

Water-Data Report 2013

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REVISED RECORDS.--Unpublished, 2009: 1941(M).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

05133500 RAINY RIVER AT MANITOU RAPIDS, MN—Continued

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2012 TO SEPTEMBER 2013
DAILY MEAN VALUES

[e, estimated]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	4,690	4,750	e4,920	e6,770	e6,320	e8,130	4,830	24,000	39,600	32,500	15,300	14,300
2	4,790	4,950	e4,900	e6,800	e6,310	e8,330	4,830	33,300	40,100	31,600	15,000	14,100
3	4,710	5,030	e4,910	e6,780	e6,320	e8,330	4,830	40,000	40,100	29,800	14,800	13,800
4	4,780	5,060	e4,900	e6,710	e6,300	e8,300	4,770	41,500	39,800	26,900	14,700	12,500
5	4,920	5,070	e4,850	e7,800	e6,300	e8,170	4,870	38,900	39,100	23,400	14,600	10,900
6	4,840	5,030	e4,890	e8,500	e6,320	e8,330	4,840	34,400	38,600	19,000	14,600	8,240
7	4,710	4,880	e4,850	e8,510	e6,310	e8,260	4,860	31,800	38,100	17,400	14,600	e5,900
8	4,670	4,720	e4,830	e8,530	e6,310	e8,300	4,860	30,500	37,700	17,000	14,600	e5,420
9	4,660	4,680	e4,860	e8,400	e6,310	e8,330	4,840	30,100	37,200	16,900	14,600	e5,320
10	4,720	4,670	e4,900	e8,680	e6,310	e8,360	4,860	29,600	36,900	18,100	14,500	6,090
11	4,680	4,670	e4,860	e8,430	e6,290	e8,360	4,860	28,900	37,000	18,500	14,500	6,600
12	4,710	4,750	e4,810	e8,290	e6,310	e8,330	4,870	28,000	37,000	18,500	14,500	7,150
13	4,640	4,780	e4,730	e8,400	e6,390	e8,390	4,870	26,800	36,900	18,500	14,300	7,850
14	4,640	4,840	e4,710	e8,340	e7,140	e8,620	4,870	25,300	36,600	18,600	14,300	8,200
15	4,660	4,930	e4,730	e7,220	e7,160	e10,800	4,870	24,300	36,200	19,000	14,300	8,320
16	4,650	4,870	e4,780	e6,740	e7,200	e10,900	4,840	23,400	35,700	18,200	14,300	8,330
17	4,680	4,800	e5,000	e6,480	e7,300	e11,000	4,900	23,000	35,500	17,100	14,200	8,310
18	4,700	4,910	e5,180	e6,480	e7,250	e11,100	4,870	24,400	35,200	16,400	14,200	7,860
19	4,780	4,940	e5,270	e6,460	e7,320	e11,000	4,870	25,100	34,700	16,400	14,300	7,010
20	4,740	4,970	e5,250	e6,440	e7,250	e10,400	4,940	29,100	34,400	16,100	14,200	6,720
21	4,700	5,000	e5,230	e6,360	e7,380	e8,910	4,850	37,100	34,100	16,000	14,200	6,600
22	4,720	5,020	e5,160	e6,410	e7,640	e8,590	4,860	43,500	33,800	15,800	14,200	6,610
23	4,850	5,060	e5,110	e6,400	e8,100	e7,940	4,980	46,200	33,700	15,500	13,400	6,700
24	4,830	e5,100	e5,040	e6,360	e8,070	e7,640	5,050	45,900	33,600	15,100	11,400	6,830
25	4,800	e5,090	e5,110	e6,310	e8,100	e7,450	5,090	44,600	33,600	14,800	10,100	7,380
26	4,830	e5,000	e5,060	e6,350	e8,130	e6,610	5,220	43,100	33,600	16,200	9,430	7,550
27	4,840	e5,040	e5,020	e6,360	e8,230	5,930	5,890	41,500	33,100	21,000	9,110	7,670
28	4,800	e5,020	e4,940	e6,340	e8,300	5,400	7,970	40,200	32,800	22,600	8,280	8,330
29	4,790	e4,990	e6,200	e6,340	---	5,200	9,840	39,000	32,900	22,000	10,400	8,900
30	4,760	e4,950	e6,780	e6,310	---	4,840	13,300	38,300	32,800	17,500	12,900	8,950
31	4,740	---	e6,820	e6,340	---	4,740	---	38,800	---	15,700	13,900	---
Total	147,030	147,570	158,600	220,640	196,670	254,990	164,200	1,050,600	1,080,400	602,100	417,720	248,440
Mean	4,743	4,919	5,116	7,117	7,024	8,225	5,473	33,890	36,010	19,420	13,470	8,281
Max	4,920	5,100	6,820	8,680	8,300	11,100	13,300	46,200	40,100	32,500	15,300	14,300
Min	4,640	4,670	4,710	6,310	6,290	4,740	4,770	23,000	32,800	14,800	8,280	5,320
Ac-ft	291,600	292,700	314,600	437,600	390,100	505,800	325,700	2,084,000	2,143,000	1,194,000	828,500	492,800
Cfsm	0.24	0.25	0.26	0.37	0.36	0.42	0.28	1.75	1.86	1.00	0.69	0.43
In.	0.28	0.28	0.30	0.42	0.38	0.49	0.31	2.01	2.07	1.15	0.80	0.48

