environmental	0.06	734	8.3	8.0	8.0	508	532	21.6	63.2	31.5
SEP												
03...	0930	Environmental	0.01	737	7.8	7.6	8.0	528	567	15.4	60.0	30.5
30...	0820	Environmental	0.02	741	10.0	7.6	8.1	522	560	5.2	70.2	32.6
05078520 CYR CREEK NEAR MARCOUX CORNERS, MN (SW5) (LAT 47°48'12"N LONG 096°16'35"W)												
OCT 2002												
16...	1705	Environmental	--	737	10.5	8.2	--	--	704	4.3	--	--
NOV												
26...	1030	Environmental	0.17	750	11.7	8.0	7.8	752	797	0.3	100	43.7
JAN 2003												
08...	1120	Environmental	0.06	726	5.5	7.9	--	--	948	0.4	--	--
APR												
01...	1320	Environmental	1.1	732	11.1	7.8	7.9	654	668	5.8	72.3	35.8
30...	1040	Environmental	1.0	736	10.1	8.0	8.1	670	706	10.7	78.1	42.9
JUN												
04...	0830	Environmental	0.44	736	7.0	7.8	8.0	664	691	17.1	73.3	41.4
11...	1105	Environmental	17	734	7.8	7.8	7.8	534	550	17.3	54.6	31.5
JUL												
02...	1100	Environmental	0.99	728	5.2	7.7	7.9	656	698	23.5	75.5	38.7
05078730 COUNTY DITCH 140 NEAR BENOIT, MN (SW1) LAT 47°41'15"N LONG 096°22'23"W)												
OCT 2002												
16...	1545	Environmental	--	736	11.5	8.2	--	--	1,130	7.4	--	--
NOV												
25...	1550	Environmental	0.09	742	18.0	8.2	7.9	750	784	0.0	90.6	45.6
25...	1551	Replicate	0.08	742	18.0	8.2	7.9	746	784	0.0	91.3	46.1
APR 2003												
01...	0820	Environmental	1.4	732	10.3	7.7	7.8	430	420	0.1	44.7	22.6
29...	1550	Environmental	0.23	740	17.3	8.4	8.4	817	836	15.9	86.2	52.3
JUN												
03...	1120	Environmental	0.09	737	8.7	7.9	7.8	910	935	17.4	74.1	60.8
10...	1650	Environmental	8.8	733	7.7	7.8	7.9	731	762	21.4	66.3	46.9
JUL												
01...	1400	Environmental	21	734	10.7	8.3	8.3	605	641	24.8	70.8	37.4
AUG												
05...	0800	Environmental	0.01	736	1.4	7.5	7.7	1,210	1,190	20.1	82.0	82.6

WATER QUALITY DATA

GLACIAL RIDGE WATER QUALITY—Continued

MISCELLANEOUS STATION ANALYSES

Date	Potas- sium, water, fltrd, mg/L (00935)	Sodium, water, fltrd, mg/L (00930)	Alka- linity, wat flt inc tit field, mg/L as CaCO ₃ (39086)	Bicar- bonate, wat flt incrm. titr., field, mg/L (00453)	Carbon- ate, wat flt incrm. titr., field, mg/L (00452)	Chlor- ide, water, fltrd, mg/L (00940)	Fluor- ide, water, fltrd, mg/L (00950)	Sulfate water, fltrd, mg/L (00945)	Ammonia + org-N, water, fltrd, mg/L as N (00623)	Ammonia + org-N, water, unfltrd mg/L as N (00625)	Ammonia water, fltrd, mg/L as N (00608)	Nitrite + nitrate water fltrd, mg/L as N (00631)	Nitrite water, fltrd, mg/L as N (00613)
05078470 JUDICIAL DITCH 64 NEAR MENTOR, MN (SW4) (LAT 47°44'16"N LONG 096°12'08"W)													
OCT 2002													
16...	--	--	--	--	--	--	--	--	0.80	0.83	<0.04	0.10	E.007
NOV													
26...	3.30	7.57	--	--	--	7.05	--	26.8	0.53	0.56	0.06	0.40	0.016
JAN 2003													
08...	--	--	304	371	--	--	--	--	0.62	0.57	0.26	0.27	<0.008
APR													
01...	10.8	5.51	173	211	--	9.51	0.14	27.7	0.79	0.94	<0.04	E.05	E.005
MAY													
01...	5.15	9.05	302	368	--	8.07	--	28.4	0.81	0.83	<0.04	<0.12	<0.008
JUN													
04...	2.98	7.79	322	393	--	4.91	--	18.6	1.2	1.3	<0.04	<0.06	E.004
11...	2.80	8.01	251	306	--	6.04	--	20.2	1.3	1.3	<0.04	<0.06	<0.008
JUL													
02...	3.18	6.30	304	371	--	5.12	--	12.0	1.5	1.4	<0.04	<0.06	<0.008
AUG													
05...	2.31	6.59	253	309	--	6.37	--	13.4	0.88	0.94	<0.04	E.04	<0.008
SEP													
03...	3.11	5.78	253	309	--	9.48	--	32.0	0.66	0.81	<0.04	<0.06	<0.008
30...	3.40	6.38	238	290	--	10.0	--	46.2	0.46	0.55	<0.04	<0.06	<0.008
05078520 CYR CREEK NEAR MARCOUX CORNERS, MN (SW5) (LAT 47°48'12"N LONG 096°16'35"W)													
OCT 2002													
16...	--	--	--	--	--	--	--	--	0.58	0.65	--	<0.06	--
NOV													
26...	3.67	14.6	--	--	--	16.0	--	47.0	0.52	0.53	E.04	0.73	0.027
JAN 2003													
08...	--	--	480	586	--	--	--	--	0.77	0.97	0.18	<0.06	<0.008
APR													
01...	8.45	15.5	218	266	--	22.5	0.16	109	0.92	1.1	E.03	0.19	0.008
30...	4.86	14.5	299	365	--	18.8	--	54.1	0.77	0.85	<0.04	<0.12	<0.008
JUN													
04...	3.80	14.2	309	377	--	14.4	--	32.9	1.0	1.1	<0.04	<0.06	<0.008
11...	2.80	14.1	215	262	--	10.4	--	64.4	1.1	1.2	<0.04	0.61	0.038
JUL													
02...	2.59	15.4	302	368	--	11.8	--	57.8	1.2	1.2	E.03	<0.06	E.004
05078730 COUNTY DITCH 140 NEAR BENOIT, MN (SW1) (LAT 47°41'15"N LONG 096°22'23"W)													
OCT 2002													
16...	--	--	--	--	--	--	--	--	2.2	2.4	1.24	0.21	0.037
NOV													
25...	5.25	16.5	--	--	--	8.61	--	123	1.0	1.1	0.08	0.23	0.008
25...	5.03	16.7	--	--	--	8.17	--	125	1.0	1.1	0.08	0.23	0.008
APR 2003													
01...	6.04	8.29	133	162	--	7.74	0.12	78.4	0.91	1.6	0.24	0.14	0.009
29...	5.42	25.8	250	305	11	9.13	--	205	0.87	1.0	<0.04	<0.06	<0.008
JUN													
03...	2.92	37.7	228	278	--	6.94	--	261	1.1	1.2	<0.04	<0.06	<0.008
10...	2.39	27.6	221	270	--	6.04	--	169	1.0	1.1	<0.04	0.07	E.007
JUL													
01...	5.38	11.1	260	317	7	10.8	--	70.2	1.0	1.3	<0.04	<0.06	E.006
AUG													
05...	14.1	57.8	381	465	--	17.7	--	281	3.4	3.4	0.78	<0.06	E.004

GLACIAL RIDGE WATER QUALITY—Continued

MISCELLANEOUS STATION ANALYSES

Date	Ortho-phosphate, water, fltrd, mg/L as P (00671)	Phosphorus, water, fltrd, mg/L (00666)	Phosphorus, water, unfltrd, mg/L (00665)
05078470 JUDICIAL DITCH 64 NEAR MENTOR, MN (SW4) (LAT 47°44'16"N LONG 096°12'08"W)			
OCT 2002			
16...	<0.02	0.011	0.013
NOV			
26...	<0.02	E.004	0.007
JAN 2003			
08...	<0.02	E.004	0.005
APR			
01...	<0.02	0.016	0.030
MAY			
01...	<0.02	0.010	0.010
JUN			
04...	<0.02	0.014	0.019
11...	<0.02	0.018	0.028
JUL			
02...	<0.02	0.025	0.033
AUG			
05...	<0.09	0.012	0.029
SEP			
03...	<0.02	0.013	0.023
30...	<0.02	0.006	0.018
05078520 CYR CREEK NEAR MARCOUX CORNERS, MN (SW5) (LAT 47°48'12"N LONG 096°16'35"W)			
OCT 2002			
16...	E.01	0.019	0.028
NOV			
26...	<0.02	0.009	0.023
JAN 2003			
08...	E.01	0.019	0.075
APR			
01...	<0.02	0.029	0.051
30...	E.01	0.014	0.022
JUN			
04...	E.01	0.032	0.042
11...	E.01	0.031	0.050
JUL			
02...	0.04	0.067	0.078
05078730 COUNTY DITCH 140 NEAR BENOIT, MN (SW1) (LAT 47°41'15"N LONG 096°22'23"W)			
OCT 2002			
16...	0.02	0.037	0.072
NOV			
25...	<0.02	0.018	0.047
25...	<0.02	0.019	0.050
APR 2003			
01...	E.02	0.037	0.148
29...	<0.02	0.023	0.052
JUN			
03...	0.02	0.050	0.066
10...	<0.02	0.012	0.030
JUL			
01...	<0.02	0.011	0.042
AUG			
05...	0.15	0.26	0.38

