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: THEILMAN, MN **COOP ID: 218227**

Climate Division: MN 9 **NWS Call Sign:** **Elevation: 730 Feet** **Lat: 44˚17N** **Lon: 92˚11W**

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	22.9	1.3	12.1	56	1981	25	22.6	1992	-44	1967	18	-1.4	1977	1641	0	.0	.0	.1	22.6	30.8	12.7
Feb	29.8	7.2	18.5	65	1981	18	32.1	1998	-38+	1971	8	7.1	1989	1303	0	.0	.0	1.2	14.0	27.3	8.1
Mar	41.4	20.3	30.9	83	1986	30	38.5	2000	-28	1967	8	20.9	1975	1058	0	.0	.0	7.9	5.1	25.9	2.1
Apr	57.2	33.5	45.4	92+	1980	22	52.2	1977	0	1982	6	37.2	1975	594	4	.0	.1	23.6	.3	13.7	@
May	69.7	44.1	56.9	94	1978	27	65.1	1977	18	1966	10	50.3	1997	293	42	.0	.6	30.7	.0	3.6	.0
Jun	79.1	54.6	66.9	100+	1996	30	74.2	1991	32+	1990	4	61.8	1982	65	120	.1	3.1	30.0	.0	.1	.0
Jul	83.0	59.0	71.0	103	1988	31	75.4	1983	39	1984	7	65.4	1972	22	208	.1	5.7	31.0	.0	.0	.0
Aug	80.6	56.8	68.7	104	1988	1	73.8	1983	32	1964	14	64.5	1986	36	151	.1	2.9	31.0	.0	.0	.0
Sep	71.3	46.8	59.1	99	1978	7	65.0	1978	22+	1991	27	53.7	1993	203	25	.0	.7	29.8	.0	1.6	.0
Oct	60.2	35.6	47.9	94	1997	4	53.9	1973	7	1988	30	40.6	1988	531	1	.0	@	27.6	.1	10.8	.0
Nov	41.5	22.7	32.1	78	1999	9	39.7	1999	-17	1977	26	25.2	1991	988	0	.0	.0	8.6	5.5	24.1	.9
Dec	27.3	8.9	18.1	62	1982	2	27.2	1997	-38	1983	19	3.0	1983	1454	0	.0	.0	.6	18.4	30.4	7.6
Ann	55.3	32.6	44.0	104	Aug 1988	1	75.4	Jul 1983	-44	Jan 1967	18	-1.4	Jan 1977	8188	551	.3	13.1	222.1	66.0	168.3	31.4

\+ 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	.95	.78	2.65	1967	25	2.33	1988	.10	1981
Feb	.71	.56	1.17	1951	26	2.39	1981	.00	1987
Mar	1.85	1.60	1.78	1989	4	4.09	1998	.15	1994
Apr	3.20	2.71	2.60	2001	12	7.16	1999	.68	1987
May	3.35	3.03	2.50	1981	29	6.37	1982	.66	1992
Jun	4.22	3.96	5.10	1950	13	9.98	1998	1.40	1985
Jul	4.84	4.34	8.00	1978	1	13.11	1978	1.13	1988
Aug	4.32	3.81	5.05	1962	31	9.70	1981	.50	1971
Sep	3.67	2.94	4.10	1978	13	10.06	1986	.63	1979
Oct	2.15	1.81	5.46	1966	15	5.74	1979	.19	1976
Nov	2.14	1.83	2.45	1975	10	8.46	1991	.00	1976
Dec	1.00	.91	1.38	1982	27	2.89	1982	.23+	1997
Ann	32.40	32.45	8.00	Jul 1978	1	13.11	Jul 1978	.00+	Feb 1987

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	5.4	3.2	.2	.1
Feb	4.1	2.5	.3	@
Mar	6.3	4.5	1.3	.2
Apr	8.5	6.5	2.4	.8
May	9.2	6.9	2.4	.8
Jun	9.9	7.7	3.1	1.1
Jul	8.8	7.3	3.4	1.2
Aug	9.2	7.8	2.9	1.3
Sep	8.4	6.4	2.3	.9
Oct	6.8	4.4	1.2	.5
Nov	6.4	4.5	1.5	.3
Dec	5.2	3.2	.4	@
Ann	88.2	64.9	21.4	7.2

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	.14	.22	.36	.49	.63	.78	.95	1.16	1.44	1.90	2.34
Feb	.04	.11	.22	.32	.43	.56	.70	.87	1.11	1.50	1.88
Mar	.35	.52	.79	1.04	1.29	1.57	1.88	2.25	2.75	3.55	4.31
Apr	.94	1.24	1.70	2.09	2.48	2.88	3.32	3.84	4.51	5.56	6.54
May	1.16	1.48	1.94	2.32	2.70	3.08	3.49	3.98	4.60	5.56	6.44
Jun	1.19	1.59	2.19	2.72	3.24	3.77	4.37	5.07	5.99	7.42	8.76
Jul	1.30	1.75	2.45	3.07	3.67	4.30	5.00	5.83	6.92	8.62	10.21
Aug	1.16	1.57	2.19	2.74	3.28	3.84	4.47	5.21	6.18	7.69	9.11
Sep	.72	1.06	1.60	2.09	2.59	3.13	3.74	4.47	5.44	7.00	8.48
Oct	.41	.60	.92	1.21	1.50	1.82	2.18	2.61	3.19	4.11	4.99
Nov	.19	.43	.78	1.09	1.41	1.76	2.16	2.65	3.30	4.35	5.36
Dec	.16	.25	.39	.53	.67	.83	1.01	1.22	1.51	1.98	2.43
Ann	22.18	24.12	26.63	28.55	30.26	31.91	33.63	35.54	37.85	41.23	44.16

