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: HESPERIA 4 WNW, MI **COOP ID: 203769**

Climate Division: MI 5 **NWS Call Sign:** **Elevation: 780 Feet** **Lat: 43˚35N** **Lon: 86˚06W**

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	12.1	20.7	57+	1967	25	29.2	1990	-35	1951	30	12.0	1977	1374	0	.0	.0	.5	19.3	30.1	4.6
Feb	32.5	12.7	22.6	66	2000	27	33.6	1998	-31	1996	3	13.0	1979	1188	0	.0	.0	.9	14.2	27.2	4.3
Mar	42.3	20.5	31.4	78	1967	30	40.2	1973	-15	1962	2	24.8	1978	1041	0	.0	.0	7.2	5.6	26.4	1.7
Apr	55.2	31.3	43.3	86	1970	29	48.5	1986	-9	1982	7	38.1	1982	651	0	.0	.0	20.0	.4	16.1	@
May	68.1	41.4	54.8	91+	1962	29	62.7	1977	18	1989	7	47.4	1997	346	29	.0	.2	30.1	.0	4.3	.0
Jun	76.6	50.5	63.6	99	1995	21	68.3	1995	29+	1978	14	57.9	1982	110	66	.0	1.3	30.0	.0	.4	.0
Jul	81.1	55.7	68.4	98	1988	10	73.1	1988	33	2001	2	62.7	1996	31	136	.0	2.2	31.0	.0	.0	.0
Aug	78.9	54.1	66.5	100+	1955	18	73.4	1995	33+	1968	27	61.6	1992	67	113	.0	1.1	31.0	.0	.0	.0
Sep	71.0	46.2	58.6	92+	1952	12	63.6	1971	22+	1950	24	54.0	1993	210	19	.0	.2	29.9	.0	2.2	.0
Oct	59.1	36.2	47.7	86	1971	2	56.5	1971	12	1952	21	40.0	1988	538	1	.0	.0	25.8	.0	10.5	.0
Nov	45.6	27.5	36.6	75+	1950	1	44.0	1975	-20	1950	25	30.7	1995	854	0	.0	.0	9.7	2.7	21.5	@
Dec	34.3	18.5	26.4	66	2001	6	34.2	1982	-20+	1976	31	16.7	1989	1197	0	.0	.0	1.6	12.8	28.9	1.7
Ann	56.2	33.9	45.1	100+	Aug 1955	18	73.4	Aug 1995	-35	Jan 1951	30	12.0	Jan 1977	7607	364	.0	5.0	217.7	55.0	167.6	12.3

\+ 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	2.26	2.03	1.90	1974	27	4.73	1999	.92	1996
Feb	1.55	1.52	1.92	1974	22	3.12	1981	.20	1987
Mar	2.41	2.33	2.81	1976	5	7.43	1976	.17	1994
Apr	3.03	3.41	3.85	1967	17	5.17	1982	1.08	1990
May	2.84	2.38	2.53	2001	15	5.88	2000	.58	1977
Jun	3.22	2.95	3.80	1969	26	7.71	1990	.50	1988
Jul	2.36	2.18	3.49	1983	28	5.24	1983	.41	1989
Aug	4.03	3.43	6.19	1975	31	13.01	1975	1.09	1971
Sep	3.56	3.22	6.56	1986	11	12.00	1986	.00	1979
Oct	3.30	3.14	4.18	1954	3	7.17	1991	.36	1971
Nov	2.92	2.61	2.23	1985	2	6.75	1985	1.14	1986
Dec	2.53	2.37	2.03	1971	10	5.26	1982	.57	1997
Ann	34.01	34.09	6.56	Sep 1986	11	13.01	Aug 1975	.00	Sep 1979

Mean Number of Days (3)

Month	Daily Precipitation >= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	13.0	7.2	.8	.1
Feb	9.5	5.3	.4	.2
Mar	9.6	6.0	1.2	.3
Apr	10.4	7.0	1.6	.5
May	9.3	6.1	1.9	.6
Jun	8.7	6.0	2.1	.8
Jul	8.6	5.7	1.6	.5
Aug	9.2	6.6	2.3	1.0
Sep	9.7	6.6	2.2	.7
Oct	10.0	7.0	2.1	.7
Nov	11.2	7.6	1.5	.4
Dec	13.1	7.8	.9	.3
Ann	122.3	78.9	18.6	6.1

