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 2 E, MI **COOP ID: 203319**

Climate Division: MI 2 **NWS Call Sign:** **Elevation: 624 Feet** **Lat: 46˚40N** **Lon: 85˚57W**

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	26.2	10.5	18.4	48	1996	18	26.8	1990	-25	1994	26	8.3	1994	1446	0	.0	.0	.0	24.4	31.0	5.5
Feb	29.5	11.0	20.3	56+	1976	24	30.6	1998	-31+	1958	12	10.5	1994	1252	0	.0	.0	.5	18.7	27.9	5.1
Mar	38.5	17.6	28.1	73	2000	8	36.5	1973	-22+	1959	18	21.5	1972	1145	0	.0	.0	2.9	9.3	29.0	2.3
Apr	50.4	27.9	39.2	87+	1990	26	45.7	1987	-13	1950	6	32.3	1996	775	0	.0	.0	12.9	1.1	22.7	.1
May	63.6	37.2	50.4	90+	1962	16	59.0	1977	15	1958	2	43.4	1997	462	9	.0	@	26.6	.0	10.6	.0
Jun	72.0	45.5	58.8	97	1988	14	64.2	1995	23	1949	8	54.5	1982	208	19	.0	.9	29.7	.0	2.1	.0
Jul	76.6	51.1	63.9	99+	1988	6	68.4	1987	30+	1985	23	57.2	1992	109	74	.0	1.6	31.0	.0	.2	.0
Aug	76.5	52.1	64.3	97+	1988	2	68.8	1995	29	1950	18	59.8	1982	96	73	.0	.9	31.0	.0	.1	.0
Sep	68.4	46.0	57.2	96	1953	1	62.0	1998	21	1955	26	52.8	1993	241	8	.0	.3	29.6	.0	1.6	.0
Oct	56.5	36.4	46.5	84+	1976	1	54.6	1971	15	1950	26	41.4	1981	576	0	.0	.0	22.6	@	10.1	.0
Nov	41.8	26.8	34.3	71+	1999	9	39.3	1999	-14	1950	25	26.7	1995	922	0	.0	.0	5.6	5.2	23.9	.1
Dec	30.8	16.4	23.6	58+	1961	4	30.6	1994	-17	1989	30	14.4	1989	1283	0	.0	.0	.2	17.6	30.5	2.0
Ann	52.6	31.5	42.1	99+	Jul 1988	6	68.8	Aug 1995	-31+	Feb 1958	12	8.3	Jan 1994	8515	183	.0	3.7	192.6	76.3	189.7	15.1

\+ 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

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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	2.31	2.30	.97	1996	18	4.30	1997	.98	1984
Feb	1.19	1.03	1.23	1950	14	2.50	1971	.12	1994
Mar	1.47	1.20	1.77	1950	8	4.53	1977	.08	1996
Apr	1.34	1.41	2.39	1954	26	2.58	1973	.24	1986
May	2.53	2.55	2.02	1949	5	5.47	1999	.38	1986
Jun	2.92	3.17	2.22	1949	20	6.16	1979	.64	1988
Jul	2.95	2.67	3.00	1982	11	5.89	1986	.55	1989
Aug	2.90	2.42	2.88	1983	19	6.32	1988	.12	2000
Sep	3.49	3.46	2.77	1964	3	6.00	1975	1.08	1989
Oct	3.01	2.72	2.43	1966	15	6.40	1979	1.18	1977
Nov	2.37	2.31	1.56	1977	3	4.96	1977	1.00	1999
Dec	2.25	2.06	1.58	1975	14	4.75	1985	.32	1994
Ann	28.73	27.35	3.00	Jul 1982	11	6.40	Oct 1979	.08	Mar 1996

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	17.5	7.9	.6	.0
Feb	11.6	3.9	.2	.0
Mar	9.5	4.2	.7	.2
Apr	8.5	3.6	.6	.2
May	8.7	6.1	1.3	.5
Jun	10.1	6.5	1.9	.6
Jul	9.2	5.4	1.7	.7
Aug	8.8	5.9	1.8	.6
Sep	11.7	7.7	2.3	.7
Oct	12.2	7.8	1.6	.4
Nov	14.2	7.1	1.0	.2
Dec	16.8	8.3	.3	@
Ann	138.8	74.4	14.0	4.1

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	.97	1.18	1.48	1.72	1.95	2.18	2.42	2.71	3.07	3.62	4.12
Feb	.23	.34	.51	.67	.84	1.01	1.21	1.45	1.77	2.28	2.76
Mar	.14	.25	.44	.65	.87	1.12	1.42	1.79	2.30	3.15	3.98
Apr	.37	.50	.69	.86	1.02	1.19	1.38	1.61	1.90	2.36	2.79
May	.73	.97	1.33	1.64	1.95	2.27	2.62	3.04	3.58	4.42	5.21
Jun	1.04	1.32	1.72	2.05	2.37	2.70	3.05	3.47	4.00	4.82	5.57
Jul	.93	1.21	1.63	1.98	2.33	2.68	3.07	3.53	4.12	5.04	5.89
Aug	.57	.83	1.25	1.65	2.04	2.47	2.95	3.53	4.30	5.53	6.70
Sep	1.47	1.79	2.23	2.60	2.94	3.29	3.66	4.09	4.64	5.47	6.22
Oct	1.02	1.31	1.72	2.08	2.41	2.76	3.14	3.58	4.15	5.03	5.84
Nov	1.05	1.26	1.56	1.80	2.02	2.25	2.49	2.77	3.12	3.65	4.13
Dec	.64	.85	1.18	1.46	1.73	2.02	2.34	2.71	3.19	3.96	4.66
Ann	21.22	22.70	24.58	26.00	27.25	28.46	29.70	31.07	32.73	35.12	37.18