WATER QUALITY DATA
GLACIAL RIDGE WATER QUALITY—Continued

MISCELLANEOUS STATION ANALYSES

Date	Time	Sample type	Instantaneous discharge, cfs (00061)	Barometric pressure, mm Hg (00025)	Dissolved oxygen, mg/L (00300)	pH, water, unfltrd field, std units (00400)	pH, water, unfltrd lab, std units (00403)	Specif. conductance, wat unfl lab, uS/cm 25 deg C (90095)	Specif. conductance, wat unfl lab, uS/cm 25 deg C (00095)	Temperature, water, deg C (00010)	Calcium water, fltrd, mg/L (00915)	Magnesium, water, fltrd, mg/L (00925)
05078770 JUDICIAL DITCH 66 NEAR MARCOUX CORNERS, MN (SW6) (LAT 47°46'54"N LONG 096°19'52"W)												
OCT 2002												
16...	1630	Environmental	--	737	12.1	8.5	--	--	524	6.3	--	--
16...	1631	Blank	--	--	--	--	--	--	--	--	--	--
NOV												
26...	0845	Environmental	1.1	751	12.4	8.0	7.8	544	574	0.0	69.8	30.6
JAN 2003												
08...	0900	Environmental	1.3	724	13.0	8.2	--	--	526	0.0	--	--
FEB												
20...	0840	Environmental	0.34	735	11.3	7.7	7.7	554	547	0.0	71.0	29.6
20...	0841	Blank	--	--	--	--	7.2	E4	--	--	E.01	<0.008
APR												
01...	1100	Environmental	4.2	732	11.3	7.9	7.9	552	587	3.4	61.5	28.3
30...	0830	Environmental	1.9	737	11.5	8.0	8.1	556	579	7.3	67.8	32.0
JUN												
03...	1350	Environmental	1.2	737	10.6	8.3	8.2	547	561	21.4	64.1	31.2
11...	0830	Environmental	17	734	7.7	7.7	7.9	632	652	16.6	66.1	34.7
JUL												
02...	0800	Environmental	3.5	729	7.2	7.8	8.1	549	579	21.2	64.2	30.9
AUG												
05...	1020	Environmental	0.50	736	7.6	8.0	8.1	572	593	21.0	74.1	27.9
SEP												
03...	1120	Environmental	0.04	740	10.0	8.0	8.2	502	533	16.8	60.2	28.0
03...	1125	Blank	--	--	--	--	--	--	--	--	--	--
30...	1050	Environmental	0.19	744	12.4	8.0	8.2	551	587	4.6	84.2	30.5
05079200 COUNTY DITCH 72 (BURNHAM CK) NR. MAPLE BAY (SW3) (LAT 47°38'19"N LONG 096°16'48"W)												
OCT 2002												
16...	1455	Environmental	--	736	11.9	8.2	--	--	644	6.5	--	--
NOV												
25...	1400	Environmental	0.19	742	9.1	7.6	7.4	689	720	0.0	103	33.3
MAR 2003												
31...	1440	Environmental	0.69	722	10.2	8.0	7.9	459	474	11.5	59.9	21.3
APR												
28...	1550	Environmental	1.4	737	12.2	8.2	8.2	594	641	14.4	87.0	28.4
JUN												
02...	1400	Environmental	0.35	733	15.3	8.6	8.5	560	562	25.2	70.8	31.2
02...	1401	Replicate	0.35	733	15.3	8.6	8.4	556	562	25.2	71.8	30.9
02...	1402	Blank	--	--	--	--	7.3	E3	--	--	0.07	0.029
10...	1440	Environmental	21	730	7.2	7.7	7.7	400	407	15.9	51.6	19.0
JUL												
01...	1050	Environmental	2.8	733	11.5	8.1	8.0	565	592	21.3	77.2	30.3
AUG												
04...	1400	Environmental	0.08	733	12.2	8.2	8.3	541	564	26.2	66.7	28.9
SEP												
03...	0740	Environmental	0.02	736	3.3	7.3	7.9	431	449	13.6	35.5	26.2
29...	1400	Environmental	0.04	739	9.7	7.7	8.1	552	598	9.8	84.0	28.0
05079250 COUNTY DITCH 65 NEAR MAPLE BAY, MN (SW2) (LAT 47°36'43"N LONG 096°16'46"W)												
OCT 2002												
16...	1420	Environmental	--	736	9.5	8.1	--	--	570	5.0	--	--
NOV												
25...	1150	Environmental	0.39	742	9.4	7.6	7.8	647	674	0.0	85.4	39.3
JAN 2003												
07...	1230	Environmental	0.16	730	8.8	8.4	--	--	655	0.1	--	--
FEB												
19...	1240	Environmental	0.02	735	2.5	7.1	7.5	422	430	0.0	65.6	18.8

GLACIAL RIDGE WATER QUALITY—Continued

MISCELLANEOUS STATION ANALYSES

Date	Potas- sium, water, fltrd, mg/L (00935)	Sodium, water, fltrd, mg/L (00930)	Alka- linity, wat flt inc tit field, mg/L as CaCO ₃ (39086)	Bicar- bonate, wat flt incr. titr., field, mg/L (00453)	Carbon- ate, wat flt incr. titr., field, mg/L (00452)	Chlor- ide, water, fltrd, mg/L (00940)	Fluor- ide, water, fltrd, mg/L (00950)	Sulfate water, fltrd, mg/L (00945)	Ammonia + org-N, water, fltrd, mg/L as N (00623)	Ammonia + org-N, water, unfltrd mg/L as N (00625)	Ammonia water, fltrd, mg/L as N (00608)	Nitrite + nitrate water fltrd, mg/L as N (00631)	Nitrite water, fltrd, mg/L as N (00613)
05078770 JUDICIAL DITCH 66 NEAR MARCOUX CORNERS, MN (SW6) (LAT 47°46'54"N LONG 096°19'52"W)													
OCT 2002													
16...	--	--	--	--	--	--	--	--	0.35	0.39	<0.04	0.69	0.010
16...	--	--	--	--	--	--	--	--	<0.10	<0.10	<0.04	<0.06	<0.008
NOV													
26...	3.77	7.75	--	--	--	7.50	--	66.2	0.36	0.33	0.05	1.04	0.014
JAN 2003													
08...	--	--	213	260	--	--	--	--	0.38	0.41	0.10	1.09	0.010
FEB													
20...	4.37	7.25	237	289	--	6.12	0.15	58.4	0.41	0.43	0.14	1.46	0.013
20...	<0.10	<0.09	--	--	--	<0.20	0.00	<0.2	<0.10	<0.10	<0.04	<0.06	<0.008
APR													
01...	6.50	11.1	158	193	--	13.0	0.12	114	0.86	1.1	0.10	0.64	0.015
30...	3.83	9.37	225	274	--	11.1	--	61.8	0.60	0.69	<0.04	0.16	<0.008
JUN													
03...	4.40	9.01	207	252	7	9.36	--	68.0	0.96	1.0	E.03	<0.06	E.006
11...	3.60	16.8	225	274	--	22.3	--	82.6	1.2	1.6	0.04	0.71	0.035
JUL													
02...	3.54	10.0	218	266	--	9.80	--	68.2	0.74	0.89	<0.04	E.04	E.005
AUG													
05...	2.93	7.63	265	323	--	7.77	--	41.0	0.76	0.83	E.03	<0.06	E.005
SEP													
03...	2.43	5.00	237	289	6	9.46	--	32.1	0.43	0.47	<0.04	<0.06	<0.008
03...	--	--	--	--	--	--	--	--	<0.10	<0.10	E.02	<0.06	<0.008
30...	3.16	7.12	247	301	--	8.95	--	53.8	0.36	0.41	<0.04	<0.06	<0.008
05079200 COUNTY DITCH 72 (BURNHAM CK) NR. MAPLE BAY (SW3) (LAT 47°38'9"N LONG 096°16'48"W)													
OCT 2002													
16...	--	--	--	--	--	--	--	--	0.71	0.84	0.14	0.22	0.025
NOV													
25...	2.34	8.05	--	--	--	12.4	--	64.8	0.57	0.52	0.05	0.53	0.015
MAR 2003													
31...	7.23	4.88	189	231	--	11.7	0.12	43.8	0.81	1.0	E.03	0.20	0.010
APR													
28...	3.08	6.80	284	346	4	13.8	--	42.8	0.79	0.82	<0.04	<0.12	<0.008
JUN													
02...	0.80	7.58	233	284	10	11.1	--	56.4	0.97	1.0	<0.04	<0.06	<0.008
02...	0.74	7.68	235	287	12	11.1	--	56.2	0.96	1.0	<0.04	<0.06	<0.008
02...	<0.16	<0.10	--	--	--	<0.20	--	<0.2	<0.10	<0.10	<0.04	<0.06	<0.008
10...	1.70	4.24	161	196	--	6.92	--	36.1	0.93	1.1	E.03	<0.06	<0.008
JUL													
01...	2.15	6.54	268	327	4	9.74	--	41.7	1.4	1.4	<0.04	<0.06	<0.008
AUG													
04...	2.75	10.5	262	320	7	14.4	--	20.9	1.2	1.2	<0.04	<0.06	<0.008
SEP													
03...	3.28	13.0	149	182	--	27.7	--	36.8	0.88	0.89	<0.04	<0.06	<0.008
29...	1.63	10.4	257	314	--	16.4	--	33.9	0.43	0.54	<0.04	<0.06	<0.008
05079250 COUNTY DITCH 65 NEAR MAPLE BAY, MN (SW2) (LAT 47°36'43"N LONG 096°16'46"W)													
OCT 2002													
16...	--	--	--	--	--	--	--	--	0.60	0.62	<0.04	<0.06	<0.008
NOV													
25...	3.60	8.90	--	--	--	9.23	--	13.1	0.73	0.72	<0.04	E.05	<0.008
JAN 2003													
07...	--	--	346	422	--	--	--	--	0.76	0.78	0.29	0.10	0.011
FEB													
19...	1.19	2.30	225	278	--	0.94	0.17	6.7	0.55	0.62	0.33	<0.06	<0.008