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1929 - 2013, BY WATER YEAR (WY)

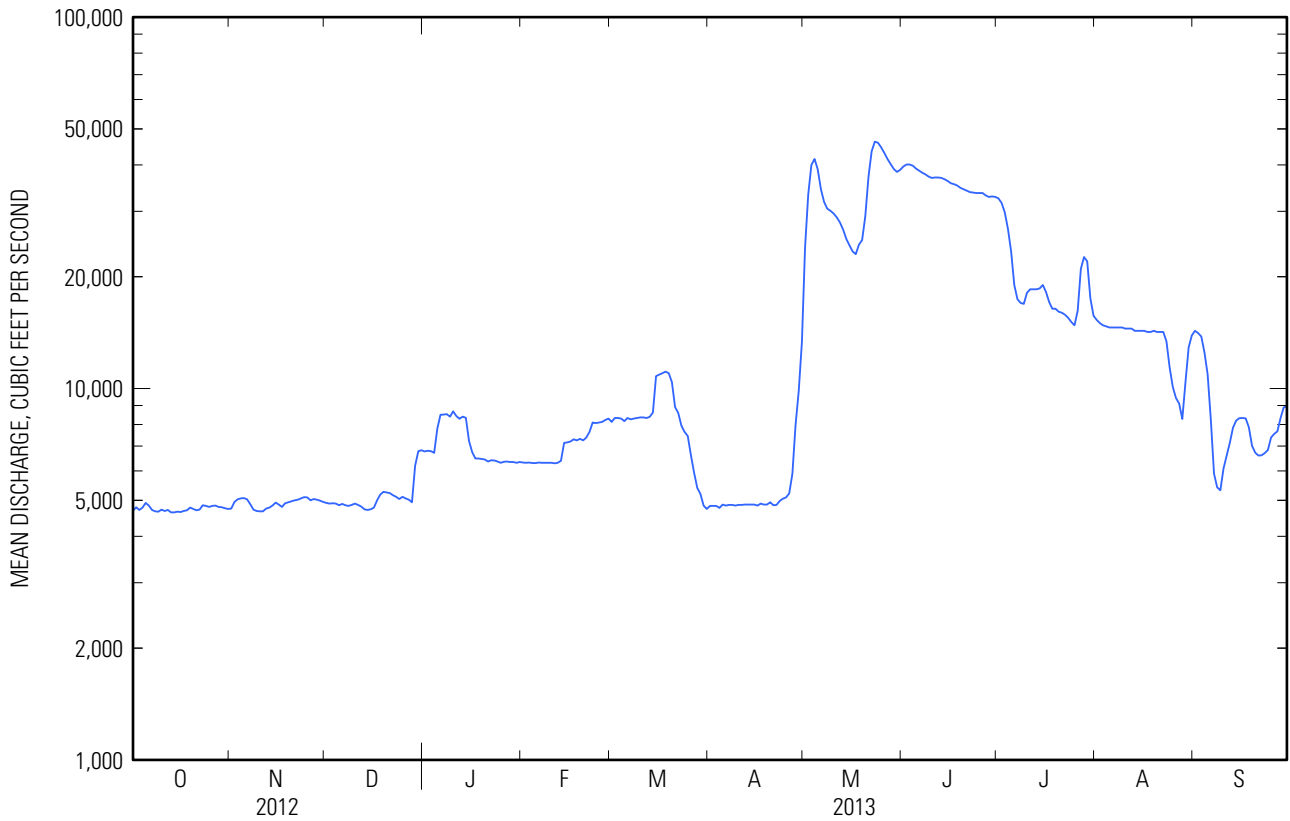
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	11,520	11,500	10,180	9,138	8,603	8,898	15,780	19,900	20,620	16,760	11,310	10,620
Max	42,410	37,280	27,790	18,430	17,240	16,640	38,100	52,880	49,480	47,970	33,700	30,620
(WY)	(1942)	(1972)	(1972)	(1972)	(1969)	(1945)	(1966)	(1950)	(1950)	(1950)	(1944)	(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 2012		Water Year 2013		Water Years 1929 - 2013	
Annual total	3,585,490		4,688,960			
Annual mean	9,796		12,850		12,920	
Highest annual mean					23,260 1950	
Lowest annual mean					4,470 1931	
Highest daily mean	28,300	Jun 24	46,200	May 23	71,300	May 11, 1950
Lowest daily mean	3,760	Mar 6	^a 4,640	Oct 13	928	Dec 26, 1929
Annual seven-day minimum	4,190	Feb 29	4,670	Oct 11	1,500	Dec 24, 1929
Maximum peak flow			46,500	May 23	71,600	May 12, 1950
Maximum peak stage			15.86	May 23	21.04	May 12, 1950
Annual runoff (ac-ft)	7,112,000		9,301,000		9,357,000	
Annual runoff (cfsm)	0.505		0.662		0.666	
Annual runoff (inches)	6.88		8.99		9.05	
10 percent exceeds	22,400		33,900		25,900	
50 percent exceeds	5,240		7,640		10,200	
90 percent exceeds	4,310		4,800		4,930	

