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: HASTINGS DAM 2, MN **COOP ID: 213567**

Climate Division: MN 9 **NWS Call Sign:** **Elevation: 695 Feet** **Lat: 44˚46N** **Lon: 92˚52W**

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	21.0	1.9	11.5	45	1998	3	24.5	1990	-34	1994	19	-1.1	1977	1659	0	.0	.0	.1	24.5	31.0	13.1
Feb	28.0	8.7	18.4	55	2000	26	31.4	1998	-36	1996	3	6.3	1979	1306	0	.0	.0	.6	16.3	27.3	7.9
Mar	39.1	21.5	30.3	72	1991	26	39.2	2000	-8+	1996	27	21.7	1975	1077	0	.0	.0	5.6	7.0	26.1	2.4
Apr	55.3	35.8	45.6	86	1991	6	52.8	1987	8	1995	5	38.2	1975	586	2	.0	.1	21.5	.4	11.8	.0
May	68.5	47.5	58.0	94	2001	15	65.2	1977	29	1990	2	52.1	1997	254	38	.0	.3	30.5	.0	1.5	.0
Jun	77.8	57.3	67.6	95+	1995	18	73.6	1988	38	1998	2	62.6	1982	50	126	@	1.8	30.0	.0	.0	.0
Jul	81.9	62.3	72.1	101	1995	14	76.4	1988	50+	1992	22	64.8	1992	15	235	.1	3.8	31.0	.0	.0	.0
Aug	79.6	60.3	70.0	94+	2001	8	75.6	1983	49+	1994	6	65.3	1992	27	180	.1	1.6	31.0	.0	.0	.0
Sep	70.5	50.9	60.7	92	1976	7	66.6	1998	30	1965	26	54.6	1993	167	39	.0	.5	29.7	.0	.4	.0
Oct	58.0	39.4	48.7	92	1997	3	54.6	1973	19	1996	31	43.6	1988	506	1	.0	@	25.5	.1	7.7	.0
Nov	39.8	24.4	32.1	78	1999	9	41.7	1999	-8+	1996	27	23.2	1991	988	0	.0	.0	6.9	7.8	24.4	.9
Dec	25.7	9.6	17.7	68	1998	2	27.1	1997	-24+	2000	26	3.1	1983	1469	0	.0	.0	.4	20.6	30.7	8.2
Ann	53.8	35.0	44.4	101	Jul 1995	14	76.4	Jul 1988	-36	Feb 1996	3	-1.1	Jan 1977	8104	621	.2	8.1	212.8	76.7	160.9	32.5

\+ 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: 1948-2001

(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	.88	.67	1.44	1996	18	2.73	1996	.12	1991
Feb	.63	.55	.83	1984	12	2.26	1981	.00	1987
Mar	1.67	1.25	1.86	1998	28	4.12	1998	.33	1994
Apr	2.76	2.73	3.10	1975	28	7.05	1975	.03	1987
May	3.36	3.44	1.83	1973	1	5.77	1991	.49	1976
Jun	4.12	3.62	5.83	1965	1	8.71	1998	.26	1988
Jul	4.42	4.05	5.37	1987	24	13.83	1997	1.20	1988
Aug	4.01	3.87	3.34	1956	3	8.90	1973	.80	1976
Sep	3.09	3.00	5.00	1992	16	7.62	1986	.65	2000
Oct	2.19	2.16	2.40	1955	5	5.05	1995	.15	1976
Nov	1.97	1.50	1.72	1996	16	5.16	1991	.05	1976
Dec	.82	.65	1.65	1982	25	3.24	1982	.16	1989
Ann	29.92	30.59	5.83	Jun 1965	1	13.83	Jul 1997	.00	Feb 1987

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	7.8	3.1	.1	@
Feb	6.1	1.9	.2	.0
Mar	8.6	4.6	.9	.2
Apr	10.7	6.2	1.7	.4
May	12.1	7.6	2.2	.6
Jun	11.5	8.0	2.5	.9
Jul	10.9	6.7	2.8	1.3
Aug	10.6	6.5	2.7	1.0
Sep	9.6	5.7	2.0	.8
Oct	8.6	4.6	1.6	.4
Nov	8.4	4.4	1.4	.3
Dec	7.5	2.7	.2	.1
Ann	112.4	62.0	18.3	6.0

