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: HALE LOUD DAM, MI **COOP ID: 203529**

Climate Division: MI 4 **NWS Call Sign:** **Elevation: 815 Feet** **Lat: 44˚28N** **Lon: 83˚43W**

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	26.4	8.8	17.6	57	1950	25	26.8	1990	-36	1951	30	7.7	1977	1470	0	.0	.0	.2	21.2	30.4	8.7
Feb	28.6	8.8	18.7	63	1984	24	28.9	1998	-40	1979	17	8.1	1994	1296	0	.0	.0	1.1	16.1	27.4	8.1
Mar	39.2	18.9	29.1	80	2000	9	37.2	1973	-24+	1962	1	21.7	1972	1114	0	.0	.0	6.5	6.5	27.7	2.6
Apr	52.2	30.8	41.5	87+	1985	24	46.1	1986	0	1972	8	34.6	1972	706	0	.0	.0	20.0	.5	17.4	@
May	65.0	41.8	53.4	92+	1949	5	59.3	1998	20	1950	8	45.7	1997	376	15	.0	.1	30.0	.0	4.9	.0
Jun	74.5	51.2	62.9	99	1995	20	67.2	1991	30	1972	11	57.8	1982	114	50	.0	1.0	30.0	.0	.2	.0
Jul	79.4	56.2	67.8	98+	1977	20	71.4	1983	35	1965	6	63.0	1992	27	113	.0	2.6	31.0	.0	.0	.0
Aug	76.5	54.9	65.7	100	1948	24	70.1	1995	33	1982	29	61.7	1992	70	91	.0	.9	31.0	.0	.0	.0
Sep	68.4	47.5	58.0	97	1953	1	62.5	1998	27+	1965	27	53.0	1975	222	10	.0	.2	29.9	.0	1.2	.0
Oct	56.5	37.0	46.8	85	1971	2	54.6	1971	12	1976	28	41.2	1976	567	0	.0	.0	25.0	.0	10.1	.0
Nov	42.4	27.5	35.0	77	1950	1	41.0	1999	-4	1976	29	27.1	1976	902	0	.0	.0	8.5	2.9	21.5	.1
Dec	31.1	16.9	24.0	66	2001	6	32.3	1982	-26	1977	11	12.6	1989	1272	0	.0	.0	1.3	14.6	29.2	3.4
Ann	53.4	33.4	43.4	100	Aug 1948	24	71.4	Jul 1983	-40	Feb 1979	17	7.7	Jan 1977	8136	279	.0	4.8	214.5	61.8	170.0	22.9

\+ 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: 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	1.73	1.57	1.90	1974	27	3.87	1974	.48	1991
Feb	1.18	1.17	1.43	2001	9	3.04	1997	.26	1989
Mar	1.75	1.57	1.84	1976	5	4.94	1998	.16	1987
Apr	2.31	2.15	1.78	1952	13	4.80	1991	.69	1987
May	2.55	2.12	3.15	1959	20	7.48	1983	.78	1977
Jun	3.02	3.15	2.25	1999	14	7.15	1999	.73	1991
Jul	3.13	2.73	3.24	1973	31	9.92	1994	.55	1989
Aug	3.63	3.18	3.04	1979	10	8.42	1994	.77	1976
Sep	3.31	2.91	2.52	1975	1	10.11	1986	.37	1979
Oct	2.38	2.09	2.51	1998	7	7.00	1991	.64	2000
Nov	2.25	2.04	1.70	1965	27	4.82	1992	.65	1986
Dec	1.69	1.60	2.01	1950	7	4.45	1971	.32	1997
Ann	28.93	28.00	3.24	Jul 1973	31	10.11	Sep 1986	.16	Mar 1987

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	9.9	5.1	.8	.2
Feb	8.2	3.8	.5	@
Mar	8.3	4.7	.8	.2
Apr	9.4	6.0	1.5	.3
May	9.5	6.2	1.2	.3
Jun	9.7	6.4	2.2	.6
Jul	9.3	6.0	2.0	.7
Aug	9.9	6.8	2.4	.9
Sep	10.4	6.3	2.3	.8
Oct	9.8	5.6	1.5	.3
Nov	10.2	5.8	1.1	.2
Dec	9.0	5.1	1.0	.1
Ann	113.6	67.8	17.3	4.6

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	.54	.70	.95	1.16	1.36	1.57	1.80	2.08	2.43	2.98	3.49
Feb	.26	.37	.54	.70	.85	1.02	1.21	1.43	1.72	2.19	2.63
Mar	.34	.50	.75	.99	1.23	1.48	1.77	2.13	2.59	3.34	4.05
Apr	.81	1.03	1.35	1.61	1.87	2.13	2.41	2.74	3.17	3.82	4.42
May	.77	1.01	1.38	1.69	1.99	2.30	2.65	3.05	3.58	4.40	5.15
Jun	.99	1.27	1.69	2.05	2.40	2.75	3.15	3.60	4.19	5.10	5.95
Jul	.94	1.24	1.68	2.07	2.44	2.83	3.25	3.75	4.40	5.42	6.36
Aug	.96	1.30	1.83	2.29	2.75	3.22	3.75	4.38	5.20	6.48	7.68
Sep	1.00	1.32	1.79	2.19	2.58	2.99	3.44	3.96	4.65	5.71	6.69
Oct	.77	1.00	1.33	1.62	1.89	2.17	2.48	2.84	3.30	4.02	4.69
Nov	.70	.92	1.23	1.51	1.77	2.04	2.34	2.70	3.15	3.86	4.51
Dec	.44	.60	.85	1.06	1.28	1.50	1.75	2.04	2.43	3.03	3.60
Ann	21.78	23.20	24.99	26.34	27.53	28.67	29.85	31.14	32.70	34.95	36.88

