U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data,
and Information Service

Climatography of the United States No. 20 1971-2000

National Climatic Data Center
Federal Building
151 Patton Avenue
Asheville, North Carolina 28801
www.ncdc.noaa.gov

Station: AGASSIZ REFUGE, MN **COOP ID: 210050**

Climate Division: MN 1 **NWS Call Sign:** **Elevation: 1,142 Feet** **Lat: 48˚18N** **Lon: 95˚59W**

Temperature (˚F)

	Mean (1)			Extremes										Degree Days (1) Base Temp 65		Mean Number of Days (3)					
Month	Daily Max	Daily Min	Mean	Highest Daily(2)	Year	Day	Highest Month(1) Mean	Year	Lowest Daily(2)	Year	Day	Lowest Month(1) Mean	Year	Heating	Cooling	Max >= 100	Max >= 90	Max >= 50	Max <= 32	Min <= 32	Min <= 0
Jan	10.7	-10.0	.4	43+	1993	31	13.9	1990	-44+	1966	29	-14.9	1982	2007	0	.0	.0	.0	27.9	31.0	20.4
Feb	18.8	-2.8	8.0	56+	2000	23	24.1	1998	-46	1996	2	-5.8	1979	1597	0	.0	.0	.2	20.6	27.9	13.8
Mar	31.8	11.3	21.6	71	1967	31	35.8	2000	-37	1962	1	12.8	1975	1347	0	.0	.0	3.1	11.5	29.1	6.3
Apr	49.6	28.5	39.1	94+	1980	22	48.0	1987	-12	1979	6	30.7	1979	780	0	.0	.1	18.6	1.2	19.5	.3
May	65.0	43.0	54.0	96	1964	22	62.2	1977	11	1967	2	44.9	1979	367	26	.0	.5	29.6	.0	3.6	.0
Jun	73.9	52.1	63.0	98	1987	22	69.9	1995	28	1964	1	56.8	1982	130	70	.0	1.0	30.0	.0	.1	.0
Jul	78.1	56.5	67.3	99	1988	5	71.8	1983	38+	1983	5	60.2	1992	57	128	.0	1.9	31.0	.0	.0	.0
Aug	77.2	53.6	65.4	97+	1989	1	70.2	1983	31	1982	27	57.3	1977	99	111	.0	1.6	31.0	.0	.1	.0
Sep	66.2	43.0	54.6	94+	1983	3	61.1	1998	19+	1974	22	50.7	1984	321	9	.0	.2	29.3	.0	3.1	.0
Oct	52.6	30.9	41.8	86+	1989	1	48.0	2000	1	1976	26	36.3	1976	722	0	.0	.0	20.8	.7	15.1	.0
Nov	30.9	14.5	22.7	70+	1999	1	34.4	1999	-29	1985	29	13.6	1985	1268	0	.0	.0	3.2	14.6	27.8	3.0
Dec	15.9	-1.9	7.0	54	1962	2	20.0	1997	-40	1967	31	-4.8	1983	1799	0	.0	.0	.1	26.1	31.0	15.1
Ann	47.6	26.6	37.1	99	Jul 1988	5	71.8	Jul 1983	-46	Feb 1996	2	-14.9	Jan 1982	10494	344	.0	5.3	196.9	102.6	188.3	58.9

\+ Also occurred on an earlier date(s)

@ Denotes mean number of days greater than 0 but less than .05

Complete documentation available from: www.ncdc.noaa.gov/oa/climate/normals/usnormals.html

(1) From the 1971-2000 Monthly Normals

(2) Derived from station's available digital record: 1961-2001

(3) Derived from 1971-2000 serially complete daily data

Issue Date: February 2004

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Precipitation (inches)

Precipitation Totals

Month	Means/ Medians(1) Mean	Means/ Medians(1) Median	Extremes Highest Daily(2)	Year	Day	Highest Monthly(1)	Year	Lowest Monthly(1)	Year
Jan	.59	.60	.52	1975	11	1.50	1989	.06	1978
Feb	.48	.36	.52	1977	24	1.16	1979	.05	1993
Mar	.72	.69	1.06	1983	7	2.40	1983	.06	1986
Apr	1.21	.93	1.65	1997	6	3.58	1979	.00	1988
May	2.71	2.42	2.30	1988	28	5.83	1999	.21	1980
Jun	3.52	3.14	2.79	1968	6	6.66	1981	.75	1987
Jul	3.63	3.35	3.17	1975	2	6.37	1982	.75	1989
Aug	3.01	2.38	7.03	1964	2	6.68	1974	.41	1997
Sep	2.57	2.48	2.26	1975	1	6.39	1973	.20	1976
Oct	1.76	1.55	1.70	2000	27	5.66	1971	.01	1976
Nov	1.13	.98	1.20	1986	8	3.36	1977	.04+	1999
Dec	.53	.45	.58	1967	21	1.32	1996	.12	1979
Ann	21.86	22.66	7.03	Aug 1964	2	6.68	Aug 1974	.00	Apr 1988