\+ 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

Complete documentation available from:
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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	12.4	14.2	5	0
Feb	8.9	9.5	3	1
Mar	6.6	5.0	1	#
Apr	.3	.0	#	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	.1	.0	#	0
Nov	2.3	.0	#	0
Dec	10.2	5.5	2	#
Ann	40.8	34.2	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	13.0	1971	3	23.2	1971	24	1982	25	17	1982
Feb	8.0	1971	5	16.5	1971	19	1971	5	13	1971
Mar	8.0	1997	12	17.5	1997	14	1971	19	8	1971
Apr	2.0	1975	10	2.0	1975	3	1982	5	#+	1991
May	.0	0	0	.0	0	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	1.0	1976	24	1.0+	1979	1	1976	24	#	1976
Nov	3.0	1971	24	9.0	1971	8	1978	18	1+	2000
Dec	6.0	1973	5	23.9	2000	17	2000	31	8	2000
Ann	13.0	Jan 1971	3	23.9	Dec 2000	24	Jan 1982	25	17	Jan 1982

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	4.6	3.3	1.8	.4	.1
Feb	2.1	1.6	.7	.3	.0
Mar	1.9	1.6	.7	.3	.0
Apr	.2	.1	.0	.0	.0
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	.1	.0	.0	.0
Nov	.7	.6	.2	.0	.0
Dec	2.5	2.0	.6	.1	.0
Ann	12.1	9.3	4.0	1.1	.1

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	.0	.0	.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	.1	.0	.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	6/13	6/07	6/02	5/29	5/25	5/21	5/17	5/12	5/05
32	6/01	5/26	5/21	5/17	5/13	5/09	5/05	4/30	4/23
28	5/13	5/07	5/03	4/29	4/26	4/22	4/19	4/14	4/08
24	5/02	4/26	4/21	4/17	4/14	4/10	4/06	4/02	3/26
20	4/21	4/15	4/11	4/08	4/05	4/02	3/30	3/26	3/20
16	4/13	4/08	4/04	3/31	3/28	3/25	3/21	3/17	3/11

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	9/08	9/13	9/16	9/19	9/22	9/25	9/27	10/01	10/05
32	9/13	9/18	9/22	9/25	9/28	10/01	10/04	10/08	10/13
28	9/21	9/27	10/01	10/05	10/09	10/12	10/16	10/20	10/27
24	10/01	10/08	10/12	10/16	10/20	10/24	10/28	11/01	11/08
20	10/10	10/16	10/20	10/24	10/28	10/31	11/04	11/08	11/14
16	10/21	10/28	11/01	11/05	11/09	11/13	11/17	11/21	11/28

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	145	136	130	125	119	114	109	103	94
32	163	154	148	142	137	132	127	120	111
28	194	184	177	171	165	160	153	146	137
24	215	206	199	194	189	183	178	172	163
20	231	222	216	210	205	200	194	188	179
16	252	243	237	231	226	220	215	208	199

***** 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	1641	1303	1058	594	293	65	22	36	203	531	988	1454	8188
60	1486	1163	903	453	190	22	5	8	103	383	838	1299	6853
57	1393	1079	810	374	139	9	0	2	62	301	748	1206	6123
55	1331	1023	749	325	111	5	0	1	41	251	688	1144	5669
50	1176	883	600	217	55	1	0	0	11	146	541	989	4619
32	645	428	177	18	0	0	0	0	0	4	136	485	1893

Base	Cooling Degree Days (1)												
Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	27	49	142	419	771	1045	1209	1138	812	497	139	54	6302
55	0	0	1	36	169	360	496	425	163	31	0	0	1681
57	0	0	0	25	136	304	434	365	123	19	0	0	1406
60	0	0	0	14	93	227	346	278	75	8	0	0	1041
65	0	0	0	4	42	120	208	151	25	1	0	0	551
70	0	0	0	0	16	48	106	65	5	0	0	0	240

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	2	42	244	578	831	992	916	619	306	49	1	0	2	44	288	866	1697	2689	3605	4224	4530	4579	4580
45	0	0	20	147	426	681	837	761	471	185	21	0	0	0	20	167	593	1274	2111	2872	3343	3528	3549	3549
50	0	0	6	79	285	531	682	606	329	99	3	0	0	0	6	85	370	901	1583	2189	2518	2617	2620	2620
55	0	0	0	39	164	383	527	451	205	39	0	0	0	0	0	39	203	586	1113	1564	1769	1808	1808	1808
60	0	0	0	14	85	247	372	300	108	14	0	0	0	0	0	14	99	346	718	1018	1126	1140	1140	1140
Base	Growing Degree Units for Corn (Monthly)												Growing Degree Units for Corn (Accumulated Monthly)											
50/86	0	0	32	165	371	541	660	600	393	197	31	0	0	0	32	197	568	1109	1769	2369	2762	2959	2990	2990

(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