^a Also occurred Oct. 14.



05133500 RAINY RIVER AT MANITOU RAPIDS, MN—Continued

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 Oct 1-13, April 4-May 12, Sept 1-Sept 30 which are considered 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, 27.3 C, Aug 5, 2011; minimum -0.4 C, many days, most winters.

EXTREMES FOR CURRENT YEAR.--

WATER TEMPERATURES: Maximum 25.0 C, Aug 28; Minimum -0.2 C, April 9.

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TEMPERATURE, WATER, DEGREES CELSIUS
WATER YEAR OCTOBER 2012 TO SEPTEMBER 2013

Day	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean
	October			November			December			January		
1	15.2	13.0	14.1	4.7	3.2	3.9	0.1	0.1	0.1	0.2	0.1	0.1
2	14.2	11.0	12.8	3.3	2.4	2.9	0.2	0.1	0.1	0.1	0.1	0.1
3	13.7	11.7	12.8	3.9	2.5	3.1	0.2	0.1	0.1	0.2	0.1	0.1
4	12.5	7.4	10.0	3.2	2.1	2.7	0.2	0.1	0.1	0.2	0.1	0.1
5	8.2	5.9	7.1	3.6	2.2	3.0	0.2	0.1	0.1	0.1	0.1	0.1
6	8.2	5.6	6.9	3.7	2.9	3.3	0.2	0.1	0.1	0.2	0.1	0.1
7	9.0	6.2	7.6	4.6	3.5	4.0	0.2	0.1	0.1	0.1	0.1	0.1
8	8.6	7.7	8.1	4.4	3.6	4.0	0.2	0.1	0.1	---	---	---
9	8.3	6.8	7.7	3.6	1.7	2.9	0.2	0.1	0.2	---	---	---
10	7.8	5.7	6.7	1.9	0.9	1.3	0.2	0.1	0.2	0.2	0.1	0.1
11	7.3	5.4	6.2	2.3	1.0	1.9	0.2	0.1	0.2	0.2	0.1	0.1
12	6.9	4.1	5.6	1.0	0.2	0.5	0.2	0.1	0.2	0.1	0.1	0.1
13	8.1	4.9	6.5	0.8	0.1	0.4	0.2	0.1	0.2	0.2	0.1	0.1
14	8.4	6.2	7.3	0.9	0.1	0.5	0.2	0.1	0.2	0.1	0.1	0.1
15	8.7	5.8	7.3	1.0	0.2	0.5	0.2	0.1	0.2	0.1	0.1	0.1
16	10.4	7.5	8.9	0.6	0.1	0.3	0.2	0.1	0.2	0.2	0.1	0.1
17	9.8	8.8	9.3	1.4	0.2	0.7	0.2	0.1	0.2	0.2	0.1	0.1
18	10.0	9.3	9.7	2.6	1.3	1.9	0.2	0.1	0.2	0.2	0.1	0.1
19	9.9	9.2	9.6	3.1	1.8	2.4	0.2	0.1	0.2	0.2	0.1	0.1
20	10.1	8.5	9.4	2.5	1.7	2.0	0.2	0.1	0.2	0.2	0.1	0.1
21	10.0	8.4	9.3	2.8	1.4	2.0	0.2	0.1	0.2	0.2	0.1	0.1
22	9.5	7.9	8.8	2.4	0.2	1.6	0.2	0.1	0.1	0.2	0.1	0.1
23	8.8	8.0	8.4	0.2	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.1
24	9.0	7.8	8.7	0.3	0.2	0.2	0.2	0.1	0.2	0.2	0.1	0.1
25	7.8	5.7	6.6	0.2	0.1	0.1	0.2	0.1	0.2	0.2	0.1	0.1
26	5.7	3.8	4.7	0.2	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.1
27	4.1	3.2	3.6	0.1	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.1
28	3.7	2.5	3.0	0.2	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.1
29	5.0	2.8	3.8	0.2	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.1
30	5.1	3.6	4.4	0.2	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.1
31	4.7	2.4	3.7	---	---	---	0.2	0.1	0.1	0.1	0.1	0.1
Month	15.2	2.4	7.7	4.7	0.1	1.6	0.2	0.1	0.1	---	---	---

