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 RAPIDS INTL AP, MI **COOP ID: 203333**

Climate Division: MI 8 **NWS Call Sign: GRR** **Elevation: 793 Feet** **Lat: 42˚53N** **Lon: 85˚31W**

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	29.3	15.6	22.4	62	1967	24	32.1	1990	-22	1994	19	12.3	1977	1317	0	.0	.0	.9	19.1	29.0	3.5
Feb	32.6	17.4	25.0	69	1999	11	34.1	1998	-19	1973	17	14.1	1979	1135	0	.0	.0	1.6	14.6	25.6	2.7
Mar	43.3	25.9	34.6	78+	1986	31	43.0	1973	-8	1978	2	28.2	1978	956	2	.0	.0	8.5	5.3	23.2	.5
Apr	56.6	36.1	46.3	88	1970	29	52.5	1977	3	1982	7	40.9	1975	571	6	.0	.0	21.2	.4	11.4	.0
May	69.6	46.6	58.1	92+	1977	20	66.0	1977	22	1966	10	50.3	1997	255	38	.0	.5	30.4	.0	1.7	.0
Jun	78.4	55.8	67.1	98+	1988	21	71.2	1987	33	1972	11	62.1	1982	58	124	.0	2.2	30.0	.0	.0	.0
Jul	82.3	60.5	71.4	100	1988	6	74.8	1988	41	1983	6	67.2	1992	10	217	@	4.3	31.0	.0	.0	.0
Aug	79.7	59.0	69.4	100	1964	3	74.8	1995	39	1976	30	65.0	1992	24	165	.0	2.1	31.0	.0	.0	.0
Sep	71.7	51.0	61.3	93	1973	3	66.0	1998	27	1991	28	56.0	1974	159	56	.0	.4	29.9	.0	.4	.0
Oct	59.6	40.2	49.9	87+	1971	1	58.0	1971	18+	1974	21	44.4	1988	471	5	.0	.0	26.4	.0	5.7	.0
Nov	45.5	31.2	38.4	77	1975	6	44.6	1975	5+	1969	28	31.0	1976	793	0	.0	.0	10.3	2.6	17.6	.0
Dec	33.7	21.4	27.6	69	2001	5	35.3	1982	-18	1983	19	17.5	1989	1147	0	.0	.0	2.1	13.1	27.8	1.2
Ann	56.9	38.4	47.6	100+	Jul 1988	6	74.8+	Aug 1995	-22	Jan 1994	19	12.3	Jan 1977	6896	613	@	9.5	223.3	55.1	142.4	7.9

\+ 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: 1963-2001

(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	2.03	1.72	2.15	1993	4	4.36	1975	.47	1981
Feb	1.54	1.15	2.96	1997	21	4.80	1997	.36	1982
Mar	2.59	2.30	1.36	1985	4	5.12	1974	.96+	1999
Apr	3.48	3.36	2.35	2000	20	6.69	1999	1.70	1997
May	3.35	2.98	4.15	2001	15	8.65	2000	.94	1987
Jun	3.67	3.70	3.17	1989	23	7.17	1994	.25	1988
Jul	3.56	3.01	3.56	1994	5	8.83	1992	.81	1976
Aug	3.78	3.31	3.61	1987	14	8.46	1987	.33	1996
Sep	4.28	4.24	3.21	1986	11	11.85	1986	.00	1979
Oct	2.80	2.60	2.24	2001	24	5.61	1991	1.00	1999
Nov	3.35	2.85	2.94	1990	27	7.14	1990	.95+	1999
Dec	2.70	2.54	2.13	1971	10	6.63	1971	.97	1989
Ann	37.13	36.86	4.15	May 2001	15	11.85	Sep 1986	.00	Sep 1979

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	16.7	6.0	.8	.2
Feb	11.9	4.5	.6	.1
Mar	12.2	6.7	1.5	.2
Apr	13.2	7.6	2.2	.7
May	10.7	6.3	1.9	.7
Jun	9.9	6.1	2.3	1.0
Jul	9.4	6.1	2.7	.8
Aug	9.7	6.1	3.0	1.0
Sep	10.5	6.9	2.8	1.1
Oct	11.3	5.9	1.9	.5
Nov	13.3	7.3	2.2	.6
Dec	15.5	6.7	1.2	.6
Ann	144.3	76.2	23.1	7.5

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	.61	.80	1.09	1.34	1.58	1.83	2.11	2.44	2.86	3.51	4.12
Feb	.39	.53	.75	.95	1.15	1.35	1.58	1.86	2.21	2.78	3.30
Mar	.91	1.16	1.51	1.81	2.10	2.39	2.71	3.08	3.56	4.29	4.97
Apr	1.66	1.96	2.37	2.70	3.01	3.32	3.65	4.02	4.49	5.19	5.83
May	.86	1.18	1.67	2.10	2.52	2.96	3.46	4.05	4.82	6.03	7.17
Jun	.93	1.27	1.81	2.28	2.74	3.23	3.78	4.43	5.28	6.63	7.88
Jul	.98	1.31	1.83	2.27	2.71	3.17	3.68	4.28	5.07	6.30	7.44
Aug	.82	1.16	1.72	2.22	2.72	3.26	3.86	4.59	5.54	7.06	8.50
Sep	.85	1.45	2.17	2.75	3.30	3.88	4.50	5.24	6.19	7.67	9.05
Oct	1.11	1.37	1.73	2.04	2.32	2.61	2.93	3.29	3.76	4.46	5.11
Nov	1.00	1.32	1.80	2.21	2.61	3.02	3.48	4.02	4.71	5.80	6.81
Dec	.77	1.03	1.42	1.75	2.08	2.42	2.80	3.24	3.82	4.73	5.57
Ann	28.09	29.88	32.14	33.85	35.36	36.80	38.29	39.92	41.89	44.73	47.16

