

Water-Data Report 2009

05133500 RAINY RIVER AT MANITOU RAPIDS, MN

Rainy Basin
Upper Rainy Subbasin

LOCATION.--Lat 48°38'04", long 93°54'47" referenced to North American Datum of 1927, in NW ¼ SE ¼ sec.36, T.160 N., R.26 W., Koochiching County, MN, Hydrologic Unit 09030004, on left bank at Manitou Rapids, 4 mi west of Indus.

DRAINAGE AREA.--19,400 mi².

SURFACE-WATER RECORDS

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.

REVISED RECORDS.--Unpublished, 2009: 1941(M).

GAGE.--Water-stage recorder. Datum of gage is 1,062.48 ft above sea level (NGVD of 1929). Prior to Nov. 10, 1934, non-recording gage at site near Birchdale, 7 mi. downstream at different datum.

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

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.

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DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2008 TO SEPTEMBER 2009
DAILY MEAN VALUES

[e, estimated]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	8,020	11,600	e13,500	e11,800	e9,480	e11,200	22,300	37,500	34,800	18,600	10,300	26,900
2	8,250	10,900	e13,500	e11,600	e9,360	e10,900	21,300	37,800	34,700	18,200	10,300	23,800
3	8,310	10,600	e13,500	e11,600	e9,240	e9,970	21,100	37,600	34,600	16,800	9,840	21,900
4	8,230	10,600	e13,500	e11,700	e9,210	e9,320	20,600	37,200	34,400	15,300	9,640	17,000
5	8,050	10,800	e13,200	e11,800	e9,180	e9,020	19,600	36,600	34,100	14,700	10,000	13,400
6	8,000	12,600	e13,200	e12,100	e9,210	e9,440	19,000	36,000	34,000	14,600	10,200	12,300
7	8,130	15,400	e13,200	e12,100	e9,270	e9,390	18,800	35,500	33,900	14,400	10,300	12,100
8	8,100	19,700	e13,000	e12,400	e9,350	e9,260	18,800	35,100	33,800	14,400	10,400	12,000
9	7,790	22,700	e13,000	e12,700	e9,360	e9,290	19,700	34,900	33,600	14,400	10,600	12,000
10	7,650	24,500	e13,000	e12,700	e9,320	e8,890	20,700	34,500	33,300	13,300	10,600	11,900
11	6,780	24,700	e13,000	e12,800	e9,250	e10,100	22,000	34,100	33,200	12,500	10,700	11,900
12	6,480	24,400	e12,800	e12,800	e9,420	e10,700	23,900	33,800	33,100	12,000	12,100	11,900
13	7,010	23,900	e12,800	e12,400	e9,750	e10,800	26,600	34,200	33,000	11,900	12,700	11,900
14	11,400	23,600	e13,000	e12,200	e9,730	e11,200	29,100	35,200	32,800	12,200	12,800	11,600
15	13,700	23,800	e12,900	e12,300	e9,760	e11,200	32,700	36,300	32,600	12,200	13,100	10,100
16	14,400	23,600	e13,000	e12,800	e9,760	e11,300	36,100	36,700	32,400	12,300	13,200	10,800
17	14,400	23,200	e13,000	e12,800	e9,700	e10,700	38,900	37,700	32,200	12,300	14,000	10,800
18	14,300	22,300	e13,000	e12,800	e9,780	e9,740	42,300	38,300	31,900	12,300	16,000	10,900
19	14,100	21,700	e12,900	e12,800	e9,590	e8,270	44,100	38,200	31,500	12,300	18,200	11,300
20	13,900	21,400	e12,700	e11,900	e9,750	e8,290	43,600	37,600	31,000	12,200	21,200	11,500
21	13,700	18,900	e12,700	e11,300	e10,100	e8,450	42,200	36,900	30,400	12,100	24,800	11,500
22	13,500	16,700	e12,700	e11,300	e11,100	e8,470	40,600	36,100	30,100	12,100	27,300	11,100
23	13,300	16,100	e12,700	e11,700	e11,100	9,250	38,800	35,500	29,700	11,800	28,000	8,190
24	13,200	15,900	e12,700	e11,500	e9,740	12,700	37,400	35,000	28,800	11,800	28,300	6,200
25	12,600	16,100	e12,500	e11,500	e9,050	17,500	37,000	34,700	27,900	10,900	28,500	5,580
26	12,200	16,000	e12,500	e11,600	e9,540	21,800	36,800	34,900	24,100	8,270	29,300	5,300
27	12,200	15,900	e12,300	e11,300	e10,300	24,500	36,700	35,200	21,600	9,920	29,300	5,410
28	12,100	15,800	e12,100	e10,800	e11,200	25,500	37,000	35,400	20,700	11,500	29,000	5,650
29	11,500	14,700	e11,800	e11,500	---	25,400	37,100	35,400	19,500	11,600	28,800	6,290
30	11,300	e13,800	e11,800	e11,400	---	24,600	37,200	35,200	18,800	10,900	28,400	7,650
31	11,900	---	e11,800	e10,800	---	23,600	---	35,000	---	10,400	28,000	---
Total	334,500	541,900	397,300	370,800	271,600	400,750	922,000	1,114,100	916,500	398,190	555,880	348,870
Mean	10,790	18,060	12,820	11,960	9,700	12,930	30,730	35,940	30,550	12,840	17,930	11,630
Max	14,400	24,700	13,500	12,800	11,200	25,500	44,100	38,300	34,800	18,600	29,300	26,900
Min	6,480	10,600	11,800	10,800	9,050	8,270	18,800	33,800	18,800	8,270	9,640	5,300
Ac-ft	663,500	1,075,000	788,000	735,500	538,700	794,900	1,829,000	2,210,000	1,818,000	789,800	1,103,000	692,000
Cfsm	0.56	0.93	0.66	0.62	0.50	0.67	1.58	1.85	1.57	0.66	0.92	0.60
In.	0.64	1.04	0.76	0.71	0.52	0.77	1.77	2.14	1.76	0.76	1.07	0.67