05133500 RAINY RIVER AT MANITOU RAPIDS, MN—Continued

TEMPERATURE, WATER, DEGREES CELSIUS
WATER YEAR OCTOBER 2012 TO SEPTEMBER 2013

Day	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean
	February			March			April			May		
1	0.2	0.1	0.1	0.1	0.1	0.1	1.2	0.0	0.5	1.7	0.2	0.6
2	0.2	0.1	0.1	0.2	0.1	0.1	1.7	0.0	0.7	0.8	0.5	0.6
3	0.2	0.1	0.1	0.2	0.1	0.1	1.4	0.1	0.8	1.0	0.2	0.6
4	0.2	0.1	0.1	0.1	0.1	0.1	2.1	0.5	1.2	1.4	0.7	1.1
5	0.2	0.1	0.1	0.1	0.1	0.1	2.3	0.2	1.3	2.2	1.4	1.7
6	0.1	0.1	0.1	0.1	0.1	0.1	1.7	0.9	1.2	3.7	2.1	2.8
7	0.1	0.1	0.1	0.1	0.1	0.1	2.3	0.8	1.5	5.3	3.5	4.4
8	0.2	0.1	0.1	0.1	0.1	0.1	2.4	1.0	1.6	6.7	5.2	5.9
9	0.1	0.1	0.1	0.1	0.1	0.1	2.9	-0.1	1.4	7.9	6.4	7.1
10	0.2	0.1	0.1	0.1	0.1	0.1	2.6	0.3	1.5	8.2	7.5	7.8
11	0.2	0.1	0.1	0.1	0.1	0.1	1.7	0.2	0.7	7.8	6.9	7.4
12	0.1	0.1	0.1	0.1	0.1	0.1	1.6	-0.1	0.5	7.5	6.5	7.0
13	0.1	0.1	0.1	0.1	0.1	0.1	3.3	-0.1	1.4	7.3	6.7	6.9
14	0.1	0.1	0.1	0.1	0.1	0.1	2.9	0.3	1.6	8.6	6.8	7.6
15	0.1	0.1	0.1	0.1	0.1	0.1	2.1	0.4	1.2	9.8	8.2	9.0
16	0.2	0.1	0.1	0.1	0.1	0.1	2.9	0.8	1.8	10.6	9.3	9.9
17	0.2	0.1	0.1	0.1	0.1	0.1	2.9	1.3	2.1	11.0	10.1	10.5
18	0.2	0.1	0.1	0.1	0.1	0.1	3.1	1.6	2.2	10.5	9.8	10.1
19	0.2	0.1	0.1	0.1	0.1	0.1	3.8	0.5	2.1	9.8	9.7	9.8
20	0.1	0.1	0.1	0.1	0.1	0.1	5.1	0.2	2.6	9.8	9.5	9.7
21	0.1	0.1	0.1	0.1	0.1	0.1	3.8	1.7	2.3	9.5	8.4	8.9
22	0.1	0.1	0.1	0.1	0.1	0.1	4.1	0.7	2.3	9.2	8.2	8.6
23	0.2	0.1	0.1	0.2	0.1	0.1	5.3	0.7	3.1	10.2	8.9	9.5
24	0.1	0.1	0.1	0.2	0.1	0.1	5.2	1.8	3.7	10.7	9.7	10.2
25	0.1	0.1	0.1	0.1	0.1	0.1	5.6	2.2	3.8	10.8	10.3	10.5
26	0.1	0.1	0.1	0.1	0.1	0.1	7.7	2.9	5.2	11.5	10.4	10.8
27	0.1	0.1	0.1	0.3	0.1	0.2	6.1	2.2	4.5	12.2	11.1	11.6
28	0.1	0.1	0.1	1.1	0.2	0.5	2.2	1.4	1.8	12.6	11.9	12.2
29	---	---	---	1.7	0.5	1.0	3.0	0.9	1.9	13.0	11.9	12.5
30	---	---	---	2.3	0.9	1.6	2.3	1.2	1.8	12.9	12.5	12.7
31	---	---	---	2.1	0.6	1.3	---	---	---	13.6	12.8	13.2
Month	0.2	0.1	0.1	2.3	0.1	0.2	7.7	-0.1	1.9	13.6	0.2	7.8