WATER QUALITY DATA

GLACIAL RIDGE WATER QUALITY—Continued

MISCELLANEOUS STATION ANALYSES

Date	Ortho-phosphate, water, fltrd, mg/L as P (00671)	Phosphorus, water, fltrd, mg/L (00666)	Phosphorus, water, unfltrd, mg/L (00665)
05078770 JUDICIAL DITCH 66 NEAR MARCOUX CORNERS, MN (SW6) (LAT 47°46'54"N LONG 096°19'52"W)			
OCT 2002			
16...	<0.02	0.006	0.011
16...	<0.02	<0.004	<0.004
NOV			
26...	<0.02	E.004	0.011
JAN 2003			
08...	<0.02	0.005	0.015
FEB			
20...	<0.02	0.012	0.022
20...	<0.02	<0.004	<0.004
APR			
01...	<0.02	0.019	0.086
30...	<0.02	0.008	0.021
JUN			
03...	<0.02	0.011	0.040
11...	E.01	0.027	0.133
JUL			
02...	<0.02	0.021	0.055
AUG			
05...	<0.09	0.018	0.051
SEP			
03...	<0.02	0.007	0.026
03...	<0.02	<0.004	<0.004
30...	<0.02	0.006	0.019
05079200 COUNTY DITCH 72 (BURNHAM CK) NR. MAPLE BAY (SW3) (LAT 47°38' 9"N LONG 096°16'48"W)			
OCT 2002			
16...	<0.02	0.011	0.029
NOV			
25...	<0.02	0.007	0.013
MAR 2003			
31...	<0.02	0.023	0.046
APR			
28...	<0.02	0.010	0.017
JUN			
02...	<0.02	0.013	0.021
02...	0.06	0.013	0.017
02...	<0.02	<0.004	<0.004
10...	<0.02	0.015	0.041
JUL			
01...	<0.02	0.023	0.027
AUG			
04...	<0.09	0.025	0.037
SEP			
03...	<0.02	0.021	0.032
29...	<0.02	0.010	0.020
05079250 COUNTY DITCH 65 NEAR MAPLE BAY, MN (SW2) (LAT 47°36'43"N LONG 096°16'46"W)			
OCT 2002			
16...	<0.02	0.006	0.013
NOV			
25...	<0.02	0.008	0.016
JAN 2003			
07...	<0.02	E.004	0.014
FEB			
19...	<0.02	E.003	0.032

GLACIAL RIDGE WATER QUALITY—Continued

MISCELLANEOUS STATION ANALYSES

Date	Time	Sample type	Instantaneous discharge, cfs (00061)	Barometric pressure, mm Hg (00025)	Dissolved oxygen, mg/L (00300)	pH, water, unfltrd field, std units (00400)	pH, water, unfltrd lab, std units (00403)	Specif. conductance, wat unfl lab, uS/cm 25 deg C (90095)	Specif. conductance, wat unfl lab, uS/cm 25 deg C (00095)	Temperature, water, deg C (00010)	Calcium water, fltrd, mg/L (00915)	Magnesium, water, fltrd, mg/L (00925)
05079250 COUNTY DITCH 65 NEAR MAPLE BAY, MN (SW2) (LAT 47°36'43"N LONG 096°16'46"W)												
MAR 2003												
31...	1150	Environmental	1.2	723	9.4	7.7	7.6	352	355	5.1	42.0	17.1
APR 29...	0950	Environmental	2.2	741	8.6	7.8	8.0	554	580	7.8	71.8	31.9
JUN 03...	0830	Environmental	9.6	735	4.9	7.4	7.5	433	446	15.7	54.0	21.4
JUN 10...	1220	Environmental	37	730	5.2	7.4	7.8	E418	442	15.4	50.2	23.9
JUL 01...	0830	Environmental	9.9	734	4.7	7.4	7.6	437	459	18.8	55.0	25.8
AUG 04...	1220	Environmental	0.05	734	7.0	7.5	7.8	562	591	23.2	73.9	28.7
SEP 29...	1200	Environmental	0.02	739	8.8	7.4	7.8	536	578	8.3	83.6	29.4

Date	Potassium, water, fltrd, mg/L (00935)	Sodium, water, fltrd, mg/L (00930)	Alkalinity, wat flt inc tit field, mg/L as CaCO3 (39086)	Bicarbonate, wat flt incrm. titr., field, mg/L (00453)	Chloride, water, fltrd, mg/L (00940)	Fluoride, water, fltrd, mg/L (00950)	Sulfate water, fltrd, mg/L (00945)	Ammonia + org-N, water, fltrd, mg/L as N (00623)	Ammonia + org-N, water, unfltrd, mg/L as N (00625)	Ammonia water, fltrd, mg/L as N (00608)	Nitrite + nitrate water, fltrd, mg/L as N (00631)	Nitrite water, fltrd, mg/L as N (00613)	Orthophosphate, water, fltrd, mg/L as P (00671)
05079250 COUNTY DITCH 65 NEAR MAPLE BAY, MN (SW2) (LAT 47°36'43"N LONG 096° 6'46"W)													
MAR 2003													
31...	6.44	4.17	160	195	5.95	0.14	18.6	0.64	0.93	E.03	0.07	E.006	<0.02
APR 29...	4.61	9.09	338	413	8.39	--	20.7	0.83	0.89	<0.04	<0.12	<0.008	<0.02
JUN 03...	6.94	4.10	212	259	7.47	--	2.4	1.3	1.5	<0.04	<0.06	<0.008	<0.02
JUN 10...	3.30	6.47	222	271	5.28	--	11.2	1.2	1.4	<0.04	E.05	E.004	<0.02
JUL 01...	2.24	4.95	235	287	3.82	--	6.1	1.1	1.1	<0.04	<0.06	<0.008	<0.02
AUG 04...	1.70	8.21	312	381	4.54	--	3.5	0.96	1.0	<0.04	<0.06	<0.008	<0.09
SEP 29...	1.83	6.33	289	353	3.88	--	19.3	0.49	0.58	<0.04	<0.06	<0.008	<0.02

Date	Phosphorus, water, fltrd, mg/L (00666)	Phosphorus, water, unfltrd, mg/L (00665)
------	--	--

05079250 COUNTY DITCH 65 NEAR MAPLE BAY, MN (SW2) (LAT 47°36'43"N LONG 096°16'46"W)

MAR 2003		
31...	0.022	0.071
APR 29...	0.011	0.022
JUN 03...	0.026	0.040
JUN 10...	0.026	0.073
JUL 01...	0.018	0.028
AUG 04...	0.015	0.035
SEP 29...	0.007	0.015

