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: HOUGHTON LAKE 6 WSW, MI **COOP ID: 203932**

Climate Division: MI 4 **NWS Call Sign:** **Elevation: 1,135 Feet** **Lat: 44˚19N** **Lon: 84˚54W**

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	7.5	16.9	54	1996	19	26.1	1990	-32	1951	30	7.4	1994	1494	0	.0	.0	.1	22.5	30.7	9.5
Feb	29.6	7.7	18.7	61	2000	27	31.1	1998	-38+	1979	17	8.0	1979	1299	0	.0	.0	.7	17.3	27.9	9.2
Mar	39.8	15.9	27.9	78	2000	9	36.8	2000	-20+	1978	2	20.8	1984	1151	0	.0	.0	6.0	7.5	28.5	3.7
Apr	53.1	28.1	40.6	88+	1980	23	45.4	1985	1+	1972	9	35.0	1975	732	0	.0	.0	18.5	1.0	19.5	.0
May	67.3	38.5	52.9	93	1988	30	59.9	1998	18	1970	3	45.9	1997	393	18	.0	.4	29.3	.0	8.2	.0
Jun	76.1	47.3	61.7	102+	1994	18	67.1	1995	22	1972	11	55.8	1972	150	51	.1	1.9	30.0	.0	1.3	.0
Jul	80.8	51.4	66.1	102	1987	21	69.7	1983	30	1985	23	60.9	1992	56	90	.2	3.5	31.0	.0	.2	.0
Aug	77.9	48.9	63.4	101	2001	9	70.3	1995	24+	1982	28	59.0	1982	121	72	.0	1.2	31.0	.0	.6	.0
Sep	69.2	41.2	55.2	94+	1953	1	59.9	1998	18+	1989	27	51.2	1974	297	3	.0	.3	29.8	.0	5.3	.0
Oct	56.7	32.5	44.6	85+	1971	1	52.4	1971	15+	1999	8	38.2	1972	633	0	.0	.0	23.6	@	15.5	.0
Nov	42.6	25.1	33.9	75	1950	1	39.3	1975	-14	1950	25	27.7	1995	935	0	.0	.0	7.6	4.9	24.4	.3
Dec	31.0	14.9	23.0	65	2001	6	30.4	1982	-24+	1976	29	12.4	1989	1304	0	.0	.0	1.2	17.2	30.1	3.7
Ann	54.2	29.9	42.1	102+	Jun 1994	18	70.3	Aug 1995	-38+	Feb 1979	17	7.4	Jan 1994	8565	234	.3	7.3	208.8	70.4	192.2	26.4

+ 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

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	1.54	1.48	1.37	1974	27	3.06+	1997	.55	1977
Feb	1.22	1.07	1.10	1997	22	3.23	1997	.27	1987
Mar	1.57	1.40	1.63	1976	5	5.51	1976	.21	1978
Apr	2.31	2.04	1.77	2001	12	5.07	1981	1.08	1985
May	2.66	2.56	2.39	1991	26	5.82	2000	.60	1977
Jun	3.17	2.79	2.97	1969	26	8.20	1996	1.03	1988
Jul	2.82	2.95	5.18	1957	8	5.14	1991	.70	1978
Aug	3.81	3.73	2.97	1996	20	6.64	1989	1.25	1980
Sep	3.47	3.36	2.52	1975	1	9.61	1986	.00	1979
Oct	2.71	2.67	3.72	1954	3	8.69	1991	.49	1971
Nov	2.39	2.21	2.08	1988	6	5.42	1988	.68	1999
Dec	1.78	1.54	2.02	1953	10	4.36	1971	.52	1976
Ann	29.45	29.49	5.18	Jul 1957	8	9.61	Sep 1986	.00	Sep 1979

Mean Number of Days (3)

Month	Daily Precipitation >= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	13.3	4.6	.5	.1
Feb	9.6	3.9	.4	@
Mar	10.1	4.7	.8	.1
Apr	10.7	5.9	1.3	.3
May	10.0	6.3	1.5	.4
Jun	9.5	5.9	2.1	.4
Jul	9.6	5.5	1.9	.5
Aug	11.1	7.0	2.5	.9
Sep	11.9	6.8	2.1	.9
Oct	12.1	6.6	1.7	.4
Nov	13.0	6.2	1.3	.3
Dec	13.4	4.9	.7	.1
Ann	134.3	68.3	16.8	4.4

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	.75	.95	1.12	1.28	1.44	1.62	1.82	2.08	2.47	2.83
Feb	.28	.40	.58	.74	.90	1.07	1.26	1.48	1.78	2.25	2.69
Mar	.36	.50	.73	.94	1.14	1.36	1.61	1.90	2.29	2.91	3.49
Apr	.88	1.10	1.41	1.66	1.90	2.15	2.42	2.73	3.12	3.73	4.28
May	.80	1.06	1.43	1.76	2.07	2.40	2.76	3.18	3.73	4.59	5.38
Jun	.93	1.23	1.68	2.07	2.45	2.85	3.29	3.80	4.47	5.52	6.49
Jul	1.07	1.33	1.71	2.02	2.32	2.62	2.95	3.33	3.82	4.56	5.24
Aug	1.43	1.78	2.29	2.72	3.12	3.53	3.98	4.50	5.16	6.18	7.11
Sep	.84	1.33	1.91	2.36	2.78	3.21	3.68	4.22	4.92	6.00	6.99
Oct	.90	1.16	1.53	1.85	2.16	2.48	2.83	3.24	3.76	4.57	5.32
Nov	.70	.93	1.27	1.56	1.85	2.15	2.48	2.87	3.38	4.17	4.90
Dec	.57	.74	.99	1.20	1.41	1.62	1.86	2.13	2.48	3.03	3.53
Ann	23.90	25.03	26.45	27.50	28.43	29.31	30.21	31.20	32.37	34.06	35.49

