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: GRAYLING, MI **COOP ID: 203391**

Climate Division: MI 4 **NWS Call Sign:** **Elevation: 1,140 Feet** **Lat: 44˚39N** **Lon: 84˚42W**

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	25.4	6.5	16.0	57+	1952	3	25.0	1990	-34	1994	31	5.9	1994	1520	0	.0	.0	.1	23.2	30.7	10.1
Feb	28.2	6.2	17.2	60	1984	24	29.4	1998	-42	1979	17	7.6	1979	1338	0	.0	.0	.8	18.9	27.7	10.3
Mar	38.3	15.1	26.7	78	2000	9	36.5	2000	-27	1980	2	18.7	1972	1188	0	.0	.0	5.4	8.8	28.6	4.8
Apr	52.1	28.1	40.1	89	1980	23	45.9	1986	-10	1954	4	32.9	1975	748	0	.0	.0	17.5	1.6	20.6	.1
May	66.7	38.9	52.8	94	1978	28	60.2	1977	18+	1968	6	44.7	1997	401	22	.0	.4	28.9	.0	9.0	.0
Jun	75.8	48.4	62.1	98+	1971	28	67.3	1995	23	1978	10	57.6	1972	140	51	.0	1.8	29.9	.0	1.2	.0
Jul	79.9	53.1	66.5	100	1977	20	71.7	1983	33+	1987	15	60.9	1992	50	97	@	3.2	31.0	.0	.0	.0
Aug	77.3	51.2	64.3	100+	1955	1	69.6	1995	26	1986	29	60.2	1992	102	78	.0	1.0	31.0	.0	.4	.0
Sep	68.3	43.6	56.0	95+	1953	1	60.7	1971	16	1989	27	51.7	1993	278	6	.0	.2	29.5	.0	4.4	.0
Oct	56.0	33.8	44.9	85+	1953	3	54.3	1971	9	1969	23	40.0	1972	622	0	.0	.0	22.0	.1	15.6	.0
Nov	41.8	25.1	33.5	75	1950	1	39.1	1999	-9	1950	25	26.3	1995	947	0	.0	.0	7.5	5.7	24.1	.4
Dec	30.1	14.5	22.3	64	2001	6	31.1	1982	-26+	1976	30	10.5	1989	1324	0	.0	.0	1.0	17.8	30.0	4.8
Ann	53.3	30.4	41.9	100+	Jul 1977	20	71.7	Jul 1983	-42	Feb 1979	17	5.9	Jan 1994	8658	254	@	6.6	204.6	76.1	192.3	30.5

\+ 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

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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	1.75	1.54	2.15	1963	12	3.27	1990	.64	1981
Feb	1.27	1.08	1.37	1971	20	3.61	1971	.37	1995
Mar	1.96	1.89	2.06	1998	31	4.53	1976	.43	1993
Apr	2.64	2.05	3.00	1979	26	5.12	1994	.63	1997
May	3.10	3.18	2.15	1963	10	8.19	1983	.59	1992
Jun	3.46	3.07	3.07	1948	27	6.76	1993	.72	1971
Jul	3.76	3.40	4.50	1984	11	9.92	1994	1.33	1989
Aug	3.79	3.93	5.02	1965	9	9.03	1987	1.14	1998
Sep	4.01	4.02	2.20	1973	22	12.51	1986	.28	1979
Oct	3.42	3.23	3.00	1991	25	10.48	1991	.89	1971
Nov	2.44	2.09	2.19	1988	6	6.21	1988	.76	1999
Dec	1.82	1.69	1.40	1982	3	4.46	1972	.38	1997
Ann	33.42	32.73	5.02	Aug 1965	9	12.51	Sep 1986	.28	Sep 1979

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	18.9	5.5	.4	@
Feb	13.9	4.2	.3	@
Mar	12.6	5.3	.9	.2
Apr	11.9	6.2	1.5	.4
May	12.2	7.0	2.1	.6
Jun	11.8	6.9	2.2	.9
Jul	11.7	6.6	2.4	.9
Aug	13.2	7.0	2.6	.8
Sep	14.6	8.1	2.5	.9
Oct	15.0	8.1	2.0	.4
Nov	15.6	6.6	1.2	.3
Dec	17.6	5.0	.7	.1
Ann	169.0	76.5	18.8	5.5

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	.73	.89	1.12	1.30	1.47	1.64	1.83	2.04	2.31	2.73	3.10
Feb	.35	.47	.65	.81	.97	1.13	1.31	1.53	1.81	2.25	2.66
Mar	.54	.73	1.01	1.26	1.50	1.75	2.03	2.36	2.79	3.46	4.09
Apr	.78	1.03	1.41	1.73	2.05	2.38	2.74	3.16	3.72	4.58	5.38
May	1.07	1.36	1.79	2.15	2.49	2.85	3.23	3.68	4.26	5.15	5.97
Jun	1.01	1.34	1.83	2.26	2.68	3.11	3.59	4.16	4.90	6.05	7.12
Jul	1.30	1.65	2.17	2.61	3.03	3.46	3.93	4.47	5.18	6.26	7.26
Aug	1.24	1.60	2.13	2.58	3.02	3.46	3.96	4.53	5.27	6.42	7.48
Sep	1.12	1.50	2.07	2.58	3.07	3.58	4.15	4.82	5.70	7.07	8.35
Oct	1.27	1.59	2.05	2.43	2.80	3.17	3.57	4.04	4.64	5.57	6.41
Nov	.80	1.03	1.37	1.66	1.94	2.22	2.54	2.91	3.38	4.12	4.80
Dec	.53	.71	.97	1.19	1.41	1.63	1.89	2.18	2.56	3.16	3.71
Ann	25.79	27.31	29.23	30.67	31.94	33.16	34.41	35.78	37.43	39.80	41.82