Ground-Water Wells by County

Ground-Water Levels



Ground-water observation well at Glacial Ridge, 2003

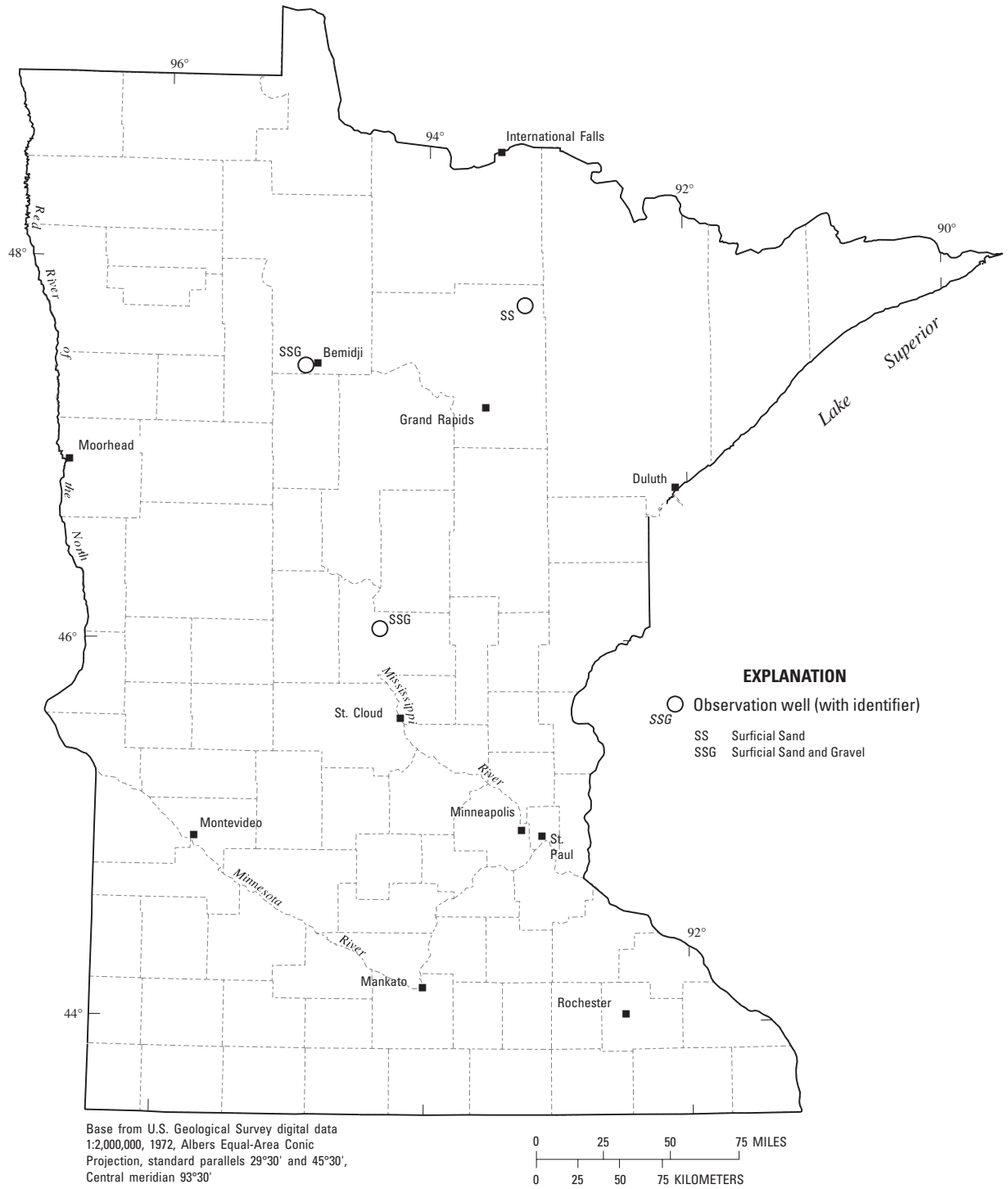


Figure 8. Location of ground-water wells.

473423095053301. Local number, 147N35W02CDCBDD.

LOCATION.-- Lat 47°34'23", long 95°05'33", in SW 1/4 SE 1/4 SW 1/4 sec.2, T.147 N., R.35 W., Hydrologic Unit 07010101, northwest of Bemidji.

Owner: U.S. Geological Survey

AQUIFER.-- Surficial outwash sand and gravel of Pleistocene Age.

WELL CHARACTERISTICS.-- Drilled observation well, diameter 2 in., depth 34.83 ft., screened 30 to 33 ft.

INSTRUMENTATION.-- Monthly measurements by USGS; continuous recordings with a datalogger.

DATUM.-- Land-surface datum is 1,420.49 ft above sea level. Measuring point: 2.70 ft above land-surface datum.

REMARKS.-- Well number 310D, at crude-oil spill site near Bemidji.

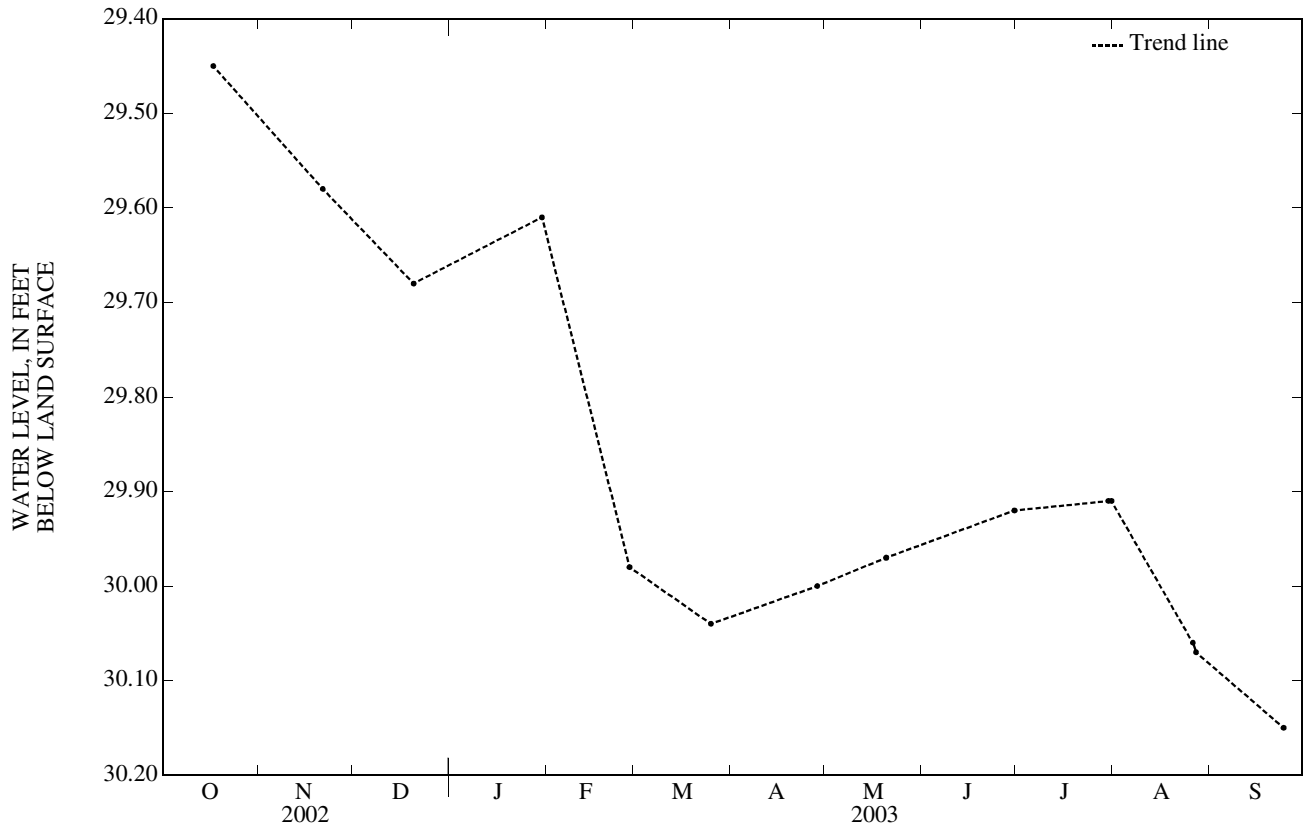
PERIOD OF RECORD.-- Apr. 1983 to current year.

EXTREMES FOR PERIOD OF RECORD.-- Highest water level observed, 27.59 ft. below land-surface datum Jun. 21, 2001; lowest observed, 30.69 ft. below land-surface datum, Feb. 27, 1997.

EXTREMES FOR CURRENT WATER YEAR.-- Highest water level observed, 29.45 ft. below land-surface datum, Oct. 17; lowest observed, 30.15 ft. below land-surface datum, Sep 24.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 17	29.45	DEC 20	29.68	FEB 27	29.98	APR 28	30.00	JUN 30	29.92	AUG 26	30.06
NOV 21	29.58	JAN 30	29.84	MAR 25	30.04	MAY 20	29.97	JUL 30	29.91	27	30.07
								31	29.91	SEP 24	30.15



ITASCA COUNTY

474921093144001. Local number 062N23W26CDC.

LOCATION.-- Lat 47°49'21", Long 93°14'40", SW¹/₄SW¹/₄SW¹/₄ sec. 26, T. 062 N, R. 23 W, Hydrologic Unit 09030002, near Togo, Minn.

Owner: U.S. Geological Survey

AQUIFER.-- Surficial sand of Pleistocene Age

WELL CHARACTERISTICS.-- Drilled water-table observation well, diameter 2 in., depth 31.20 ft.

INSTRUMENTATION.-- Measurements by USGS personnel.

DATUM.-- Land-surface datum is 1,390.0 feet above sea level. Measuring point: Top of casing, 2.25 ft. above land surface datum. Surficial

PERIOD OF RECORD.-- Aug. 1999 to Sep. 2001, Oct. 2002 to Sep. 2003 (discontinued).