\+ 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	11.5	9.7	9	9
Feb	10.2	10.2	10	8
Mar	6.9	7.4	6	4
Apr	1.7	1.0	#	#
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	8.5	9.0	1	#
Dec	12.7	10.8	4	3
Ann	51.7	48.1	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	11.5	1982	1	22.5	1990	23	1979	16	19	1979
Feb	10.0	1993	22	18.7	1993	25	1985	15	21+	1982
Mar	8.0	1971	19	15.6	1972	24	1982	5	16	1982
Apr	5.0	1973	10	5.3+	2000	8	1972	2	2	1972
May	1.0	1990	11	1.0	1990	1	1990	11	#+	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	2.0	1992	21	2.0	1992	2	1997	27	#+	1997
Nov	10.0	1981	20	18.2	2000	12	1981	21	3	1981
Dec	8.0	1972	13	25.2	1972	14	1985	29	8	1985
Ann	11.5	Jan 1982	1	25.2	Dec 1972	25	Feb 1985	15	21+	Feb 1982

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	8.6	4.9	.9	.5	.0
Feb	6.7	4.4	1.0	.3	.1
Mar	4.5	2.6	.9	.5	.0
Apr	1.3	.7	.1	.1	.0
May	@	@	.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	.3	.2	.0	.0	.0
Nov	4.0	2.4	.8	.4	.1
Dec	8.3	4.4	1.2	.5	.0
Ann	33.7	19.6	4.9	2.3	.2

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	28.2	24.4	19.7	7.5
Feb	25.9	24.4	18.5	9.8
Mar	16.0	12.8	10.4	4.6
Apr	2.0	.2	.1	.0
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	.1	.0	.0	.0
Nov	8.7	3.5	1.7	.4
Dec	-9.9	-9.9	-9.9	-9.9
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	7/25	7/15	7/08	7/02	6/27	6/21	6/15	6/08	5/30
32	7/08	6/29	6/23	6/17	6/12	6/07	6/01	5/26	5/17
28	6/08	6/02	5/28	5/25	5/21	5/18	5/14	5/10	5/04
24	5/22	5/16	5/12	5/08	5/05	5/01	4/28	4/23	4/17
20	4/26	4/23	4/20	4/18	4/16	4/14	4/12	4/10	4/06
16	4/18	4/14	4/11	4/08	4/06	4/04	4/01	3/29	3/25

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	8/06	8/13	8/17	8/21	8/25	8/29	9/02	9/07	9/13
32	8/19	8/25	8/30	9/03	9/07	9/11	9/14	9/19	9/26
28	9/08	9/13	9/17	9/19	9/22	9/25	9/28	10/01	10/06
24	9/20	9/27	10/02	10/06	10/10	10/14	10/19	10/24	10/31
20	10/07	10/12	10/17	10/20	10/23	10/27	10/30	11/03	11/09
16	10/27	11/02	11/06	11/09	11/12	11/15	11/19	11/23	11/28

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	96	83	74	66	58	51	43	34	21
32	125	112	102	94	86	78	70	61	47
28	145	137	132	127	123	119	114	109	102
24	184	175	169	163	158	153	147	140	131
20	210	203	198	193	189	185	181	176	169
16	241	233	228	224	219	215	211	205	198

***** 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	1494	1299	1151	732	393	150	56	121	297	633	935	1304	8565
60	1339	1159	996	583	268	72	11	49	165	480	785	1149	7056
57	1246	1075	903	494	205	41	3	23	102	393	695	1056	6236
55	1184	1019	841	436	167	26	0	14	69	336	635	994	5721
50	1029	879	686	299	91	8	0	2	20	213	486	839	4552
32	487	401	218	21	0	0	0	0	0	9	76	332	1544

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	16	26	89	279	648	892	1057	974	696	399	131	51	5258
55	0	0	0	4	102	228	344	275	75	14	0	0	1042
57	0	0	0	2	78	182	285	223	48	8	0	0	826
60	0	0	0	1	48	124	200	155	21	3	0	0	552
65	0	0	0	0	18	51	90	72	3	0	0	0	234
70	0	0	0	0	6	14	24	23	0	0	0	0	67

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	26	144	430	676	832	759	491	205	46	3	0	0	26	170	600	1276	2108	2867	3358	3563	3609	3612
45	0	0	14	75	295	526	677	604	345	113	19	1	0	0	14	89	384	910	1587	2191	2536	2649	2668	2669
50	0	0	3	38	182	382	522	450	219	54	5	0	0	0	3	41	223	605	1127	1577	1796	1850	1855	1855
55	0	0	0	19	103	250	368	303	120	22	0	0	0	0	0	19	122	372	740	1043	1163	1185	1185	1185
60	0	0	0	7	50	138	230	174	58	4	0	0	0	0	0	7	57	195	425	599	657	661	661	661
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	0	23	109	293	432	543	497	315	138	29	0	0	0	23	132	425	857	1400	1897	2212	2350	2379	2379

(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:
www.ncdc.noaa.gov/oa/climate/normals/usnormals.html

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