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: THORHULT 1 S, MN **COOP ID: 218254**

Climate Division: MN 2 **NWS Call Sign:** **Elevation: 1,190 Feet** **Lat: 48˚13N** **Lon: 95˚15W**

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	16.3	-7.9	4.2	49	1981	24	17.3	1990	-49	1996	20	-9.0	1979	1887	0	.0	.0	.0	28.1	31.0	20.7
Feb	24.7	-.1	12.3	56	2000	22	28.0	1998	-51+	1996	2	-.9	1989	1476	0	.0	.0	.3	20.0	28.0	14.5
Mar	37.2	13.3	25.3	76	1963	31	34.8	1973	-41	1974	24	14.7	1996	1234	0	.0	.0	4.0	10.8	28.7	6.6
Apr	54.3	27.8	41.1	96	1980	21	50.7	1987	-21	1975	1	32.9	1996	720	1	.0	.1	18.3	1.3	21.0	.5
May	68.9	40.1	54.5	94	1964	21	64.3	1977	10	1966	1	44.7	1979	356	29	.0	.3	29.4	.0	7.1	.0
Jun	76.3	48.8	62.6	98	1995	18	71.1	1988	20	1964	1	57.2	1982	140	68	.0	1.0	30.0	.0	1.0	.0
Jul	80.6	53.7	67.2	101	1988	5	72.7	1983	33+	1980	26	59.6	1992	63	129	@	1.3	31.0	.0	.0	.0
Aug	78.9	52.0	65.5	98+	1989	3	71.0	1984	27	1986	28	60.2	1977	92	105	.0	1.4	31.0	.0	.2	.0
Sep	68.3	41.7	55.0	94	1978	5	59.9	1998	10	1974	22	50.3	1974	308	6	.0	.2	29.1	.0	4.9	.0
Oct	55.4	31.7	43.6	88	1963	5	49.3	1973	0	1956	22	39.0	1976	664	0	.0	.0	21.0	.7	17.2	.0
Nov	35.1	16.1	25.6	73	1999	8	35.6	1981	-31	1985	28	16.7	1996	1181	0	.0	.0	3.7	14.0	28.2	3.8
Dec	20.9	-.4	10.3	57	1962	1	22.0	1997	-43	1990	30	-1.8	1983	1698	0	.0	.0	.2	26.0	30.8	15.6
Ann	51.4	26.4	38.9	101	Jul 1988	5	72.7	Jul 1983	-51+	Feb 1996	2	-9.0	Jan 1979	9819	338	@	4.3	198.0	100.9	198.1	61.7

\+ 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	.44	.29	.54	1950	24	2.13	1975	.00+	2000
Feb	.34	.05	1.42	1977	23	2.67	1977	.00+	1999
Mar	.72	.60	1.21	1983	6	2.35	1976	.00+	1997
Apr	1.28	.94	2.00	1997	6	3.88	1979	.00+	1988
May	2.74	2.28	2.68	1987	21	6.41	1977	.10	1976
Jun	3.87	3.93	2.78	1984	8	8.84	1975	.57	1988
Jul	3.71	3.26	4.80	1972	19	7.84	1978	.97	1989
Aug	3.99	3.27	6.50	2001	1	9.88	1985	1.33	1997
Sep	2.81	2.39	3.54	1999	1	8.39	1999	.33+	1976
Oct	1.85	1.76	2.12	1984	14	6.39	1984	.12	1992
Nov	.85	.72	1.00	1996	6	3.44	2000	.00+	1999
Dec	.47	.47	.91	1949	11	1.34	1977	.00+	1999
Ann	23.07	23.17	6.50	Aug 2001	1	9.88	Aug 1985	.00+	Jan 2000

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	5.2	1.5	@	.0
Feb	2.0	.9	.1	@
Mar	3.6	2.1	.4	.1
Apr	5.5	3.7	.9	.1
May	8.3	6.2	1.5	.6
Jun	11.2	7.4	2.6	.8
Jul	9.1	6.9	2.5	.9
Aug	9.0	6.9	2.5	1.1
Sep	8.1	5.8	1.8	.7
Oct	6.4	4.3	1.1	.4
Nov	5.5	3.0	.5	@
Dec	3.9	.9	.1	.0
Ann	77.8	49.6	14.0	4.7

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	.00	.00	.00	.00	.15	.28	.42	.59	.80	1.13	1.45
Feb	.00	.00	.00	.00	.00	.05	.20	.38	.64	1.07	1.49
Mar	.00	.00	.00	.20	.38	.55	.73	.96	1.25	1.74	2.18
Apr	.00	.16	.40	.61	.81	1.04	1.30	1.60	2.02	2.70	3.35
May	.56	.81	1.22	1.58	1.95	2.35	2.79	3.33	4.03	5.17	6.24
Jun	.95	1.31	1.88	2.38	2.87	3.40	3.99	4.68	5.60	7.04	8.40
Jul	1.18	1.53	2.05	2.50	2.93	3.37	3.86	4.44	5.17	6.32	7.39
Aug	1.19	1.57	2.14	2.63	3.11	3.60	4.15	4.79	5.63	6.93	8.14
Sep	.52	.77	1.18	1.57	1.95	2.37	2.85	3.43	4.19	5.43	6.60
Oct	.15	.27	.52	.77	1.05	1.38	1.77	2.25	2.93	4.06	5.18
Nov	.00	.05	.17	.30	.44	.60	.80	1.04	1.38	1.95	2.52
Dec	.00	.00	.00	.17	.32	.43	.54	.66	.81	1.04	1.25
Ann	16.00	17.36	19.10	20.43	21.62	22.76	23.95	25.27	26.87	29.19	31.21