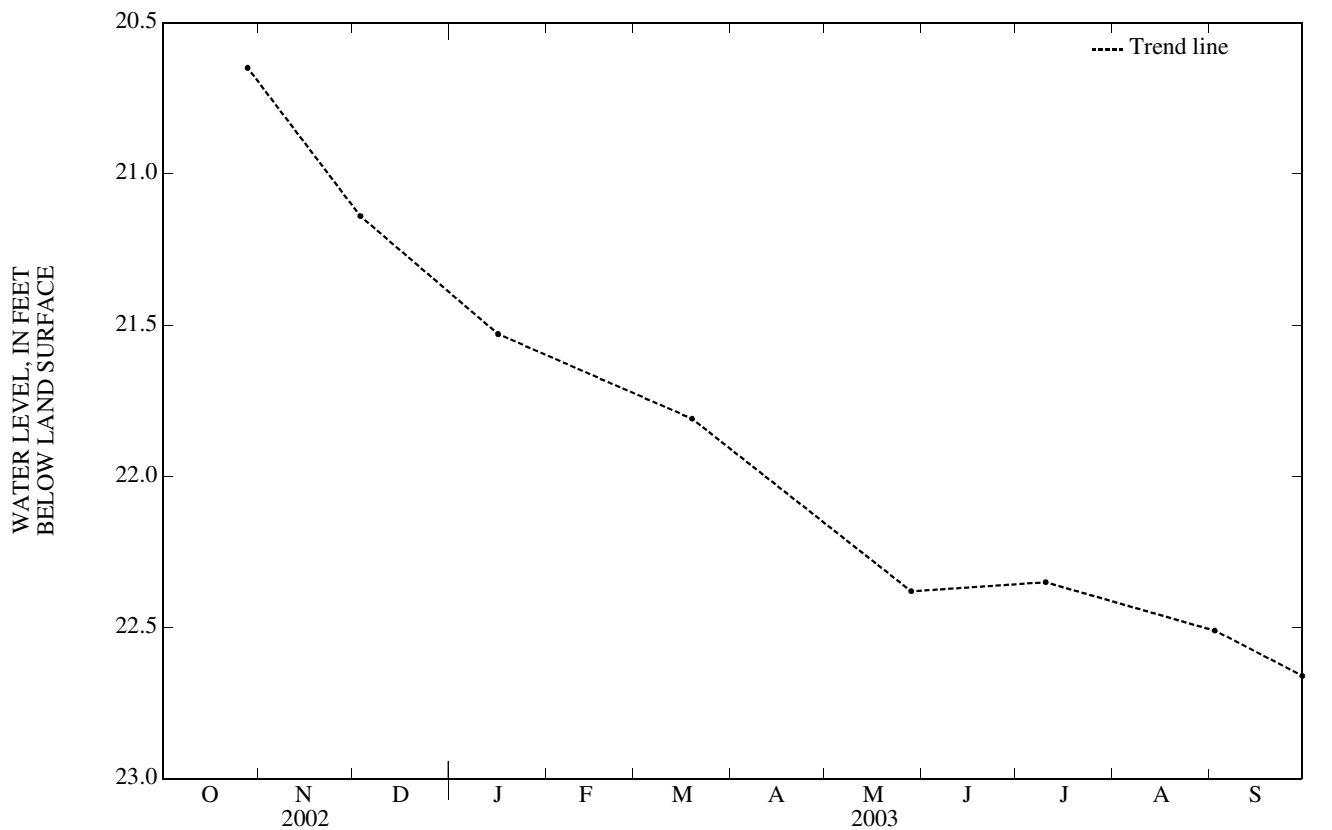
REMARKS.--

EXTREMES FOR PERIOD OF RECORD.-- Highest water level observed, 19.4 ft. below land-surface datum, Nov. 23 and Apr. 24, 1999; lowest observed, 22.66 ft. below land-surface datum, Sep. 30, 2003

EXTREMES FOR CURRENT WATER YEAR.-- Highest water level observed, 20.65 ft. below land-surface datum, Oct.. 23 ; lowest observed, 22.66 ft. below land-surface datum, Sep. 30.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 28	20.65	DEC 03	21.14	JAN 16	21.53	MAR 19	21.81	JUL 10	22.35	SEP 02	22.51
						MAY 28	22.38			SEP 30	22.66



GROUND-WATER LEVELS
MORRISON COUNTY

460444094212501. Local number, 130N29W08DCC01.

LOCATION.-- Lat 46°04'44", long 94°21'25", in SW 1/4 SW 1/4 SE 1/4 sec.8, T.130 N., R.29 W., Hydrologic Unit 07010104, at Camp Ripley.

Owner: Minnesota Army National Guard, Camp Ripley.

AQUIFER.-- Surficial outwash sand and gravel of Pleistocene Age.

WELL CHARACTERISTICS.-- Drilled observation well, diameter 2 in., depth 59 ft, screened 56 to 59 ft.

INSTRUMENTATION.-- Monthly measurements by observer. Intermittent measurements by USGS personnel. Data Collection Platform installed on Dec. 12, 2002.

DATUM.-- Land-surface datum is 1,149.0 ft above sea level. Measuring point: Top of casing, 2.10 ft above land-surface datum.

REMARKS.-- Water levels used in monthly National Water Conditions Report.

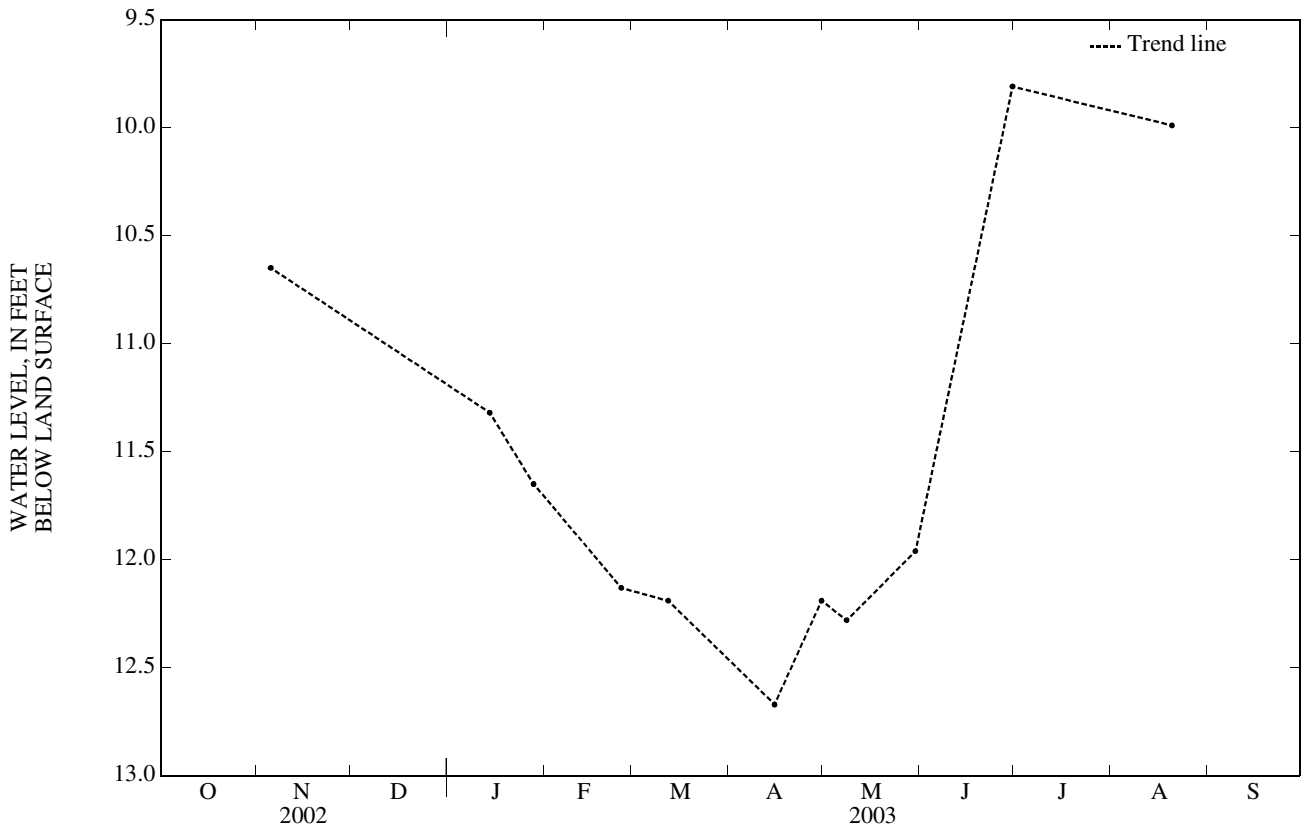
PERIOD OF RECORD.-- Apr. 1949 to current year.

EXTREMES FOR PERIOD OF RECORD.-- Highest water level observed, 7.35 ft below land-surface datum, July 28, 1972; lowest observed, 19.75 ft below land-surface datum, Aug. 4, 1961.