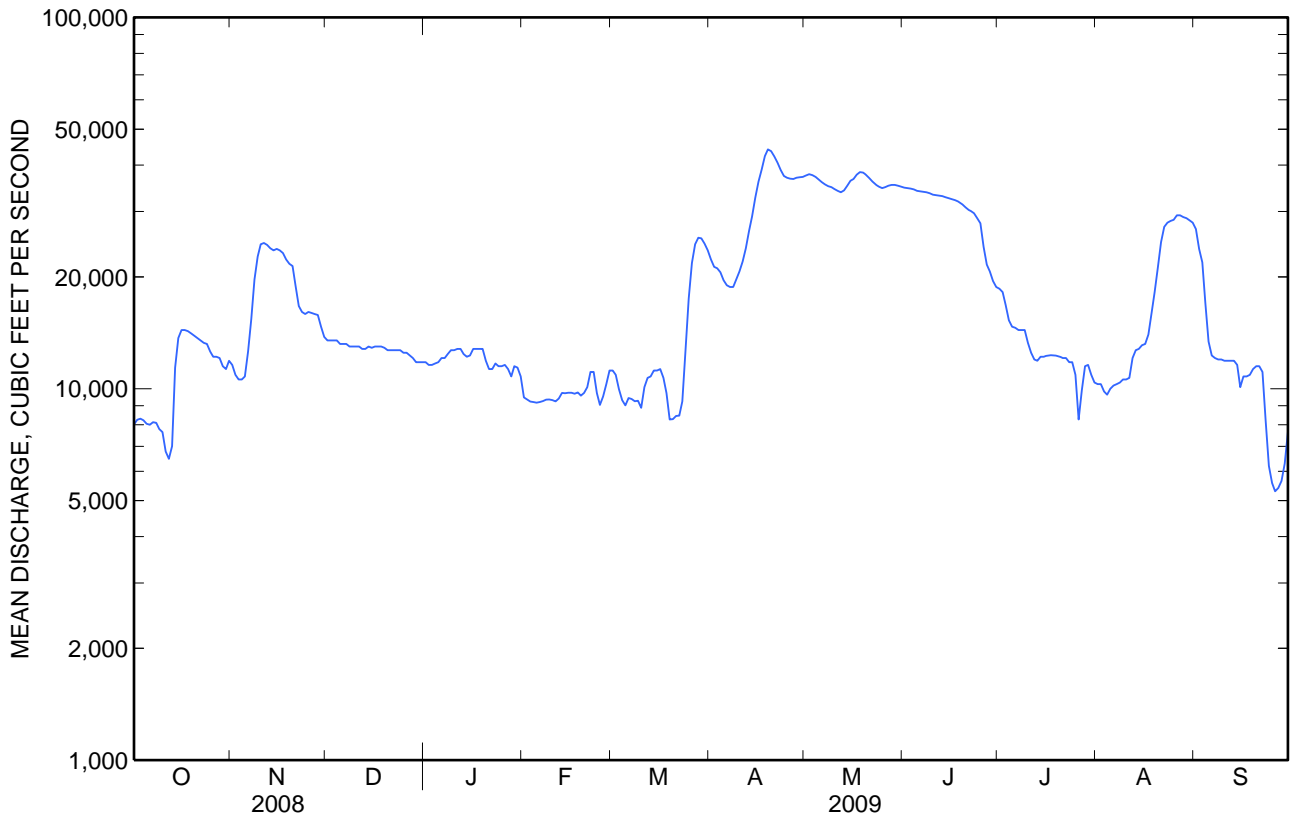
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1929 - 2009, BY WATER YEAR (WY)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	11,710	11,670	10,270	9,215	8,665	8,885	15,830	19,870	20,610	16,770	11,350	10,780
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	4,131	3,796	3,190	2,835	2,805	2,926	4,378	4,106	3,676	3,483	3,422	3,746
(WY)	(2004)	(1977)	(1930)	(2007)	(2007)	(1931)	(1977)	(1977)	(1980)	(1980)	(1980)	(1998)