+ 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)

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	17.5	16.0	9	8	13.0	1985	1	43.0	1994	30	1976	31	21	1982	6.6	5.4	1.9	.6	.1	28.8	26.0	21.4	14.6
Feb	9.8	7.9	11	8	9.0	1974	22	28.0	1985	46	1985	19	30	1985	5.2	3.6	1.0	.2	.0	27.4	24.2	20.6	14.5
Mar	8.8	6.8	7	5	13.5	1998	9	22.9	1998	31	1972	17	24	1972	3.6	2.8	.7	.4	.1	21.1	14.9	12.7	9.3
Apr	1.8	1.0	1	#	5.0	1973	10	6.5+	1980	18	1972	6	10	1972	1.0	.7	.2	@	.0	4.1	2.0	1.2	.2
May	.2	.0	#	0	4.0	1994	1	4.0	1994	#+	1996	12	#+	1996	.1	.1	@	.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	#	1991	26	#	1991	.0	.0	.0	.0	.0	.0	.0	.0	.0
Oct	.0	.0	#	0	.2	1993	9	.3	1993	#	1976	21	#	1976	.1	.0	.0	.0	.0	.0	.0	.0	.0
Nov	4.0	3.0	1	#	8.0	1989	16	14.0	1977	20	1995	28	4	1995	2.3	1.6	.5	.1	.0	3.8	1.4	.6	.2
Dec	11.9	11.9	4	3	9.0	1987	15	26.0	1972	21	2000	30	16	1995	5.0	3.6	1.3	.3	.0	19.7	13.9	7.4	2.4
Ann	54.0	46.6	N/A	N/A	13.5	Mar 1998	9	43.0	Jan 1994	46	Feb 1985	19	30	Feb 1985	23.9	17.8	5.6	1.6	.2	104.9	82.4	63.9	41.2

+ 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	6/10	6/06	6/03	6/01	5/30	5/27	5/25	5/22	5/18
32	6/02	5/28	5/24	5/21	5/19	5/16	5/13	5/09	5/05
28	5/16	5/12	5/10	5/07	5/05	5/03	4/30	4/27	4/23
24	4/28	4/25	4/23	4/21	4/19	4/17	4/15	4/12	4/09
20	4/22	4/18	4/15	4/12	4/10	4/08	4/06	4/03	3/30
16	4/13	4/09	4/05	4/02	3/30	3/27	3/25	3/21	3/16

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	9/14	9/16	9/19	9/21	9/24	9/27	10/01
32	9/16	9/21	9/24	9/27	9/29	10/02	10/04	10/08	10/12
28	10/01	10/05	10/08	10/11	10/13	10/15	10/18	10/21	10/25
24	10/15	10/19	10/23	10/25	10/28	10/31	11/02	11/06	11/10
20	10/26	10/30	11/03	11/06	11/08	11/11	11/14	11/17	11/22
16	11/05	11/10	11/14	11/17	11/20	11/23	11/26	11/30	12/05

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	127	122	118	115	112	108	105	101	96
32	149	143	139	136	133	130	126	122	117
28	177	172	167	164	160	157	154	149	144
24	208	202	198	195	192	188	185	181	175
20	230	224	219	215	211	208	204	199	193
16	257	249	243	238	234	229	225	219	211

***** 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	1470	1296	1114	706	376	114	27	70	222	567	902	1272	8136
60	1315	1156	959	557	250	45	4	19	110	418	752	1117	6702
57	1222	1072	866	469	187	22	0	7	63	334	662	1024	5928
55	1160	1016	804	411	150	13	0	3	40	282	602	962	5443
50	1005	876	649	277	78	3	0	0	10	171	454	807	4330
32	472	398	192	17	0	0	0	0	0	6	70	315	1470

Base	Cooling Degree Days (1)												
Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	24	25	101	301	663	926	1109	1044	778	462	158	66	5657
55	0	0	0	5	100	249	396	334	129	26	0	0	1239
57	0	0	0	3	75	198	334	276	91	16	0	0	993
60	0	0	0	1	45	131	244	195	48	7	0	0	671
65	0	0	0	0	15	50	113	91	10	0	0	0	279
70	0	0	0	0	4	11	33	28	1	0	0	0	77

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	30	160	471	727	891	831	577	268	58	5	0	0	30	190	661	1388	2279	3110	3687	3955	4013	4018
45	0	0	13	84	327	577	736	676	429	158	24	1	0	0	13	97	424	1001	1737	2413	2842	3000	3024	3025
50	0	0	3	43	205	427	581	521	289	78	4	0	0	0	3	46	251	678	1259	1780	2069	2147	2151	2151
55	0	0	0	17	114	284	426	368	168	31	0	0	0	0	0	17	131	415	841	1209	1377	1408	1408	1408
60	0	0	0	5	56	161	273	220	84	6	0	0	0	0	0	5	61	222	495	715	799	805	805	805
Base	Growing Degree Units for Corn (Monthly)												Growing Degree Units for Corn (Accumulated Monthly)											
50/86	0	0	27	118	307	455	577	537	350	160	28	2	0	0	27	145	452	907	1484	2021	2371	2531	2559	2561

(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