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TEMPERATURE, WATER, DEGREES CELSIUS
WATER YEAR OCTOBER 2012 TO SEPTEMBER 2013

Day	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean
	June			July			August			September		
1	13.5	13.1	13.3	22.3	20.9	21.5	19.9	18.5	19.2	21.9	20.8	21.5
2	13.4	12.7	13.1	22.8	21.4	22.0	19.8	18.5	19.2	21.4	---	---
3	13.6	12.6	13.1	22.6	21.9	22.3	19.6	18.5	19.0	21.3	19.8	20.5
4	13.7	13.1	13.4	22.4	21.9	22.1	20.1	18.3	19.1	21.1	19.6	20.3
5	13.8	13.2	13.4	21.9	20.6	21.5	20.0	19.2	19.5	21.1	19.0	19.9
6	14.1	13.0	13.6	21.1	20.5	20.8	19.2	18.5	18.9	22.5	19.5	20.9
7	14.0	13.4	13.7	22.6	21.0	21.7	19.4	17.9	18.6	---	---	---
8	14.4	13.1	13.7	23.9	21.9	22.8	19.0	18.0	18.5	21.8	19.4	20.8
9	14.8	13.9	14.3	23.3	22.6	23.1	18.6	17.8	18.2	20.9	---	---
10	15.2	14.5	14.8	23.0	22.2	22.6	19.4	17.4	18.3	20.7	19.3	20.0
11	15.9	14.6	15.2	22.5	21.5	22.2	19.6	18.3	18.9	20.7	19.0	19.9
12	15.7	14.8	15.2	21.7	20.7	21.2	19.8	18.5	19.1	19.7	17.9	18.8
13	17.4	14.9	16.0	22.9	21.5	22.2	19.8	18.4	19.0	20.3	17.8	18.9
14	17.6	17.0	17.3	23.0	22.4	22.7	20.2	18.3	19.2	19.6	18.0	18.9
15	17.4	16.7	17.0	24.1	22.9	23.4	20.9	18.8	19.7	19.2	17.3	18.0
16	17.6	16.8	17.1	24.5	23.1	23.7	21.3	19.4	20.2	18.5	16.1	17.2
17	16.9	15.7	16.2	24.4	23.4	23.9	21.5	20.1	20.7	18.0	16.0	17.1
18	17.6	15.5	16.5	23.4	21.1	22.0	20.8	19.8	20.2	18.3	17.1	17.6
19	18.0	17.4	17.6	23.6	22.3	22.9	20.9	19.4	20.0	19.5	17.8	18.5
20	17.7	16.9	17.3	23.1	21.9	22.5	---	20.0	---	18.6	15.8	16.9
21	19.3	17.5	18.4	22.3	21.2	21.7	22.0	20.9	21.5	16.5	14.8	15.6
22	19.3	18.8	18.9	21.8	20.9	21.4	21.8	20.0	20.6	16.3	13.9	15.1
23	19.2	18.9	19.1	21.9	20.3	21.0	21.9	19.9	20.7	17.0	14.3	15.6
24	19.5	18.5	19.0	21.3	20.3	20.8	23.0	20.5	21.6	17.8	15.2	16.5
25	19.1	18.4	18.7	21.1	19.9	20.4	24.2	21.4	22.7	17.9	15.7	16.8
26	19.9	18.4	19.1	20.4	18.5	19.4	24.1	21.8	23.0	18.2	15.9	17.0
27	20.5	19.5	20.0	18.5	17.7	18.0	---	---	---	17.9	16.8	17.4
28	20.3	18.4	19.4	18.6	17.4	17.9	25.0	22.3	23.6	17.7	15.8	16.8
29	20.3	18.0	19.0	18.8	17.8	18.3	---	23.1	---	16.5	14.9	15.7
30	21.3	19.8	20.5	19.4	18.4	18.9	23.1	22.0	22.6	17.4	15.4	16.3
31	---	---	---	19.8	18.6	19.2	22.8	21.9	22.3	---	---	---
Month	21.3	12.6	16.5	24.5	17.4	21.4	---	---	---	---	---	---