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	8.5	2.2	@	.0
Feb	6.5	1.5	.1	.0
Mar	6.6	2.2	.1	@
Apr	6.8	3.2	.6	.2
May	9.8	5.7	1.4	.7
Jun	11.1	7.1	2.5	.7
Jul	11.1	6.8	2.4	.9
Aug	9.3	5.8	2.0	.7
Sep	8.6	5.1	1.7	.6
Oct	7.5	4.0	1.2	.3
Nov	7.7	3.1	.7	.1
Dec	8.5	1.9	@	.0
Ann	102.0	48.6	12.7	4.2

Precipitation Probabilities (1)

Probability that the monthly/annual precipitation will be equal to or less than the indicated amount

Monthly/Annual Precipitation vs Probability Levels
These values were determined from the incomplete gamma distribution

Month	.05	.10	.20	.30	.40	.50	.60	.70	.80	.90	.95
Jan	.12	.18	.26	.34	.42	.51	.61	.72	.88	1.13	1.36
Feb	.07	.12	.18	.25	.32	.39	.48	.58	.72	.95	1.17
Mar	.11	.17	.28	.38	.48	.59	.72	.88	1.09	1.44	1.77
Apr	.08	.20	.39	.56	.75	.96	1.20	1.50	1.90	2.56	3.20
May	.55	.79	1.19	1.56	1.93	2.32	2.77	3.30	4.01	5.15	6.23
Jun	1.08	1.42	1.92	2.34	2.76	3.19	3.66	4.22	4.93	6.05	7.09
Jul	1.23	1.57	2.07	2.50	2.90	3.33	3.78	4.32	5.01	6.08	7.06
Aug	.89	1.18	1.61	1.98	2.34	2.71	3.13	3.62	4.25	5.23	6.15
Sep	.42	.64	1.01	1.37	1.73	2.13	2.58	3.14	3.88	5.08	6.23
Oct	.13	.24	.47	.71	.98	1.29	1.66	2.13	2.79	3.89	4.98
Nov	.10	.17	.32	.48	.65	.85	1.08	1.37	1.78	2.45	3.11
Dec	.15	.20	.27	.34	.41	.47	.55	.64	.75	.94	1.11
Ann	15.72	16.91	18.44	19.60	20.63	21.62	22.64	23.77	25.14	27.13	28.84

\+ Also occurred on an earlier date(s)
\# Denotes amounts of a trace
@ Denotes mean number of days greater than 0 but less than .05
****** Statistics not computed because less than six years out of thirty had measurable precipitation

(1) From the 1971-2000 Monthly Normals
(2) Derived from station's available digital record: 1961-2001
(3) Derived from 1971-2000 serially complete daily data

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Snow (inches)

Snow Totals

Means/Medians (1)

Extremes (2)

Mean Number of Days (1)