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SUMMARY STATISTICS

	Calendar Year 2008		Water Year 2009		Water Years 1929 - 2009	
Annual total	6,056,980		6,572,390			
Annual mean	16,550		18,010		12,980	
Highest annual mean					23,260	1950
Lowest annual mean					4,470	1931
Highest daily mean	42,900	Jun 10	44,100	Apr 19	71,300	May 11, 1950
Lowest daily mean	4,430	Sep 10	5,300	Sep 26	928	Dec 26, 1929
Annual seven-day minimum	4,510	Aug 27	6,010	Sep 24	1,500	Dec 24, 1929
Maximum peak flow			44,300	Apr 19	71,600	May 12, 1950
Maximum peak stage			15.38	Apr 19	21.04	May 12, 1950
Annual runoff (ac-ft)	12,010,000		13,040,000		9,405,000	
Annual runoff (cfsm)	0.853		0.928		0.669	
Annual runoff (inches)	11.61		12.60		9.09	
10 percent exceeds	35,500		35,100		26,000	
50 percent exceeds	12,400		12,800		10,300	
90 percent exceeds	5,970		9,270		4,960	



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WATER-QUALITY RECORDS

PERIOD OF RECORD.--

WATER TEMPERATURE: October 1980 to May 1983, June 2009 to current year.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: October 1980 to May 1983, June 2009 to current year.

INSTRUMENTATION.--Analog temperature sensor, June 2009 to current year, which provides continuous recordings. Sensor located at gage.

REMARKS.--Temperature at the sensor was compared independently with a calibrated digital thermometer approximately monthly. Variation of temperature between meter and recorded values were within +/- 0.8 C (corrections applied as appropriate). Water temperature record is rated "Excellent" except for the periods, June 16-24, July 8-14, Aug. 18-20, and Sept. 20-30, which are rated "Good". Prior to the 2009 water year, water temperatures at sensor were collected, reported, and represented within 0.5 C.

Additional water-quality data for this site are available at: URL <http://water.usgs.gov/mn/nwis/qw>.

