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: GRAND MARAIS, MN **COOP ID: 213282**

Climate Division: MN 3 **NWS Call Sign:** **Elevation: 612 Feet** **Lat: 47˚44N** **Lon: 90˚22W**

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	4.9	13.9	48	1944	22	22.2	1990	-34	1935	23	4.9	1982	1584	0	.0	.0	.0	24.8	30.7	12.5
Feb	27.4	9.6	18.5	58	1976	25	30.6	1998	-34	1933	9	6.7	1979	1302	0	.0	.0	.2	18.9	27.7	7.8
Mar	35.4	19.6	27.5	67	1986	28	33.7	2000	-24	1943	2	21.7	1996	1162	0	.0	.0	.7	10.2	28.0	1.8
Apr	46.4	30.3	38.4	83	1965	29	43.4	1980	-8	1975	1	34.5	1996	801	0	.0	.0	8.1	.9	17.6	@
May	55.9	38.2	47.1	87+	1986	30	50.5	1972	17	1947	9	43.3	1997	557	0	.0	.0	23.3	@	3.7	.0
Jun	62.9	43.7	53.3	93	1970	29	57.8	1971	25	1947	12	50.1	1989	350	1	.0	.1	29.5	.0	@	.0
Jul	69.8	51.3	60.6	95	1966	12	66.0	1988	28	1950	4	55.4	1992	170	31	.0	.3	31.0	.0	.0	.0
Aug	71.0	54.2	62.6	94	1951	2	67.2	1998	33	1947	1	56.9	1977	128	54	.0	.1	31.0	.0	.0	.0
Sep	63.0	47.2	55.1	89	1953	1	60.8	1998	23	1942	28	49.8	1993	303	6	.0	.0	29.2	.0	.8	.0
Oct	52.0	37.1	44.6	79	1992	2	50.1	1971	6	1936	26	40.5	1993	634	0	.0	.0	18.8	@	8.8	.0
Nov	38.3	25.2	31.8	67+	2001	6	37.8	1999	-14	1976	30	24.9	1995	999	0	.0	.0	2.2	7.2	23.2	.5
Dec	27.3	11.5	19.4	55+	1962	4	28.6	1997	-27+	1967	31	9.0	1983	1413	0	.0	.0	.1	19.3	29.7	7.6
Ann	47.7	31.1	39.4	95	Jul 1966	12	67.2	Aug 1998	-34+	Jan 1935	23	4.9	Jan 1982	9403	92	.0	.5	174.1	81.3	170.2	30.2

\+ 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: 1932-2001

(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	.72	.59	1.60	1935	1	2.60	1975	.01	1981
Feb	.56	.44	1.10	1936	14	1.83	1971	.02	1993
Mar	1.12	.91	2.20	1938	29	4.43	1979	.12+	1993
Apr	1.30	1.12	2.62	1967	17	3.43	1981	.07	1987
May	2.50	2.22	2.78	1950	5	4.78	1974	.35	1976
Jun	3.41	3.18	5.43	1996	29	7.14	1996	.05	1995
Jul	3.38	3.16	3.60	1999	5	8.30	1993	.88	1989
Aug	3.13	2.75	2.93	1987	1	7.82	1988	.67	1981
Sep	3.36	3.45	3.49	1961	10	7.47	1977	.93	1976
Oct	2.59	2.26	2.55	1968	9	7.62	1998	.70	1986
Nov	1.76	1.63	1.92	1940	11	4.23	1982	.13	1976
Dec	.79	.66	1.78	1984	16	1.94	1984	.19	1997
Ann	24.62	24.71	5.43	Jun 1996	29	8.30	Jul 1993	.01	Jan 1981

Mean Number of Days (3)

Month	Daily Precipitation >= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	7.6	2.6	.1	@
Feb	5.3	1.8	.2	.0
Mar	6.6	3.1	.5	.1
Apr	5.8	3.4	.7	.1
May	9.4	5.4	1.7	.4
Jun	10.8	6.7	2.1	.6
Jul	10.9	6.8	2.3	.7
Aug	9.6	6.5	2.0	.6
Sep	10.9	6.4	2.1	.7
Oct	9.6	5.6	1.6	.7
Nov	7.1	4.0	1.2	.3
Dec	6.7	2.8	.2	@
Ann	100.3	55.1	14.7	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	.11	.18	.28	.38	.48	.60	.73	.88	1.09	1.44	1.77
Feb	.06	.11	.19	.26	.35	.44	.55	.68	.87	1.17	1.47
Mar	.13	.21	.37	.52	.69	.87	1.09	1.36	1.73	2.34	2.93
Apr	.23	.34	.53	.71	.89	1.09	1.32	1.59	1.95	2.54	3.10
May	.71	.95	1.30	1.61	1.92	2.24	2.59	3.00	3.54	4.38	5.17
Jun	.70	1.01	1.51	1.97	2.43	2.92	3.48	4.15	5.03	6.45	7.79
Jul	1.08	1.40	1.88	2.28	2.67	3.08	3.52	4.05	4.72	5.76	6.73
Aug	.67	.96	1.42	1.83	2.25	2.70	3.20	3.81	4.60	5.87	7.08
Sep	1.32	1.63	2.07	2.44	2.78	3.13	3.51	3.95	4.51	5.36	6.14
Oct	.66	.91	1.29	1.62	1.95	2.29	2.68	3.13	3.73	4.67	5.55
Nov	.42	.59	.84	1.07	1.30	1.54	1.81	2.13	2.56	3.23	3.85
Dec	.22	.30	.41	.51	.61	.71	.82	.96	1.13	1.40	1.65
Ann	18.59	19.79	21.31	22.45	23.46	24.42	25.42	26.51	27.83	29.74	31.37

