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: HILLSDALE, MI **COOP ID: 203823**

Climate Division: MI 9 **NWS Call Sign:** **Elevation: 1,080 Feet** **Lat: 41˚56N** **Lon: 84˚38W**

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	28.7	12.5	20.6	67	1950	25	31.3	1990	-22	1994	19	10.4	1977	1376	0	.0	.0	1.3	18.3	29.7	5.4
Feb	32.5	14.2	23.4	69	1999	12	34.0	1998	-20+	1967	8	11.4	1978	1166	0	.0	.0	1.8	13.3	26.1	4.2
Mar	43.2	23.9	33.6	79+	1986	31	41.2	2000	-14	1967	1	23.5	1984	975	0	.0	.0	9.6	4.9	24.3	.6
Apr	56.0	34.5	45.3	86	1990	26	51.1	1977	3	1982	7	39.9	1975	594	0	.0	.0	21.8	.3	13.0	.0
May	68.3	45.5	56.9	90+	1953	30	64.2	1991	19	1966	10	50.6	1984	288	36	.0	.1	30.1	.0	2.5	.0
Jun	77.7	55.0	66.4	104	1988	26	70.2	1971	32	1972	11	62.0	1992	58	98	@	1.5	30.0	.0	@	.0
Jul	81.7	59.0	70.4	99+	1983	22	74.4	1999	36	1984	8	67.0	1992	11	176	.0	4.1	31.0	.0	.0	.0
Aug	79.6	56.5	68.1	99	1988	2	74.5	1995	34	1976	30	63.7	1992	40	135	.0	1.6	31.0	.0	.0	.0
Sep	72.3	49.1	60.7	97	1953	2	64.8	1998	26+	1951	29	56.5	1993	158	28	.0	.5	29.9	.0	1.0	.0
Oct	60.0	38.0	49.0	89	1951	4	56.9	1971	15+	1952	21	43.6	1987	498	2	.0	.0	26.8	.0	8.7	.0
Nov	45.9	29.1	37.5	79	1950	1	43.1	1975	-4	1950	24	31.1	1995	825	0	.0	.0	11.7	2.6	19.5	.0
Dec	33.6	19.0	26.3	69	2001	6	35.0	1982	-19	1983	25	14.2	2000	1200	0	.0	.0	2.7	11.7	28.4	2.2
Ann	56.6	36.4	46.5	104	Jun 1988	26	74.5	Aug 1995	-22	Jan 1994	19	10.4	Jan 1977	7189	475	@	7.8	227.7	51.1	153.2	12.4

\+ 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	2.10	1.70	2.38	1960	12	4.98	1993	.60	1988
Feb	1.82	1.43	1.81	1997	21	4.62	1971	.47+	1995
Mar	2.77	2.50	2.25	1954	25	5.51	1974	.75	1981
Apr	3.39	3.48	3.35	2000	21	5.63	1999	1.03	1997
May	3.82	3.93	3.82	1989	31	7.19	1989	1.42	1992
Jun	4.29	4.62	6.07	1978	26	8.18	1978	.51	1988
Jul	3.54	2.82	5.96	1951	22	8.07	1981	1.01	1995
Aug	3.70	3.59	3.62	1998	6	8.33	1975	.74	1976
Sep	3.71	3.53	2.92	2000	12	7.72	1972	.33	1979
Oct	2.82	2.61	2.30	1991	26	6.30	1991	1.40	1977
Nov	3.07	2.84	2.03	1984	11	7.56	1985	.83	1980
Dec	2.66	2.55	2.35	1965	24	5.55	1971	.85	1976
Ann	37.69	36.61	6.07	Jun 1978	26	8.33	Aug 1975	.33	Sep 1979

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	13.0	5.9	.8	.2
Feb	10.6	5.1	.8	.2
Mar	12.0	6.7	1.7	.4
Apr	13.1	8.3	1.9	.3
May	12.4	7.5	2.5	.9
Jun	10.8	7.2	3.1	1.1
Jul	10.7	7.1	2.5	.6
Aug	10.8	7.0	2.3	.9
Sep	10.8	6.6	2.4	1.0
Oct	11.5	6.4	1.6	.4
Nov	13.1	7.4	1.8	.5
Dec	14.0	6.8	1.5	.3
Ann	142.8	82.0	22.9	6.8