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	.79	1.00	1.31	1.57	1.82	2.08	2.36	2.68	3.10	3.75	4.34
Feb	.40	.55	.77	.97	1.17	1.37	1.60	1.87	2.23	2.79	3.31
Mar	.48	.70	1.06	1.38	1.71	2.06	2.46	2.94	3.57	4.58	5.54
Apr	1.18	1.46	1.86	2.19	2.51	2.83	3.17	3.57	4.08	4.86	5.57
May	.78	1.05	1.46	1.81	2.16	2.53	2.94	3.42	4.04	5.02	5.94
Jun	.84	1.15	1.61	2.02	2.43	2.85	3.32	3.88	4.61	5.76	6.83
Jul	.45	.67	1.01	1.33	1.65	2.00	2.40	2.87	3.50	4.51	5.48
Aug	1.11	1.49	2.07	2.58	3.08	3.60	4.18	4.86	5.75	7.14	8.44
Sep	.57	1.05	1.65	2.14	2.63	3.14	3.71	4.38	5.25	6.64	7.93
Oct	1.01	1.32	1.79	2.19	2.58	2.98	3.43	3.95	4.63	5.68	6.66
Nov	1.08	1.35	1.75	2.07	2.39	2.71	3.05	3.46	3.97	4.76	5.49
Dec	.77	1.01	1.37	1.68	1.98	2.29	2.63	3.03	3.55	4.36	5.11
Ann	24.28	26.16	28.58	30.41	32.04	33.61	35.24	37.03	39.21	42.36	45.08

+ 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	18.9	16.4	10	7
Feb	11.2	12.1	10	7
Mar	8.1	6.2	4	3
Apr	2.4	.9	#	#
May	#	.0	#	0
Jun	.0	.0	0	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	#	.0	0	0
Oct	.2	.0	#	0
Nov	6.4	5.1	1	#
Dec	17.2	14.8	5	4
Ann	64.4	55.5	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	9.2	1978	26	35.8	1978	33	1999	13	25	1979
Feb	8.0	1981	11	26.2	1978	27+	1985	15	24	1979
Mar	10.5	1998	10	20.7	1974	23	1978	6	14	1978
Apr	8.2	1982	4	11.5	1982	10	1982	7	2	1982
May	#	1997	16	#+	1997	#	1997	16	#	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	#	1983	23	#	1983	0	0	0	0	0
Oct	2.7	1989	20	2.7	1989	2	1997	27	#+	2000
Nov	12.3	1981	20	19.0	1989	13+	1989	18	4	1981
Dec	7.8	1988	13	39.3	1983	24	1983	29	14	2000
Ann	12.3	Nov 1981	20	39.3	Dec 1983	33	Jan 1999	13	25	Jan 1979

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	10.6	7.2	2.0	.7	.0
Feb	6.5	4.5	1.2	.2	.0
Mar	4.2	2.5	.9	.2	@
Apr	1.2	.8	.3	.1	.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	.2	.1	.0	.0	.0
Nov	3.2	2.2	.7	.2	@
Dec	8.8	6.5	2.0	.5	.0
Ann	34.7	23.8	7.1	1.9	@

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	27.2	22.6	18.4	11.2
Feb	24.3	22.1	18.3	10.2
Mar	15.8	11.6	8.5	3.9
Apr	1.7	.8	.4	.1
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	5.0	2.5	1.4	.4
Dec	20.5	15.7	10.8	3.3
Ann	94.6	75.3	57.8	29.1

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

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

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	121	111	104	98	92	86	80	72	62
32	146	138	133	129	124	120	116	110	103
28	175	169	164	160	156	153	149	144	138
24	204	196	189	184	179	174	169	163	154
20	231	222	216	211	206	201	195	189	180
16	254	245	239	233	228	223	217	210	201

***** 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	1374	1188	1041	651	346	110	31	67	210	538	854	1197	7607
60	1219	1048	886	503	231	45	6	19	106	390	704	1042	6199
57	1126	964	793	417	173	22	0	8	62	308	614	949	5436
55	1064	908	731	360	140	13	0	3	40	257	555	887	4958
50	909	768	581	233	73	3	0	0	10	150	408	732	3867
32	376	310	156	9	0	0	0	0	0	3	51	251	1156

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	25	46	138	348	706	946	1128	1070	798	489	187	78	5959
55	0	0	0	9	133	269	415	360	149	29	0	0	1364
57	0	0	0	5	104	218	353	302	110	18	0	0	1110
60	0	0	0	2	68	150	266	221	64	8	0	0	779
65	0	0	0	0	29	66	136	113	19	1	0	0	364
70	0	0	0	0	10	18	52	43	3	0	0	0	126

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	3	48	187	491	736	905	850	583	277	68	7	0	3	51	238	729	1465	2370	3220	3803	4080	4148	4155
45	0	0	20	105	347	586	750	695	437	160	26	1	0	0	20	125	472	1058	1808	2503	2940	3100	3126	3127
50	0	0	5	55	219	438	595	540	295	83	10	0	0	0	5	60	279	717	1312	1852	2147	2230	2240	2240
55	0	0	0	25	123	292	440	386	179	36	0	0	0	0	0	25	148	440	880	1266	1445	1481	1481	1481
60	0	0	0	11	61	172	291	239	91	8	0	0	0	0	0	11	72	244	535	774	865	873	873	873
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	0	30	124	318	469	600	552	364	170	37	1	0	0	30	154	472	941	1541	2093	2457	2627	2664	2665

(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