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	.14	.21	.34	.46	.59	.73	.88	1.07	1.33	1.75	2.15
Feb	.06	.13	.24	.33	.42	.52	.64	.78	.97	1.27	1.56
Mar	.38	.54	.78	1.00	1.22	1.46	1.72	2.03	2.44	3.09	3.71
Apr	.41	.65	1.04	1.43	1.82	2.26	2.76	3.37	4.19	5.53	6.81
May	1.25	1.56	2.02	2.39	2.75	3.12	3.52	3.98	4.57	5.48	6.31
Jun	1.06	1.45	2.05	2.58	3.10	3.65	4.26	4.98	5.93	7.42	8.82
Jul	1.14	1.56	2.20	2.76	3.32	3.91	4.56	5.34	6.35	7.95	9.45
Aug	1.48	1.86	2.40	2.85	3.28	3.72	4.20	4.75	5.46	6.55	7.55
Sep	.65	.93	1.38	1.80	2.21	2.66	3.16	3.76	4.56	5.83	7.03
Oct	.32	.50	.82	1.12	1.44	1.79	2.19	2.68	3.34	4.41	5.45
Nov	.29	.45	.74	1.01	1.29	1.60	1.96	2.40	2.99	3.96	4.89
Dec	.15	.22	.34	.46	.57	.69	.83	1.00	1.22	1.58	1.93
Ann	20.45	22.26	24.59	26.37	27.96	29.50	31.10	32.87	35.02	38.17	40.89

\+ 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: 1948-2001
(3) Derived from 1971-2000 serially complete daily data

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Snow (inches)

Snow Totals

Means/Medians (1)

Month	Snow Fall Mean	Snow Fall Median	Snow Depth Mean	Snow Depth Median
Jan	10.5	8.5	9	9
Feb	5.9	6.2	9	10
Mar	8.8	6.0	4	3
Apr	1.9	.0	#	#
May	#	.0	0	0
Jun	.0	.0	0	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	.0	.0	0	0
Oct	.0	.0	#	0
Nov	5.1	2.5	2	1
Dec	8.9	7.7	4	3
Ann	41.1	30.9	N/A	N/A

Extremes (2)

Month	Highest Daily Snow Fall	Year	Day	Highest Monthly Snow Fall	Year	Highest Daily Snow Depth	Year	Day	Highest Monthly Mean Snow Depth	Year
Jan	16.0	1982	23	39.5	1982	41	1982	24	23	1997
Feb	5.0	1973	14	11.7	1981	23	1997	1	18	1979
Mar	13.0	1985	4	23.0	1989	20	1989	9	13	1975
Apr	15.0	1985	1	19.0	1983	15	1985	1	4	1975
May	#	1989	6	#+	1989	0	0	0	0	0
Jun	.0	0	0	.0	0	0	0	0	0	0
Jul	.0	0	0	.0	0	0	0	0	0	0
Aug	.0	0	0	.0	0	0	0	0	0	0
Sep	.0	0	0	.0	0	0	0	0	0	0
Oct	.8	1987	24	1.1	1987	1	1987	24	#+	1988
Nov	14.0	1991	1	36.0	1991	28	1991	10	15	1983
Dec	10.0	1985	1	24.0	1985	25	2000	31	14	1996
Ann	16.0	Jan 1982	23	39.5	Jan 1982	41	Jan 1982	24	23	Jan 1997

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	5.7	4.3	1.4	.4	.1
Feb	3.5	2.4	.6	.1	.0
Mar	3.1	2.6	.9	.3	.1
Apr	.5	.4	.2	.1	@
May	.0	.0	.0	.0	.0
Jun	.0	.0	.0	.0	.0
Jul	.0	.0	.0	.0	.0
Aug	.0	.0	.0	.0	.0
Sep	.0	.0	.0	.0	.0
Oct	.1	.0	.0	.0	.0
Nov	2.3	1.9	.6	.2	@
Dec	4.9	3.2	.9	.3	@
Ann	20.1	14.8	4.6	1.4	.2