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	.56	.76	1.07	1.33	1.59	1.87	2.17	2.53	3.00	3.74	4.43
Feb	.41	.58	.84	1.08	1.32	1.58	1.86	2.21	2.66	3.37	4.05
Mar	1.01	1.27	1.64	1.96	2.26	2.56	2.90	3.28	3.78	4.54	5.24
Apr	1.50	1.80	2.22	2.57	2.89	3.21	3.55	3.95	4.45	5.21	5.89
May	1.46	1.81	2.32	2.74	3.14	3.55	4.00	4.51	5.16	6.17	7.09
Jun	1.52	1.93	2.51	3.00	3.47	3.95	4.48	5.09	5.87	7.07	8.18
Jul	1.18	1.51	2.00	2.42	2.82	3.24	3.69	4.22	4.90	5.95	6.92
Aug	1.17	1.52	2.04	2.49	2.92	3.36	3.85	4.42	5.16	6.31	7.37
Sep	1.12	1.47	2.00	2.45	2.90	3.35	3.86	4.45	5.22	6.42	7.53
Oct	1.25	1.50	1.85	2.14	2.41	2.67	2.96	3.29	3.70	4.33	4.90
Nov	1.01	1.30	1.73	2.10	2.45	2.81	3.20	3.67	4.26	5.18	6.03
Dec	.95	1.20	1.57	1.87	2.16	2.46	2.78	3.16	3.64	4.38	5.07
Ann	29.48	31.13	33.21	34.76	36.13	37.44	38.78	40.25	42.02	44.56	46.72

\+ 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	14.2	15.0	4	4
Feb	10.8	10.1	4	4
Mar	7.2	6.3	2	1
Apr	1.5	.5	#	0
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	.3	.0	#	0
Nov	4.4	3.5	#	#
Dec	13.1	11.8	2	1
Ann	51.6	47.2	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	13.0	1978	26	37.2	1978	19	1974	13	12	1999
Feb	8.0	1982	3	21.5	1974	22	1982	12	14	1982
Mar	15.0	1973	17	16.9	1993	21	1989	1	11	1978
Apr	7.0	1982	6	8.5	1982	7	1982	6	1	1982
May	1.5	1974	8	1.5	1974	0	0	0	0	0
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	2.5	1980	28	3.0	1989	3	1980	28	#+	1997
Nov	6.3	1986	19	12.0	1972	7	1986	19	3	1972
Dec	12.0	1973	19	36.4	2000	16	1973	24	9	2000
Ann	15.0	Mar 1973	17	37.2	Jan 1978	22	Feb 1982	12	14	Feb 1982

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	9.9	5.3	1.4	.5	.1
Feb	7.2	4.1	1.1	.2	.0
Mar	4.8	2.4	.7	.4	@
Apr	1.0	.5	.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	3.4	1.9	.4	.1	.0
Dec	8.3	4.1	1.5	.4	@
Ann	34.9	18.5	5.2	1.7	.1

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	16.1	11.7	7.8	.4
Feb	18.0	13.0	7.7	2.5
Mar	3.8	1.8	.9	.2
Apr	.6	.4	.1	.0
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	.2	@	.0	.0
Nov	2.5	1.6	.9	.0
Dec	10.0	6.9	4.8	2.3
Ann	51.2	35.4	22.2	5.4

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

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

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	141	133	127	121	116	111	106	100	91
32	165	158	153	149	145	141	136	131	124
28	185	179	174	170	166	163	159	154	148
24	224	216	210	205	200	196	191	185	176
20	243	235	229	224	219	214	209	203	195
16	265	256	250	245	240	235	230	223	215

***** 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	1376	1166	975	594	288	58	11	40	158	498	825	1200	7189
60	1221	1026	820	446	182	17	0	9	68	353	675	1045	5862
57	1128	942	727	361	130	7	0	2	36	274	585	952	5144
55	1066	886	665	306	101	4	0	0	21	226	526	890	4691
50	911	746	519	186	46	1	0	0	4	127	383	740	3663
32	397	296	121	4	0	0	0	0	0	2	48	277	1145

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	44	54	169	400	771	1030	1188	1118	860	529	213	100	6476
55	0	0	0	12	159	344	475	405	192	40	1	0	1628
57	0	0	0	7	126	287	413	345	146	26	0	0	1350
60	0	0	0	3	84	207	320	259	88	12	0	0	973
65	0	0	0	0	36	98	176	135	28	2	0	0	475
70	0	0	0	0	12	29	71	53	4	0	0	0	169

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	5	10	72	232	550	809	958	889	640	326	95	18	5	15	87	319	869	1678	2636	3525	4165	4491	4586	4604
45	0	2	37	138	400	659	803	734	492	202	49	4	0	2	39	177	577	1236	2039	2773	3265	3467	3516	3520
50	0	0	18	75	267	509	648	579	346	111	17	1	0	0	18	93	360	869	1517	2096	2442	2553	2570	2571
55	0	0	3	39	156	361	493	425	221	53	6	0	0	0	3	42	198	559	1052	1477	1698	1751	1757	1757
60	0	0	0	12	80	233	340	275	126	17	0	0	0	0	0	12	92	325	665	940	1066	1083	1083	1083
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	5	49	148	336	525	635	585	403	192	50	6	0	5	54	202	538	1063	1698	2283	2686	2878	2928	2934

(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