EXTREMES FOR CURRENT WATER YEAR.-- Highest water level observed, 9.81 ft below land-surface datum, Jun 30; lowest observed, 12.67 ft below land-surface datum, Apr.15.

WATER LEVELS IN FEET BELOW LAND SURFACE DATUM, WATER YEAR OCTOBER 2002 TO SEPTEMBER 2003

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 05	10.65	JAN 14	11.32	FEB 25	12.13	APR 15	12.67	MAY 08	12.28	JUN 30	9.81
		28	11.65	MAR 12	12.19	30	12.19	30	11.96	AUG 20	9.99



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Quality of Ground Water



Ground-water well water-quality sampling, 2003

QUALITY OF GROUND WATER

MULTIPLE STATION ANALYSIS

Local identifier	Date	Time	Sample type	Barometric pressure, mm Hg (00025)	Dissolved oxygen, mg/L (00300)	Dissolved oxygen, percent of saturation (00301)	pH, water, unfltrd field, std units (00400)	Specif. conductance, wat unfltrd lab, uS/cm 25 degC (90095)	Specif. conductance, wat unfltrd lab, uS/cm 25 degC (00095)	Temperature, air, deg C (00020)
CARVER COUNTY										
Rain Garden lysimeter near Chanhassen, MN	08-22-03	0722	Environmental	--	--	--	--	593	--	--
Rain Garden outflow near Chanhassen, MN	08-22-03	0830	Environmental	744	5.3	62	6.8	--	789	--
	09-19-03	0936	Environmental	--	--	--	7.8	--	783	--
DAKOTA COUNTY										
Rain Garden background well near Lakeville, MN	10-18-02	1330	Environmental	--	4.3	42	7.0	1,290	1,220	--
	08-21-03	0848	Environmental	--	6.0	--	6.5	--	1,830	--
Rain Garden well near Lakeville, MN	08-21-03	1035	Environmental	--	8.7	--	8.0	--	334	--
Rain Garden lysimeter near Lakeville, MN	08-21-03	1000	Environmental	--	--	--	--	361	--	--
Rain Garden background lysimeter near Lakeville, MN	08-21-03	0750	Environmental	--	--	--	--	2,710	--	--
HENNEPIN COUNTY										
Rain Garden background well Near Minnetonka, MN	08-20-03	0841	Environmental	--	7.4	--	6.9	--	640	--
Rain Garden lysimeter near Minnetonka, MN	08-20-03	0920	Environmental	--	--	--	--	1,110	--	--
POLK COUNTY										
G13 149N44W28CADD	05-23-03	1000	Environmental	740	--	--	7.5	--	801	16.0
	06-26-03	1500	Environmental	--	8.4	77	7.1	--	785	--
	07-31-03	1350	Environmental	731	9.5	90	7.4	--	792	--
L032 150N45W25DDDD	05-22-03	1355	Environmental	739	3.0	26	7.4	--	548	18.0
	06-24-03	1050	Environmental	--	1.8	--	7.4	--	534	--
L043 150N45W29ADAA	06-24-03	1052	Blank	--	--	--	--	--	--	--
	05-22-03	1219	Environmental	738	6.0	54	7.6	--	547	19.0
	05-22-03	1221	Environmental	--	--	--	--	--	--	--
	05-22-03	1221	Replicate	--	--	--	--	--	--	--
	06-24-03	0930	Environmental	731	5.9	54	7.4	--	569	--
	07-30-03	1045	Environmental	734	6.6	59	7.8	--	550	--
	08-20-03	1320	Environmental	731	7.4	72	7.7	--	513	--
G01-R 149N44W30CAAD	09-23-03	0850	Environmental	--	7.2	64	7.6	--	499	--
	05-21-03	0845	Environmental	739	--	--	7.0	--	825	15.5
	06-26-03	1210	Environmental	--	0.2	--	6.8	--	823	--
G16 149N43W19DADD	07-30-03	1310	Environmental	732	0.1	0.0	6.9	--	890	--
	08-19-03	1050	Environmental	732	0.5	5	6.8	--	950	--
	09-23-03	1545	Environmental	--	0.1	5	6.7	--	1,040	--
	05-21-03	1510	Environmental	740	2.8	22	7.7	--	414	20.0
	06-25-03	1100	Environmental	740	3.0	26	7.3	--	414	--
	07-31-03	1630	Environmental	729	3.0	29	7.6	--	417	--
	07-31-03	1632	Replicate	--	--	--	--	--	--	--
E03-R 149N44W12BADA	08-19-03	1545	Environmental	731	3.9	38	7.6	--	414	--
	09-23-03	1130	Environmental	--	3.5	34	7.6	--	424	--
	05-22-03	1935	Environmental	738	--	--	7.2	--	727	17.5
	06-26-03	1650	Environmental	--	0.9	8	7.2	--	493	--
G15-R 148N44W10CCCC	07-31-03	0800	Environmental	730	94.0	8	7.2	--	739	--
	08-20-03	0800	Environmental	727	6.3	59	7.4	--	740	--
	09-23-03	1030	Environmental	--	1.0	9	7.5	--	738	--
	05-21-03	1240	Environmental	740	--	--	7.8	--	665	--

QUALITY OF GROUND WATER
MULTIPLE STATION ANALYSIS—Continued

Local identifier	Date	Temperature, water, deg C (00010)	Alkalinity, wat flt inc tit field, mg/L as CaCO3 (39086)	Bicarbonate, wat flt incrm. titr., field, mg/L (00453)	Carbonate, wat flt incrm. titr., field, mg/L (00452)	Chloride, water, fltrd, mg/L (00940)	Residue on evap. at 180 deg C wat flt mg/L (70300)	Residue total at 105 deg C, suspended, mg/L (00530)	Ammonia + org-N, water, fltrd, mg/L as N (00623)	Ammonia + org-N, water, unfltrd mg/L as N (00625)	Ammonia water, fltrd, mg/L as N (00608)
CARVER COUNTY											
Rain Garden lysimeter near Chanhassen, MN	08-22-03	--	--	--	--	24.1	--	--	--	0.71	0.10
Rain Garden outflow near Chanhassen, MN	08-22-03	22.2	--	--	--	17.3	490	<10	--	0.51	<0.04
	09-19-03	--	--	--	--	19.7	517	<10	--	0.56	<0.04
DAKOTA COUNTY											
Rain Garden background well near Lakeville, MN	10-18-02	13.2	--	--	--	190	--	--	--	0.14	<0.04
	08-21-03	12.8	--	--	--	262	--	--	--	0.28	<0.04
Rain Garden well near Lakeville, MN	08-21-03	20.2	--	--	--	6.65	--	--	--	0.56	<0.04
Rain Garden lysimeter near Lakeville, MN	08-21-03	--	--	--	--	8.89	--	--	--	0.55	<0.04
Rain Garden background lysimeter near Lakeville, MN	08-21-03	--	--	--	--	19.1	--	--	--	1.3	E.04
HENNEPIN COUNTY											
Rain Garden background well near Minnetonka, MN	08-20-03	13.9	--	--	--	7.46	--	--	--	0.29	<0.04
Rain Garden lysimeter near Minnetonka, MN	08-20-03	--	--	--	--	88.8	--	--	--	0.93	0.07
POLK COUNTY											
G13 149N44W2	05-23-03	7.6	470	573	0.0	--	--	--	0.25	--	<0.04
	06-26-03	9.4	373	455	0.0	--	--	--	0.24	--	<0.04
	07-31-03	11.3	438	534	0.0	--	--	--	0.27	--	<0.04
L032 150N45W2	05-22-03	6.1	268	326	0.0	--	--	--	0.12	--	<0.04
	06-24-03	8.2	255	312	0.0	--	--	--	0.13	--	<0.04
L043 150N45W2	06-24-03	--	--	--	--	--	--	--	<0.10	--	<0.04
	05-22-03	8.6	276	336	0.0	--	--	--	0.24	--	<0.04
	05-22-03	--	--	--	--	--	--	--	--	--	--
	05-22-03	--	--	--	--	--	--	--	0.23	--	<0.04
	06-24-03	9.2	284	346	0.0	--	--	--	0.20	--	<0.04
	07-30-03	8.7	268	326	0.0	--	--	--	0.18	--	<0.04
G01-R 149N44W3	08-20-03	12.9	276	337	0.0	--	--	--	0.18	--	<0.04
	09-23-03	8.4	260	316	0.0	--	--	--	0.17	--	<0.04
	05-21-03	5.6	446	544	0.0	--	--	--	0.94	--	0.18
	06-26-03	11.0	438	534	0.0	--	--	--	0.98	--	0.24
	07-30-03	14.4	487	594	0.0	--	--	--	1.0	--	0.20
	08-19-03	16.1	519	633	0.0	--	--	--	1.1	--	0.22
G16 149N43W1	09-23-03	15.2	535	653	0.0	--	--	--	1.0	--	0.25
	05-21-03	5.8	211	257	0.0	--	--	--	0.14	--	<0.04
	06-25-03	8.3	211	257	0.0	--	--	--	0.12	--	<0.04
E03-R 149N44W1	07-31-03	11.5	211	257	0.0	--	--	--	0.12	--	<0.04
	07-31-03	--	--	--	--	--	--	--	0.11	--	<0.04
	08-19-03	13.2	204	249	0.0	--	--	--	0.13	--	<0.04
	09-23-03	--	211	257	0.0	--	--	--	0.13	--	<0.04
	05-22-03	8.1	288	351	0.0	--	--	--	0.21	--	<0.04
	06-26-03	8.8	276	337	0.0	--	--	--	0.23	--	<0.04
G15-R 148N44W1	07-31-03	9.4	260	317	0.0	--	--	--	0.20	--	<0.04
	08-20-03	10.4	276	337	0.0	--	--	--	0.21	--	<0.04
	09-23-03	8.6	260	316	0.0	--	--	--	0.21	--	<0.04
	05-21-03	4.5	211	257	0.0	--	--	--	0.35	--	0.07