EXTREMES FOR PERIOD OF RECORD.--

WATER TEMPERATURES: Maximum, 25.0 deg C, July 18, August 14, 1982; minimum 0.0 deg C, many days, most winters.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURES: Maximum 22.8 degree C, Sept 15; minimum 12.6 degree C, Sept 29.

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TEMPERATURE, WATER, DEGREES CELSIUS
WATER YEAR OCTOBER 2008 TO SEPTEMBER 2009

Day	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean
	June			July			August			September		
1	---	---	---	16.6	15.2	15.8	19.1	17.5	18.3	19.0	18.3	18.6
2	---	---	---	17.0	15.9	16.4	19.1	17.0	18.0	19.2	18.3	18.7
3	---	---	---	18.3	16.4	17.3	18.9	17.1	18.0	19.4	18.5	18.9
4	---	---	---	19.5	17.3	18.3	19.4	17.2	18.3	20.0	18.6	19.2
5	---	---	---	20.0	17.9	18.9	19.6	17.3	18.4	20.5	18.9	19.6
6	---	---	---	20.4	18.4	19.3	20.5	17.4	18.8	21.0	19.1	20.0
7	---	---	---	20.6	18.7	19.5	19.7	18.0	18.8	20.8	19.2	19.9
8	---	---	---	21.1	18.8	19.8	19.5	18.4	19.0	20.4	19.3	19.8
9	---	---	---	20.3	19.4	19.7	19.9	18.7	19.2	20.9	19.3	20.0
10	---	---	---	20.8	19.1	19.9	20.9	18.6	19.6	21.0	18.9	19.8
11	---	---	---	19.8	18.5	19.1	22.0	19.0	20.4	21.0	19.9	20.4
12	---	---	---	19.6	17.6	18.6	22.6	19.9	21.2	21.1	19.5	20.2
13	---	---	---	20.1	17.1	18.6	22.1	20.6	21.3	21.5	19.7	20.5
14	---	---	---	18.9	17.9	18.4	---	---	---	22.1	19.9	20.9
15	---	---	---	18.1	17.4	17.8	---	---	---	22.8	20.3	21.4
16	---	---	---	17.4	16.0	16.5	---	---	---	22.3	20.6	21.4
17	16.6	15.8	16.2	16.3	15.6	15.9	---	---	---	22.5	20.9	21.7
18	18.3	16.4	17.3	17.7	15.8	16.6	---	---	---	22.0	20.5	21.2
19	18.4	17.3	17.9	19.3	16.3	17.7	19.2	18.0	18.6	22.1	20.1	21.0
20	19.1	18.0	18.5	18.9	17.5	18.2	18.9	18.3	18.7	21.8	20.4	21.0
21	18.5	17.4	17.9	19.1	17.7	18.4	18.9	18.0	18.4	21.5	20.1	20.7
22	20.6	17.3	19.0	19.3	17.5	18.4	19.2	18.2	18.7	20.8	19.3	20.2
23	21.1	20.2	20.7	19.3	17.3	18.4	19.8	18.6	19.2	20.0	18.0	19.0
24	20.9	19.1	20.0	19.4	18.2	18.7	19.6	19.2	19.4	20.6	17.5	19.0
25	19.1	17.3	18.1	20.1	18.0	18.9	19.6	19.1	19.3	20.8	17.9	19.3
26	19.0	17.0	17.9	22.0	18.3	20.1	19.9	18.9	19.4	20.1	18.7	19.2
27	19.3	18.8	19.0	21.2	19.4	20.2	19.7	19.4	19.6	18.9	16.2	17.7
28	19.6	18.6	19.3	19.7	18.5	19.0	19.4	18.6	19.0	16.2	13.8	15.1
29	18.6	15.5	16.8	19.7	18.0	18.8	18.8	18.2	18.5	14.8	12.6	13.5
30	15.6	15.0	15.3	19.2	17.5	18.3	18.7	18.0	18.3	14.9	13.0	13.9
31	---	---	---	19.5	17.3	18.3	19.0	18.0	18.5	---	---	---
Month	---	---	---	22.0	15.2	18.4	---	---	---	22.8	12.6	19.4