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	25.9	22.2	19.9	9.0
Feb	22.2	20.2	15.4	11.5
Mar	12.2	8.8	7.7	5.1
Apr	1.2	.8	.7	.3
May	.0	.0	.0	.0
Jun	.0	.0	.0	.0
Jul	.0	.0	.0	.0
Aug	.0	.0	.0	.0
Sep	.0	.0	.0	.0
Oct	@	.0	.0	.0
Nov	5.6	3.0	2.3	.7
Dec	19.2	12.4	7.3	3.2
Ann	86.3	67.4	53.3	29.8

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

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

-9/-9.9 represents missing values
Annual statistics for Mean/Median snow depths are not appropriate

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

(2) Derived from 1971-2000 daily data

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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	5/29	5/23	5/19	5/15	5/12	5/09	5/05	5/01	4/25
32	5/22	5/15	5/10	5/06	5/02	4/28	4/23	4/18	4/11
28	5/05	4/29	4/25	4/22	4/19	4/15	4/12	4/08	4/02
24	4/23	4/18	4/14	4/11	4/09	4/06	4/03	3/30	3/25
20	4/15	4/10	4/07	4/04	4/02	3/30	3/27	3/24	3/19
16	4/09	4/03	3/30	3/26	3/23	3/19	3/16	3/11	3/05

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	9/16	9/20	9/23	9/25	9/28	9/30	10/03	10/06	10/10
32	9/23	9/28	10/02	10/05	10/08	10/10	10/13	10/17	10/22
28	9/29	10/06	10/10	10/14	10/18	10/21	10/25	10/29	11/05
24	10/13	10/18	10/22	10/26	10/29	11/02	11/05	11/09	11/15
20	10/21	10/27	10/31	11/03	11/06	11/09	11/13	11/17	11/22
16	10/28	11/03	11/07	11/11	11/14	11/18	11/22	11/26	12/02

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	161	153	147	143	138	133	129	123	115
32	185	176	169	163	158	153	147	140	131
28	209	199	192	187	181	176	170	163	154
24	228	220	213	208	203	198	192	186	177
20	241	233	227	222	218	213	209	203	195
16	263	254	247	241	236	230	225	218	209

***** 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	1659	1306	1077	586	254	50	15	27	167	506	988	1469	8104
60	1504	1166	922	444	153	14	1	5	79	357	838	1314	6797
57	1411	1082	829	364	105	5	0	1	44	276	748	1221	6086
55	1349	1026	767	314	80	2	0	0	28	227	688	1159	5640
50	1194	886	617	205	34	0	0	0	6	125	545	1004	4616
32	661	434	187	13	0	0	0	0	0	3	149	495	1942

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	25	53	134	420	806	1066	1243	1176	862	521	152	49	6507
55	0	0	0	30	173	378	530	464	199	32	1	0	1807
57	0	0	0	20	137	321	468	403	156	19	0	0	1524
60	0	0	0	10	91	240	376	313	101	7	0	0	1138
65	0	0	0	2	38	126	235	180	39	1	0	0	621
70	0	0	0	0	12	50	123	84	10	0	0	0	279

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	1	34	223	565	855	993	918	632	295	37	2	0	1	35	258	823	1678	2671	3589	4221	4516	4553	4555
45	0	0	11	133	417	705	838	763	485	178	16	0	0	0	11	144	561	1266	2104	2867	3352	3530	3546	3546
50	0	0	3	67	275	555	683	608	343	94	3	0	0	0	3	70	345	900	1583	2191	2534	2628	2631	2631
55	0	0	0	30	161	406	528	453	216	40	0	0	0	0	0	30	191	597	1125	1578	1794	1834	1834	1834
60	0	0	0	10	84	264	375	300	115	13	0	0	0	0	0	10	94	358	733	1033	1148	1161	1161	1161
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	0	21	142	344	549	668	603	379	164	22	0	0	0	21	163	507	1056	1724	2327	2706	2870	2892	2892

(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