Snow Fall >= Thresholds

Snow Depth >= Thresholds

Month	Snow Fall Mean	Snow Fall Median	Snow Depth Mean	Snow Depth Median	Highest Daily Snow Fall	Year	Day	Highest Monthly Snow Fall	Year	Highest Daily Snow Depth	Year	Day	Highest Monthly Mean Snow Depth	Year	0.1	1.0	3.0	5.0	10.0	1	3	5	10
Jan	8.9	7.8	11	11	5.9	1989	7	23.9	1989	26	1971	31	21	1971	9.2	3.5	.7	.1	.0	30.8	30.8	29.6	15.8
Feb	5.6	4.5	13	13	7.5	1977	24	14.8	1977	28	1972	29	23+	1997	6.7	1.9	.4	.1	.0	27.6	27.4	27.3	19.1
Mar	5.7	4.8	10	11	6.9	1997	4	14.5	1976	30	1997	8	27	1997	5.4	2.3	.4	.1	.0	20.7	19.3	18.0	10.7
Apr	1.7	1.3	2	#	5.2	1994	27	5.4	1992	24	1996	5	12	1996	1.6	.7	.2	@	.0	3.9	2.6	2.2	1.6
May	.1	.0	#	0	1.3	1991	1	1.3	1991	1	1991	1	#+	1997	.1	.1	.0	.0	.0	@	.0	.0	.0
Jun	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Jul	.0	.0	#	0	.0	0	0	.0	0	#	1975	1	#	1975	.0	.0	.0	.0	.0	.0	.0	.0	.0
Aug	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Sep	.1	.0	#	0	1.4	1995	22	1.4	1995	#+	1995	21	#+	1995	.1	@	.0	.0	.0	.0	.0	.0	.0
Oct	1.0	.1	#	#	4.0	1997	13	5.8	1997	4	1997	13	#+	2000	.8	.4	.1	.0	.0	.7	.1	.0	.0
Nov	7.9	6.6	2	2	8.0	1998	19	23.5	1995	17	1977	29	8	1977	6.2	3.0	.7	.2	.0	14.0	9.3	4.0	.9
Dec	7.5	6.3	6	5	6.3	1988	27	18.5	1996	20	1996	30	15+	1996	9.5	2.9	.3	.1	.0	27.5	22.8	16.8	5.9
Ann	38.5	31.4	N/A	N/A	8.0	Nov 1998	19	23.9	Jan 1989	30	Mar 1997	8	27	Mar 1997	39.6	14.8	2.8	.6	.0	125.2	112.3	97.9	54.0

+ Also occurred on an earlier date(s) #Denotes trace amounts

(1) Derived from Snow Climatology and 1971-2000 daily data

@ Denotes mean number of days greater than 0 but less than .05

(2) Derived from 1971-2000 daily data

-9/-9.9 represents missing values

Annual statistics for Mean/Median snow depths are not appropriate

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Freeze Data

Spring Freeze Dates (Month/Day)

Temp (F)	Probability of later date in spring (thru Jul 31) than indicated(*)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	6/01	5/28	5/25	5/23	5/20	5/18	5/15	5/12	5/08
32	5/27	5/22	5/18	5/15	5/12	5/08	5/05	5/01	4/26
28	5/13	5/08	5/05	5/02	4/30	4/27	4/25	4/21	4/17
24	5/05	4/30	4/26	4/23	4/20	4/17	4/13	4/10	4/04
20	4/19	4/16	4/14	4/12	4/10	4/08	4/06	4/04	3/31
16	4/15	4/11	4/09	4/06	4/04	4/02	3/31	3/28	3/25

Fall Freeze Dates (Month/Day)

Temp (F)	Probability of earlier date in fall (beginning Aug 1) than indicated(*)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	8/28	9/02	9/05	9/08	9/10	9/13	9/15	9/19	9/23
32	9/04	9/10	9/13	9/17	9/20	9/23	9/26	9/29	10/05
28	9/15	9/20	9/23	9/26	9/29	10/02	10/05	10/08	10/13
24	9/23	9/29	10/03	10/07	10/10	10/13	10/17	10/21	10/27
20	10/01	10/07	10/12	10/17	10/21	10/24	10/29	11/03	11/09
16	10/15	10/21	10/25	10/29	11/01	11/04	11/08	11/12	11/18

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	130	124	120	116	112	109	105	100	94
32	155	147	141	135	130	125	120	114	105
28	171	164	159	155	151	148	143	139	132
24	198	189	183	177	173	168	162	156	148
20	217	209	203	198	193	188	183	177	169
16	231	224	218	214	210	206	201	196	189

***** Probability of observing a temperature as cold, or colder, later in the spring or earlier in the fall than the indicated date.

0/00 Indicates that the probability of occurrence of threshold temperature is less than the indicated probability.

Derived from 1971-2000 serially complete daily data

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Degree Days to Selected Base Temperatures (˚F)

Heating Degree Days (1)

Base Below	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
65	2007	1597	1347	780	367	130	57	99	321	722	1268	1799	10494
60	1852	1457	1192	633	248	59	15	39	196	567	1118	1644	9020
57	1759	1373	1099	548	190	31	6	20	134	476	1028	1551	8215
55	1697	1317	1037	493	155	20	1	12	99	417	968	1489	7705
50	1542	1177	885	364	85	5	0	2	39	280	818	1334	6531
32	991	699	401	67	2	0	0	0	0	23	330	798	3311

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	7	26	76	278	684	930	1094	1035	678	325	52	22	5207
55	0	0	0	13	124	260	382	334	87	5	0	0	1205
57	0	0	0	8	97	212	325	280	62	2	0	0	986
60	0	0	0	4	63	149	241	206	34	0	0	0	697
65	0	0	0	0	26	70	128	111	9	0	0	0	344
70	0	0	0	0	9	22	52	46	2	0	0	0	131