\+ 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: 1932-2001
(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	12.4	11.6	15	13
Feb	6.6	5.5	18	17
Mar	7.1	6.3	13	11
Apr	2.1	1.2	2	1
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	.2	.0	#	0
Nov	2.9	2.2	1	#
Dec	10.4	9.7	6	5
Ann	41.7	36.5	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	11.0	1978	25	25.0	1991	52	1996	29	40	1989
Feb	10.0	1992	20	14.0	1992	47	1996	15	43	1996
Mar	10.0	1971	15	18.6	1979	40	1997	25	35	1997
Apr	5.0	1983	14	7.0	1989	22+	1997	1	10	1996
May	.5	1979	6	.5	1979	1	1996	1	#+	1996
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	2.0	1981	22	2.0	1981	2	1981	22	#+	1984
Nov	8.0	1991	1	8.0	1991	17	1985	26	6	1991
Dec	10.0	1980	22	28.7	1980	32	1995	14	22	1995
Ann	11.0	Jan 1978	25	28.7	Dec 1980	52	Jan 1996	29	43	Feb 1996

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	7.1	4.8	1.5	.7	@
Feb	4.4	2.5	.7	.1	@
Mar	3.7	2.4	.6	.2	@
Apr	.9	.7	.2	@	.0
May	@	.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	2.0	1.2	.3	.2	.0
Dec	5.4	3.6	1.4	.4	@
Ann	23.6	15.3	4.7	1.6	@

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	4.9	3.4	2.6	.9
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	3.3	1.6	.5	.0
Dec	18.1	12.8	8.7	2.9
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	6/11	6/07	6/04	6/01	5/29	5/27	5/24	5/20	5/16
32	5/26	5/22	5/18	5/15	5/13	5/10	5/07	5/04	4/29
28	5/13	5/09	5/06	5/03	5/01	4/28	4/26	4/22	4/18
24	4/30	4/26	4/23	4/20	4/18	4/16	4/13	4/10	4/06
20	4/16	4/13	4/10	4/07	4/05	4/03	4/01	3/29	3/25
16	4/14	4/09	4/06	4/03	3/31	3/29	3/26	3/23	3/18

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	9/10	9/14	9/17	9/20	9/23	9/25	9/28	10/01	10/05
32	9/20	9/23	9/26	9/28	9/30	10/02	10/04	10/06	10/10
28	10/01	10/07	10/12	10/15	10/19	10/22	10/26	10/30	11/05
24	10/16	10/21	10/24	10/27	10/30	11/02	11/05	11/09	11/14
20	10/27	10/31	11/02	11/04	11/07	11/09	11/11	11/14	11/17
16	11/01	11/04	11/07	11/09	11/11	11/13	11/16	11/18	11/22

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	135	128	124	119	116	112	108	103	96
32	155	150	146	142	139	136	133	129	123
28	192	184	179	175	170	166	162	157	149
24	217	209	204	199	194	190	185	180	172
20	228	223	220	217	215	212	209	206	201
16	240	234	231	227	224	221	218	214	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	1584	1302	1162	801	557	350	170	128	303	634	999	1413	9403
60	1429	1162	1007	651	402	207	76	51	176	479	849	1258	7747
57	1336	1078	914	561	310	132	38	23	115	388	759	1165	6819
55	1274	1022	852	501	252	91	22	13	81	328	699	1103	6238
50	1119	882	697	353	125	23	3	1	26	195	549	948	4921
32	578	408	198	21	0	0	0	0	0	3	118	434	1760

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	17	30	59	210	466	640	884	949	693	392	109	44	4493
55	0	0	0	0	5	41	192	248	84	5	0	0	575
57	0	0	0	0	1	22	147	197	57	2	0	0	426
60	0	0	0	0	0	7	92	131	29	0	0	0	259
65	0	0	0	0	0	1	31	54	6	0	0	0	92
70	0	0	0	0	0	0	7	14	0	0	0	0	21

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	2	51	226	405	635	702	451	171	16	0	0	0	2	53	279	684	1319	2021	2472	2643	2659	2659
45	0	0	0	13	106	255	480	547	309	76	2	0	0	0	0	13	119	374	854	1401	1710	1786	1788	1788
50	0	0	0	1	37	124	325	392	178	23	0	0	0	0	0	1	38	162	487	879	1057	1080	1080	1080
55	0	0	0	0	5	44	187	242	83	1	0	0	0	0	0	0	5	49	236	478	561	562	562	562
60	0	0	0	0	0	11	78	113	25	0	0	0	0	0	0	0	0	11	89	202	227	227	227	227
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	0	2	25	105	203	347	402	222	70	3	0	0	0	2	27	132	335	682	1084	1306	1376	1379	1379

(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