\+ 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	27.5	26.8	13	12
Feb	18.4	17.2	16	13
Mar	12.2	12.0	9	8
Apr	3.7	3.3	1	#
May	.1	.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	8.9	7.0	1	1
Dec	18.5	20.8	6	5
Ann	90.3	87.1	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	14.0	1987	30	44.1	1976	46	1979	20	36	1979
Feb	12.0	1981	11	37.6	1985	45	1978	7	35	1978
Mar	13.0	1989	18	27.0	1998	33	1978	18	23	1978
Apr	5.0	1982	4	14.8	1985	13	1975	3	5	1975
May	1.0	1984	1	1.0+	1996	6	1994	1	#+	1997
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	5.0	1992	21	7.8	1992	4	1981	24	#+	2000
Nov	13.0	1990	6	22.5+	1990	16	1992	16	6	1995
Dec	13.0	1987	16	32.0	1991	29	1985	27	22	1995
Ann	14.0	Jan 1987	30	44.1	Jan 1976	46	Jan 1979	20	36	Jan 1979

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	15.3	9.2	3.2	1.1	.1
Feb	10.4	6.2	2.2	.8	.1
Mar	7.1	5.1	1.7	.6	.1
Apr	2.4	1.6	.3	@	.0
May	.1	.1	.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	.8	.4	.1	@	.0
Nov	5.4	3.7	1.3	.5	@
Dec	11.8	7.5	2.4	1.1	.1
Ann	53.3	33.8	11.2	4.1	.4

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	26.8	25.3	21.5	11.0
Feb	-9.9	-9.9	-9.9	-9.9
Mar	19.8	17.5	13.2	9.6
Apr	3.9	1.6	.5	.1
May	.1	.0	.0	.0
Jun	.0	.0	.0	.0
Jul	.0	.0	.0	.0
Aug	.0	.0	.0	.0
Sep	.0	.0	.0	.0
Oct	.7	.1	.0	.0
Nov	7.4	3.8	2.2	.4
Dec	22.0	14.5	11.3	4.7
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	7/16	7/07	7/01	6/26	6/21	6/16	6/11	6/05	5/28
32	6/20	6/14	6/10	6/07	6/04	6/01	5/28	5/24	5/19
28	6/02	5/27	5/23	5/20	5/17	5/14	5/10	5/07	5/01
24	5/22	5/17	5/13	5/10	5/07	5/04	4/30	4/26	4/21
20	5/03	4/29	4/26	4/24	4/22	4/20	4/17	4/14	4/11
16	4/25	4/21	4/18	4/15	4/13	4/11	4/08	4/05	4/01

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	8/15	8/20	8/25	8/28	8/31	9/04	9/07	9/12	9/17
32	8/22	8/29	9/02	9/07	9/10	9/14	9/18	9/23	9/29
28	9/09	9/14	9/19	9/22	9/25	9/29	10/02	10/06	10/12
24	9/27	10/03	10/08	10/11	10/15	10/18	10/21	10/26	11/01
20	10/14	10/19	10/23	10/26	10/28	10/31	11/03	11/07	11/12
16	10/21	10/29	11/03	11/07	11/11	11/15	11/20	11/25	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	105	93	84	77	70	64	56	48	36
32	124	115	108	103	98	93	87	81	72
28	155	146	140	135	131	126	121	115	107
24	181	174	169	164	160	156	151	146	139
20	210	203	197	193	189	185	181	176	169
16	239	230	223	217	212	206	200	193	184

***** 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	1520	1338	1188	748	401	140	50	102	278	622	947	1324	8658
60	1365	1198	1033	600	278	64	9	36	154	470	797	1169	7173
57	1272	1114	940	512	216	35	2	16	96	382	707	1076	6368
55	1210	1058	878	455	179	22	0	9	67	326	647	1014	5865
50	1055	918	723	322	103	6	0	0	21	202	498	859	4707
32	508	436	248	35	3	0	0	0	0	7	83	349	1669

Base	Cooling Degree Days (1)												
Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	11	22	83	277	647	902	1071	999	719	407	126	48	5312
55	0	0	0	7	110	234	358	295	95	14	0	0	1113
57	0	0	0	4	85	187	297	240	65	8	0	0	886
60	0	0	0	2	54	126	212	167	33	3	0	0	597
65	0	0	0	0	22	51	97	78	6	0	0	0	254
70	0	0	0	0	8	13	27	24	1	0	0	0	73

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	21	133	422	677	834	765	491	202	46	2	0	0	21	154	576	1253	2087	2852	3343	3545	3591	3593
45	0	0	10	74	289	529	679	610	349	111	17	1	0	0	10	84	373	902	1581	2191	2540	2651	2668	2669
50	0	0	2	39	183	383	524	456	223	56	2	0	0	0	2	41	224	607	1131	1587	1810	1866	1868	1868
55	0	0	1	18	107	255	372	308	124	22	0	0	0	0	1	19	126	381	753	1061	1185	1207	1207	1207
60	0	0	0	7	54	142	233	175	58	4	0	0	0	0	0	7	61	203	436	611	669	673	673	673
Base	Growing Degree Units for Corn (Monthly)												Growing Degree Units for Corn (Accumulated Monthly)											
50/86	0	0	20	103	289	434	542	493	310	133	28	1	0	0	20	123	412	846	1388	1881	2191	2324	2352	2353

(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