\+ 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	52.6	60.5	21	21
Feb	30.9	26.7	26	26
Mar	17.5	15.3	22	22
Apr	5.3	2.5	7	6
May	.4	.0	1	0
Jun	.0	.0	0	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	#	.0	0	0
Oct	.7	.0	#	0
Nov	12.7	9.5	2	1
Dec	42.2	28.2	10	7
Ann	162.3	142.7	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	23.2	1975	16	76.2	1977	43	1977	31	35	1977
Feb	9.0	1976	4	54.9	1976	49	1977	26	46	1977
Mar	14.0	1975	24	42.4	1976	56	1977	5	40	1972
Apr	12.0	1985	6	19.7	1979	30	1975	7	25	1972
May	3.4	1971	12	3.4	1971	12	1975	1	11	1972
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	#	1993	29	#+	1993	0	0	0	0	0
Oct	3.5	1981	24	5.8	1981	5	1981	24	#+	1997
Nov	9.4	1976	28	52.0	1976	26	1976	30	6	1976
Dec	13.7	1977	25	88.5	1977	33+	1983	29	26	1976
Ann	23.2	Jan 1975	16	88.5	Dec 1977	56	Mar 1977	5	46	Feb 1977

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	16.6	14.6	6.4	2.4	.2
Feb	9.8	8.1	3.3	1.3	.0
Mar	6.2	4.7	1.8	.8	.1
Apr	2.3	1.8	.6	.2	.1
May	.2	.1	.1	.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	.5	.4	@	.0	.0
Nov	6.6	5.3	1.3	.6	.0
Dec	14.0	12.2	5.3	2.0	.2
Ann	56.2	47.2	18.8	7.3	.6

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	27.8	27.3	26.8	22.5
Feb	26.5	26.5	26.5	25.6
Mar	26.6	25.8	25.1	21.1
Apr	9.1	8.4	7.9	5.9
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	.4	@	@	.0
Nov	10.0	4.8	2.3	.5
Dec	22.9	18.9	15.8	10.1
Ann	123.3	111.7	104.4	85.7

+ 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	7/22	7/15	7/09	7/05	7/01	6/27	6/22	6/17	6/10
32	7/05	6/29	6/24	6/20	6/16	6/12	6/08	6/03	5/28
28	6/14	6/09	6/04	6/01	5/29	5/25	5/22	5/18	5/12
24	5/22	5/17	5/12	5/09	5/05	5/02	4/28	4/24	4/18
20	5/03	4/28	4/25	4/22	4/19	4/16	4/13	4/10	4/05
16	4/22	4/17	4/14	4/11	4/08	4/06	4/03	3/30	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	8/14	8/21	8/26	8/31	9/03	9/07	9/12	9/17	9/23
32	8/28	9/05	9/11	9/15	9/20	9/24	9/29	10/04	10/12
28	9/23	9/30	10/04	10/08	10/11	10/15	10/19	10/23	10/29
24	10/05	10/11	10/16	10/19	10/23	10/26	10/30	11/04	11/10
20	10/26	10/31	11/04	11/07	11/10	11/13	11/16	11/20	11/25
16	11/01	11/07	11/11	11/15	11/18	11/21	11/24	11/28	12/04

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	95	84	76	70	64	58	51	43	33
32	130	118	109	102	95	88	81	72	60
28	160	152	145	140	135	130	124	118	109
24	196	187	181	175	170	165	159	153	144
20	228	220	214	209	204	199	194	188	180
16	246	238	232	227	223	218	213	208	200

***** 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	1446	1252	1145	775	462	208	109	96	241	576	922	1283	8515
60	1291	1112	990	626	326	106	39	30	124	427	772	1128	6971
57	1198	1028	897	537	254	63	17	12	73	342	682	1035	6138
55	1136	972	835	479	212	41	10	6	48	289	622	973	5623
50	981	832	680	340	125	11	0	0	12	175	473	818	4447
32	435	352	191	31	4	0	0	0	0	5	71	300	1389

Base — Cooling Degree Days (1)

Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	11	23	69	245	574	802	988	1001	756	452	140	40	5101
55	0	0	0	4	69	153	285	294	115	23	0	0	943
57	0	0	0	2	49	115	230	238	79	14	0	0	727
60	0	0	0	0	28	68	159	163	40	6	0	0	464
65	0	0	0	0	9	19	74	73	8	0	0	0	183
70	0	0	0	0	1	3	22	21	1	0	0	0	48

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	11	87	324	556	739	749	510	219	32	1	0	0	11	98	422	978	1717	2466	2976	3195	3227	3228
45	0	0	1	48	205	408	584	594	363	117	10	0	0	0	1	49	254	662	1246	1840	2203	2320	2330	2330
50	0	0	0	21	124	271	430	439	228	57	1	0	0	0	0	21	145	416	846	1285	1513	1570	1571	1571
55	0	0	0	10	67	163	280	290	123	20	0	0	0	0	0	10	77	240	520	810	933	953	953	953
60	0	0	0	1	33	82	158	162	57	4	0	0	0	0	0	1	34	116	274	436	493	497	497	497
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	0	7	67	215	347	464	466	298	121	14	0	0	0	7	74	289	636	1100	1566	1864	1985	1999	1999

(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