Growing Degree Units (2)

Base	Growing Degree Units (Monthly)												Growing Degree Units (Accumulated Monthly)											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
40	0	0	8	150	512	728	887	823	489	186	12	0	0	0	8	158	670	1398	2285	3108	3597	3783	3795	3795
45	0	0	0	77	364	578	732	668	346	101	2	0	0	0	0	77	441	1019	1751	2419	2765	2866	2868	2868
50	0	0	0	36	243	429	577	513	219	43	0	0	0	0	0	36	279	708	1285	1798	2017	2060	2060	2060
55	0	0	0	14	141	285	422	359	122	13	0	0	0	0	0	14	155	440	862	1221	1343	1356	1356	1356
60	0	0	0	3	68	163	269	222	57	4	0	0	0	0	0	3	71	234	503	725	782	786	786	786
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	0	6	108	320	455	575	524	299	123	9	0	0	0	6	114	434	889	1464	1988	2287	2410	2419	2419

(1) Derived from the 1971-2000 Monthly Normals
(2) Derived from 1971-2000 serially complete daily data
Note: For corn, temperatures below 50 are set to 50, and temperatures above 86 are set to 86

Complete documentation available from:
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Notes

a. The monthly means are simple arithmetic averages computed by summing the monthly values for the period 1971-2000 and dividing by thirty. Prior to averaging, the data are adjusted if necessary to compensate for data quality issues, station moves or changes in station reporting practices. Missing months are replaced by estimates based on neighboring stations.

b. The median is defined as the middle value in an ordered set of values. The median is being provided for the snow and precipitation elements because the mean can be a misleading value for precipitation normals.

c. Only observed validated values were used to select the extreme daily values.

d. Extreme monthly temperature/precipitation means were selected from the monthly normals data.
Monthly snow extremes were calculated from daily values quality controlled to be consistent with the Snow Climatology.

e. Degree Days were derived using the same techniques as the 1971-2000 normals.
Compete documentation for the 1971-2000 Normals is available on the internet from:
www.ncdc.noaa.gov/oa/climate/normals/usnormals.html

f. Mean "number of days statistics" for temperature and precipitation were calculated from a serially complete daily data set .
Documentation of the serially complete data set is available from the link below:

g. Snowfall and snow depth statistics were derived from the Snow Climatology.
Documentation for the Snow Climatology project is available from the link under references.

Data Sources for Tables

Several different data sources were used to create the Clim20 climate summaries. In some cases the daily extremes appear inconsistent with the monthly extremes and or the mean number of days statistics. For example, a high daily extreme value may not be reflected in the highest monthly value or the mean number of days threshold that is less than and equal to the extreme value. Some of these difference are caused by different periods of record. Daily extremes are derived from the station's entire period of record while the serial data and normals data were are for the 1971-2000 period. Therefore extremes observed before 1971 would not be included in the 1971-2000 normals or the 1971-2000 serial daily data set. Inconsistencies can also occur when monthly values are adjusted to reflect the current observing conditions or were replaced during the 1971-2000 Monthly Normals processing and are not reconciled with the Summary of the Day data.

a. Temperature/ Precipitation Tables
   1. 1971-2000 Monthly Normals
   2. Cooperative Summary of the Day
   3. National Weather Service station records
   4. 1971-2000 serially complete daily data

b. Degree Day Table
   1. Monthly and Annual Heating and Cooling Degree Days Normals to Selected Bases derived from 1971-2000 Monthly Normals
   2. Daily Normal Growing Degree Units to Selected Base Temperatures derived from 1971-2000 serially complete daily data

c. Snow Tables
   1. Snow Climatology
   2. Cooperative Summary of the Day

d. Freeze Data Table
   1971-2000 serially complete daily data

References

U.S. Climate Normals 1971-2000, www.ncdc.noaa.gov/normals.html
U.S. Climate Normals 1971-2000-Products Clim20, www.ncdc.noaa.gov/oa/climate/normals/usnormalsprods.html
Snow Climatology Project Description, www.ncdc.noaa.gov/oa/climate/monitoring/snowclim/mainpage.html
Eischeid, J. K., P. Pasteris, H. F. Diaz, M. Plantico, and N. Lott, 2000: Creating a serially complete, national daily time series of temperature and precipitation for the Western United States. J. Appl. Meteorol., 39, 1580-1591,
www1.ncdc.noaa.gov/pub/data/special/ serialcomplete_jam_0900.pdf