MULTIPLE STATION ANALYSIS—Continued

Local identifier	Date	Nitrite + nitrate water fltrd, mg/L as N (00631)	Nitrite water, fltrd, mg/L as N (00613)	Ortho-phosphate, water, fltrd, mg/L as P (00671)	Phosphorus, water, fltrd, mg/L (00666)	Phosphorus, water, unfltrd mg/L (00665)
CARVER COUNTY						
Rain Garden lysimeter near Chanhassen, MN	08-22-03	0.77	0.032	--	0.13	0.13
	08-22-03	0.29	E.004	--	0.04	0.05
Rain Garden outflow near Chanhassen, MN	09-19-03	0.66	E.006	--	E.03	0.04
DAKOTA COUNTY						
Rain Garden background well near Lakeville, MN	10-18-02	1.56	0.014	--	<0.04	<0.04
	08-21-03	2.55	<0.008	--	<0.04	E.03
Rain Garden well near Lakeville, MN	08-21-03	0.97	<0.008	--	E.02	E.04
Rain Garden lysimeter near Lakeville, MN	08-21-03	2.05	E.006	--	0.08	0.08
Rain Garden background lysimeter near Lakeville, MN	08-21-03	6.64	E.005	--	0.05	0.07
HENNEPIN COUNTY						
Rain Garden background well near Minnetonka, MN	08-20-03	2.82	<0.008	--	<0.04	<0.04
Rain Garden lysimeter near Minnetonka, MN	08-20-03	1.28	0.116	--	E.03	0.05
POLK COUNTY						
G13 149N44W2	05-23-03	0.10	<0.008	<0.02	<0.004	--
	06-26-03	0.25	<0.008	<0.02	E.002	--
	07-31-03	0.35	<0.008	<0.02	E.003	--
L032 150N45W2	05-22-03	2.61	<0.008	E.02	0.019	--
	06-24-03	2.17	E.004	E.01	0.019	--
	06-24-03	<0.06	<0.008	<0.02	<0.004	--
L043 150N45W2	05-22-03	2.81	0.028	<0.02	E.004	--
	05-22-03	--	--	--	--	--
	05-22-03	3.67	0.052	<0.02	<0.004	--
	06-24-03	3.25	0.011	<0.02	E.002	--
	07-30-03	3.29	E.006	<0.02	E.004	--
	08-20-03	2.56	0.010	<0.02	E.004	--
	09-23-03	2.79	0.016	<0.02	E.003	--
G01-R 149N44W3	05-21-03	<0.06	<0.008	<0.02	0.011	--
	06-26-03	<0.06	<0.008	<0.02	0.013	--
	07-30-03	<0.06	<0.008	<0.02	0.014	--
G16 149N43W1	08-19-03	<0.06	<0.008	E.01	0.017	--
	09-23-03	E.03	<0.008	E.01	0.017	--
	05-21-03	0.81	0.086	<0.02	E.002	--
	06-25-03	0.95	0.075	<0.02	<0.004	--
	07-31-03	0.91	0.059	<0.02	E.003	--
	07-31-03	0.90	0.058	<0.02	E.004	--
	08-19-03	0.80	0.043	<0.18	E.004	--
E03-R 149N44W1	09-23-03	0.89	0.022	<0.02	E.003	--
	05-22-03	9.95	0.079	<0.02	E.004	--
	06-26-03	--	0.103	<0.02	E.004	--
G15-R 148N44W1	07-31-03	12.1	0.084	<0.02	0.005	--
	08-20-03	8.95	0.091	<0.18	0.005	--
	09-23-03	12.6	0.072	<0.02	0.005	--
	05-21-03	10.3	0.814	<0.02	0.009	--
	05-21-03	10.3	0.814	<0.02	0.009	--

QUALITY OF GROUND WATER
MULTIPLE STATION ANALYSIS—Continued

Local identifier	Date	Time	Sample type	Barometric pressure, mm Hg (00025)	Dissolved oxygen, mg/L (00300)	Dissolved oxygen, percent of saturation (00301)	pH, water, unfltrd std units (00400)	Specif. conductance, wat unfltrd lab, uS/cm 25 deg C (90095)	Specif. conductance, wat unfltrd lab, uS/cm 25 deg C (00095)	Temperature, air, deg C (00020)
POLK COUNTY										
G15-R 148N44W10CCCC	06-25-03	1210	Environmental	--	0.2	--	7.6	--	679	--
	07-30-03	1555	Environmental	729	0.1	1	7.8	--	672	--
	08-19-03	1445	Environmental	729	0.2	2	7.8	--	654	--
	09-23-03	1330	Environmental	--	0.1	1	7.7	--	662	--
E01D-R 148N45W01CBDD	05-21-03	1130	Environmental	739	--	--	8.0	--	739	17.0
	06-26-03	1015	Environmental	--	0.5	5	7.7	--	740	--
	07-30-03	1500	Environmental	731	0.3	3	7.9	--	749	--
	08-19-03	1345	Environmental	732	0.2	2	7.8	--	736	--
G08-R 149N44W17ABAD	09-23-03	1500	Environmental	--	0.1	1	7.9	--	749	--
	05-23-03	0900	Environmental	740	--	--	7.3	--	1,310	15.0
	06-26-03	1530	Environmental	--	3.9	36	7.2	--	1,180	--
	07-31-03	1240	Environmental	732	9.9	100	7.5	--	1,290	--
E01S-R 148N45W01CBDD	08-20-03	1140	Environmental	727	1.9	20	7.4	--	1,290	--
	09-24-03	0950	Environmental	--	5.2	52	7.4	--	1,300	--
	05-21-03	1055	Environmental	739	--	--	7.5	--	720	17.0
	06-26-03	0955	Environmental	--	1.1	10	7.4	--	708	--
E02D 149N44W26DACD	07-30-03	1430	Environmental	731	4.9	46	7.5	--	731	--
	08-19-03	1320	Environmental	732	1.7	17	7.4	--	727	--
	09-23-03	1435	Environmental	--	4.6	45	7.3	--	716	--
	08-19-03	1020	Environmental	729	0.1	1	7.7	--	590	--
G09 149N44W26DDCA	08-19-03	1022	Replicate	--	--	--	--	--	--	--
	09-24-03	1240	Environmental	--	0.4	4	7.9	--	590	--
	07-31-03	1545	Environmental	--	9.7	91	7.6	--	528	--
	08-19-03	0945	Environmental	729	0.2	2	7.3	--	536	--
G22S-R 149N43W29CCBB	09-24-03	1130	Environmental	--	0.1	1	7.5	--	518	--
	08-20-03	0930	Environmental	726	3.6	35	7.5	--	1,460	--
	09-23-03	1215	Environmental	--	4.0	38	7.2	--	1,460	--
	09-23-03	1217	Replicate	--	--	--	--	--	--	--
WASHINGTON COUNTY										
Rain Garden well at Hugo, MN	08-18-03	1232	Environmental	--	9.9	103	6.1	--	121	--
Rain Garden background well at Hugo, MN	08-18-03	1009	Environmental	--	6.3	--	6.4	--	169	--
Rain Garden background lysimeter at Hugo, MN	08-18-03	0915	Environmental	--	--	--	--	148	--	--
Rain Garden background well near Woodbury, MN	10-18-02	1100	Environmental	--	7.4	71	6.5	1,130	695	--
	08-19-03	1351	Environmental	--	7.5	--	7.9	--	543	--
Rain Garden lysimeter near Woodbury, MN	08-19-03	1034	Environmental	--	--	--	--	2,020	--	--
Rain Garden background lysimeter near Woodbury, MN	08-19-03	1302	Environmental	--	--	--	--	422	--	--
Rain Garden well near Woodbury, MN	08-19-03	1130	Environmental	--	10.3	--	7.7	--	1,130	--