\+ 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: 1963-2001
(3) Derived from 1971-2000 serially complete daily data

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Snow (inches)

Snow Totals

Means/Medians (1)

Extremes (2)

Mean Number of Days (1)

Snow Fall >= Thresholds

Snow Depth >= Thresholds

Month	Snow Fall Mean	Snow Fall Median	Snow Depth Mean	Snow Depth Median	Highest Daily Snow Fall	Year	Day	Highest Monthly Snow Fall	Year	Highest Daily Snow Depth	Year	Day	Highest Monthly Mean Snow Depth	Year	0.1	1.0	3.0	5.0	10.0	1	3	5	10
Jan	17.9	16.0	5	4	16.1	1978	26	45.5	1979	27	1978	27	18	1979	15.3	5.9	1.5	.4	.1	23.9	19.0	13.6	4.7
Feb	11.4	9.7	4	3	8.8	1985	11	29.6	1994	21+	1985	16	15	1979	10.0	3.5	1.0	.2	.0	18.3	13.0	9.9	3.7
Mar	8.1	7.0	1	2	9.0	1976	2	19.3	1996	11+	1979	3	5	1978	6.5	2.1	.8	.3	.0	9.1	4.7	2.5	.2
Apr	2.9	2.1	#	0	7.8	1975	2	12.4	1982	10	1975	3	1+	1982	2.4	.8	.3	.1	.0	1.3	.6	.3	@
May	.0	.0	#	0	.2	1990	10	.2	1990	0	0	0	#	2000	.2	.0	.0	.0	.0	.0	.0	.0	.0
Jun	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Jul	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Aug	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Sep	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Oct	.6	.0	#	0	4.5	1989	19	5.8	1989	1+	1997	27	#	1997	.6	.2	@	.0	.0	.1	.0	.0	.0
Nov	6.5	5.5	#	0	10.4	1991	3	20.8	1995	11	2000	21	1+	2000	5.1	2.3	.5	.1	@	3.9	1.5	.5	@
Dec	17.0	17.3	2	2	14.2	2000	11	34.8	1983	16	2000	25	8	2000	12.6	5.5	1.7	.4	@	16.9	10.0	6.2	1.2
Ann	64.4	57.6	N/A	N/A	16.1	Jan 1978	26	45.5	Jan 1979	27	Jan 1978	27	18	Jan 1979	52.7	20.3	5.8	1.5	.1	73.5	48.8	33.0	9.8

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

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	9/15	9/19	9/23	9/25	9/28	9/30	10/03	10/06	10/10
32	9/26	9/30	10/03	10/06	10/08	10/11	10/13	10/16	10/21
28	10/06	10/12	10/16	10/20	10/23	10/27	10/30	11/03	11/09
24	10/16	10/23	10/28	11/01	11/05	11/09	11/13	11/18	11/25
20	10/28	11/04	11/10	11/14	11/19	11/23	11/27	12/03	12/10
16	11/16	11/21	11/25	11/29	12/02	12/05	12/09	12/13	12/18

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	155	148	143	138	134	130	125	120	113
32	173	167	163	159	156	153	149	145	139
28	208	198	192	186	181	176	170	164	155
24	236	227	221	216	211	206	200	194	185
20	258	248	241	235	229	224	218	211	201
16	276	269	263	259	254	250	245	240	233

***** 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	1317	1135	956	571	255	58	10	24	159	471	793	1147	6896
60	1164	979	788	416	167	18	0	6	62	329	649	1006	5584
57	1071	895	695	332	120	8	0	1	32	252	560	913	4879
55	1009	839	633	281	93	4	0	0	19	207	501	851	4437
50	854	699	486	167	43	1	0	0	4	114	359	696	3423
32	344	260	96	3	0	0	0	0	0	2	39	232	976

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	27	44	170	434	807	1055	1228	1164	886	561	228	58	6662
55	0	0	7	34	162	368	515	452	225	51	6	0	1820
57	0	0	4	25	126	313	453	390	181	36	3	0	1531
60	0	0	2	16	85	234	361	299	124	19	1	0	1141
65	0	0	2	6	38	124	217	165	56	5	0	0	613
70	0	0	0	1	12	49	98	67	18	1	0	0	246

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	2	9	71	235	571	826	989	927	656	331	95	17	2	11	82	317	888	1714	2703	3630	4286	4617	4712	4729
45	0	1	34	137	418	676	834	772	507	205	47	4	0	1	35	172	590	1266	2100	2872	3379	3584	3631	3635
50	0	0	16	75	281	526	679	617	361	113	20	2	0	0	16	91	372	898	1577	2194	2555	2668	2688	2690
55	0	0	6	36	169	379	525	462	235	55	5	0	0	0	6	42	211	590	1115	1577	1812	1867	1872	1872
60	0	0	1	15	86	241	370	308	130	23	1	0	0	0	1	16	102	343	713	1021	1151	1174	1175	1175
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	4	46	146	349	530	664	614	400	184	50	5	0	4	50	196	545	1075	1739	2353	2753	2937	2987	2992

(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