\+ 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	8.2	8.8	15	12
Feb	6.5	3.5	15	14
Mar	4.3	3.3	9	6
Apr	1.4	.5	1	#
May	.0	.0	#	0
Jun	#	.0	0	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	.0	.0	#	0
Oct	.7	#	#	0
Nov	4.2	3.5	3	1
Dec	8.6	8.8	9	6
Ann	33.9	28.4	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	8.0	1971	13	18.7	1971	45	1989	26	37	1989
Feb	8.0	1977	23	15.0	1972	39	1989	7	35	1996
Mar	10.0	1985	4	11.5	1971	40	1997	13	27	1997
Apr	5.0	1982	1	5.0	1991	30	1996	4	13	1996
May	1.0	1981	9	1.0	1981	#+	2000	13	#+	2000
Jun	#	1996	25	#	1996	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	.8	1972	26	.8	1972	#	1995	22	#	1995
Oct	4.5	1984	19	4.5+	1984	4	1975	25	#+	1999
Nov	6.3	1974	1	11.5	1978	24	1985	30	9	1995
Dec	5.5	1975	13	10.5	1971	31	1996	31	24+	1996
Ann	10.0	Mar 1985	4	18.7	Jan 1971	45	Jan 1989	26	37	Jan 1989

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	2.3	1.5	.5	.2	.0
Feb	1.5	.9	.3	.1	.0
Mar	1.4	1.0	.3	.1	@
Apr	.8	.6	.2	@	.0
May	@	@	.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
Oct	.4	.4	.1	.0	.0
Nov	1.2	.9	.4	.2	.0
Dec	1.6	1.2	.3	.1	.0
Ann	9.2	6.5	2.1	.7	@

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	-9.9	-9.9	-9.9	-9.9
Feb	-9.9	-9.9	-9.9	-9.9
Mar	-9.9	-9.9	-9.9	-9.9
Apr	1.1	.8	.6	.0
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	.2	@	.0	.0
Nov	-9.9	-9.9	-9.9	-9.9
Dec	-9.9	-9.9	-9.9	-9.9
Ann	-9.9	-9.9	-9.9	-9.9

+ 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	7/06	6/28	6/22	6/17	6/12	6/07	6/02	5/27	5/19
32	6/15	6/09	6/05	6/01	5/29	5/25	5/22	5/17	5/11
28	5/27	5/22	5/19	5/16	5/13	5/10	5/08	5/04	4/29
24	5/16	5/11	5/07	5/04	5/01	4/27	4/24	4/20	4/15
20	5/05	4/29	4/25	4/22	4/19	4/15	4/12	4/08	4/02
16	4/21	4/16	4/13	4/11	4/08	4/05	4/03	3/31	3/26

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	8/13	8/18	8/23	8/26	8/30	9/02	9/06	9/10	9/16
32	8/28	9/02	9/05	9/08	9/11	9/14	9/17	9/20	9/25
28	9/06	9/11	9/15	9/18	9/20	9/23	9/26	9/29	10/04
24	9/19	9/24	9/28	10/01	10/04	10/07	10/10	10/13	10/18
20	9/29	10/05	10/09	10/13	10/17	10/20	10/24	10/28	11/03
16	10/06	10/13	10/18	10/22	10/26	10/29	11/03	11/07	11/14

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	110	99	91	84	78	71	64	56	45
32	128	120	114	109	105	100	95	89	81
28	151	144	138	134	129	125	120	115	107
24	179	171	165	160	155	151	146	140	131
20	207	198	191	186	180	175	169	163	153
16	225	216	210	205	200	195	190	184	175

***** 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)

Base	Heating Degree Days (1)												
Below	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
65	1887	1476	1234	720	356	140	63	92	308	664	1181	1698	9819
60	1732	1336	1079	574	240	66	18	33	180	509	1031	1543	8341
57	1639	1252	986	490	183	37	8	16	117	419	941	1450	7538
55	1577	1196	924	436	150	24	3	9	83	360	881	1388	7031
50	1422	1056	776	311	81	6	0	1	27	229	732	1233	5874
32	882	589	315	44	1	0	0	0	0	14	275	706	2826

Base	Cooling Degree Days (1)												
Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	18	37	104	315	698	918	1090	1036	689	372	84	31	5392
55	0	0	0	17	133	251	380	332	82	6	0	0	1201
57	0	0	0	10	105	204	323	277	56	3	0	0	978
60	0	0	0	5	69	144	240	202	29	0	0	0	689
65	0	0	0	1	29	68	129	105	6	0	0	0	338
70	0	0	0	0	11	22	54	42	1	0	0	0	130

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	133	453	672	833	774	446	171	13	0	0	0	8	141	594	1266	2099	2873	3319	3490	3503	3503
45	0	0	0	66	314	523	678	619	305	89	4	0	0	0	0	66	380	903	1581	2200	2505	2594	2598	2598
50	0	0	0	31	195	373	523	465	183	36	1	0	0	0	0	31	226	599	1122	1587	1770	1806	1807	1807
55	0	0	0	11	106	236	371	313	98	10	0	0	0	0	0	11	117	353	724	1037	1135	1145	1145	1145
60	0	0	0	2	49	125	221	183	43	1	0	0	0	0	0	2	51	176	397	580	623	624	624	624
Base	Growing Degree Units for Corn (Monthly)												Growing Degree Units for Corn (Accumulated Monthly)											
50/86	0	0	6	108	301	429	538	496	282	113	10	0	0	0	6	114	415	844	1382	1878	2160	2273	2283	2283

(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