MULTIPLE STATION ANALYSIS—Continued

Local identifier	Date	Temperature, water, deg C (00010)	Alkalinity, wat flt inc tit mg/L as CaCO3 (39086)	Bicarbonate, wat flt incm. titr., field, mg/L (00453)	Carbonate, wat flt incm. titr., field, mg/L (00452)	Chloride, water, fltrd, mg/L (00940)	Ammonia + org-N, water, fltrd, mg/L as N (00623)	Ammonia + org-N, water, unfltrd mg/L as N (00625)	Ammonia water, fltrd, mg/L as N (00608)	Nitrite + nitrate water fltrd, mg/L as N (00631)	Nitrite water, fltrd, mg/L as N (00613)
POLK COUNTY											
G15-R 148N44W1	06-25-03	9.0	--	262	0.0	--	0.35	--	0.08	11.6	0.840
	07-30-03	11.7	211	257	0.0	--	0.30	--	E.04	12.2	0.526
	08-19-03	13.4	195	237	0.0	--	0.30	--	E.03	11.7	0.358
	09-23-03	13.1	211	257	0.0	--	0.27	--	0.04	12.5	0.574
E01D-R 148N45W0	05-21-03	8.0	381	464	0.0	--	4.0	--	2.99	<0.06	<0.008
	06-26-03	11.0	389	475	0.0	--	4.0	--	3.23	<0.30	E.004
	07-30-03	12.5	389	475	0.0	--	3.8	--	3.14	E.03	<0.008
	08-19-03	16.1	389	475	0.0	--	4.0	--	3.20	<0.06	<0.008
	09-23-03	10.6	389	474	0.0	--	3.6	--	3.35	<0.06	<0.008
G08-R 149N44W1	05-23-03	7.2	535	653	0.0	--	1.1	--	0.12	33.1	0.074
	06-26-03	10.6	316	386	0.0	--	0.75	--	0.07	45.3	0.016
	07-31-03	13.8	357	435	0.0	--	0.93	--	0.04	52.6	0.041
	08-20-03	15.0	406	495	0.0	--	0.95	--	E.04	45.3	0.076
	09-24-03	12.6	406	494	0.0	--	0.90	--	0.04	46.6	0.116
E01S-R 148N45W0	05-21-03	7.0	373	455	0.0	--	1.4	--	0.95	1.28	<0.008
	06-26-03	10.1	370	451	0.0	--	0.50	--	0.19	1.81	0.018
	07-30-03	11.1	373	455	0.0	--	0.68	--	0.40	1.24	<0.008
	08-19-03	14.3	373	455	0.0	--	0.51	--	0.20	0.96	0.010
	09-23-03	12.8	357	435	0.0	--	0.64	--	0.35	0.96	<0.008
E02D 149N44W2	08-19-03	10.9	292	356	0.0	--	1.3	--	1.07	<0.06	<0.008
	08-19-03	--	--	--	--	--	1.3	--	1.00	<0.06	<0.008
	09-24-03	7.5	292	356	0.0	--	1.0	--	0.92	<0.06	<0.008
G09 149N44W2	07-31-03	10.6	260	317	0.0	--	0.52	--	<0.04	2.59	0.072
	08-19-03	12.4	260	317	0.0	--	0.68	--	0.05	3.41	0.055
	09-24-03	10.5	243	297	0.0	--	0.48	--	<0.04	3.23	0.071
G22S-R 149N43W2	08-20-03	12.6	308	376	0.0	--	0.63	--	E.03	97.1	0.108
	09-23-03	11.4	292	356	0.0	--	0.65	--	0.04	103	0.049
	09-23-03	--	--	--	--	--	0.57	--	0.04	96.0	0.040
WASHINGTON COUNTY											
Rain Garden well at Hugo, MN	08-18-03	17.3	--	--	--	1.37	--	0.16	<0.04	1.32	<0.008
Rain Garden background well at Hugo, MN	08-18-03	15.5	--	--	--	11.4	--	0.11	<0.04	2.01	<0.008
Rain Garden background lysimeter at Hugo, MN	08-18-03	--	--	--	--	3.89	--	0.28	<0.04	1.80	0.011
Rain Garden background well near Woodbury, MN	10-18-02	12.1	--	--	--	235	--	0.15	<0.04	0.45	E.007
	08-19-03	11.9	--	--	--	84.3	--	<0.10	<0.04	0.54	<0.008
Rain Garden lysimeter near Woodbury, MN	08-19-03	--	--	--	--	415	--	1.4	0.53	<0.06	<0.008
Rain Garden background lysimeter near Woodbury, MN	08-19-03	--	--	--	--	32.2	--	0.30	0.07	0.37	0.013
Rain Garden well near Woodbury, MN	08-19-03	17.2	--	--	--	231	--	E.07	<0.04	0.81	<0.008

QUALITY OF GROUND WATER
MULTIPLE STATION ANALYSIS—Continued

Local identifier	Date	Ortho-phosphate, water, fltrd, mg/L as P (00671)	Phosphorus, water, fltrd, mg/L (00666)	Phosphorus, water, unfltrd mg/L (00665)
POLK COUNTY				
G15-R 148N44W1	06-25-03	<0.02	0.010	--
	07-30-03	<0.02	0.011	--
	08-19-03	<0.18	0.013	--
E01D-R 148N45W0	09-23-03	<0.02	0.012	--
	05-21-03	0.27	0.31	--
	06-26-03	0.26	0.29	--
G08-R 149N44W1	07-30-03	0.28	0.28	--
	08-19-03	0.27	0.30	--
	09-23-03	0.29	0.27	--
E01S-R 148N45W0	05-23-03	<0.02	0.005	--
	06-26-03	<0.02	0.008	--
	07-31-03	<0.02	0.006	--
E02D 149N44W2	08-20-03	<0.02	E.004	--
	09-24-03	<0.02	E.004	--
	05-21-03	<0.02	0.010	--
G09 149N44W2	06-26-03	<0.02	0.015	--
	07-30-03	<0.02	0.017	--
	08-19-03	<0.18	0.008	--
G22S-R 149N43W2	09-23-03	<0.02	0.012	--
	08-19-03	<0.18	0.041	--
	08-19-03	<0.18	0.039	--
	09-24-03	0.03	0.042	--
	07-31-03	<0.02	0.007	--
	08-19-03	<0.18	0.013	--
	09-24-03	<0.02	0.006	--
	08-20-03	<0.02	E.004	--
	09-23-03	<0.02	E.003	--
	09-23-03	<0.02	E.002	--
WASHINGTON COUNTY				
Rain Garden well at Hugo, MN	08-18-03	--	0.06	0.07
Rain Garden background well at Hugo, MN	08-18-03	--	0.07	0.09
Rain Garden background lysimeter at Hugo, MN	08-18-03	--	<0.04	<0.04
Rain Garden background well near Woodbury, MN	10-18-02	--	<0.04	0.16
	08-19-03	--	0.04	0.04
Rain Garden lysimeter near Woodbury, MN	08-19-03	--	<0.04	0.05
RainGarden background lysimeter near Woodbury, MN	08-19-03	--	<0.04	<0.04
Rain Garden well near Woodbury, MN	08-19-03	--	E.02	E.02

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Conversion Factors

Multiply	By	To obtain
Length		
inch (in.)	2.54×10^1	millimeter (mm)
	2.54×10^{-2}	meter
foot (ft)	3.048×10^{-1}	meter (m)
mile (mi)	1.609×10^0	kilometer (km)
Area		
acre	4.047×10^3	square meter (m ²)
	4.047×10^{-1}	square hectometer (hm ²)
	4.047×10^{-3}	square kilometer (km ²)
square mile (mi ²)	2.590×10^0	square kilometer (km ²)
Volume		
gallon (gal)	3.785×10^0	liter (L)
	3.785×10^{-3}	cubic meter (m ³)
	3.785×10^0	cubic decimeter (dm ³)
million gallons (Mgal)	3.785×10^3	cubic meter (m ³)
cubic foot (ft ³)	3.785×10^{-3}	cubic hectometer (hm ³)
	2.832×10^{-2}	cubic meter (m ³)
cubic-foot-per-second-per-day [(ft ³ /s/d)]	2.832×10^1	cubic decimeter (dm ³)
	2.447×10^3	cubic meter (m ³)
acre-foot (acre-ft)	2.447×10^{-3}	cubic hectometer (hm ³)
	1.223×10^3	cubic meter (m ³)
	1.223×10^{-3}	cubic hectometer (hm ³)
	1.223×10^{-6}	cubic kilometer (km ³)
Flow rate		
cubic foot per second (ft ³ /s)	2.832×10^1	liter (L/s)
	2.832×10^{-2}	cubic meter per second (m ³ /s)
	2.832×10^1	cubic decimeter per second (dm ³ /s)
gallon per minute (gal/min)	6.309×10^{-2}	liter per second (L/s)
	6.309×10^{-5}	cubic meter per second (m ³ /s)
million gallons per day (Mgal/d)	6.309×10^{-2}	cubic decimeter per second (dm ³ /s)
	4.381×10^{-2}	cubic meter per second
	4.381×10^1	cubic decimeter per second (dm ³ /s)
Mass		
ton, short (2,000 lb)	9.072×10^{-1}	megagram (Mg) or metric ton

Temperature in degrees Celsius (°C) may be converted to degrees Fahrenheit (°F) as follows:

$$^{\circ}\text{F} = (1.8 \times ^{\circ}\text{C}) + 32$$