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: LAKE CITY EXP FARM, MI **COOP ID: 204502**

Climate Division: MI 3 **NWS Call Sign:** **Elevation: 1,240 Feet** **Lat: 44˚19N** **Lon: 85˚12W**

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	25.9	7.9	16.9	54	1973	26	25.5	1990	-37	1951	30	8.3	1994	1491	0	.0	.0	.1	23.3	30.7	8.1
Feb	29.3	8.1	18.7	60	2000	27	30.0	1998	-35	1979	18	8.9	1978	1296	0	.0	.0	.5	17.5	27.7	8.4
Mar	39.0	17.2	28.1	75	2000	9	38.4	2000	-24	1962	2	21.6	1984	1145	0	.0	.0	5.1	8.3	27.8	3.6
Apr	52.6	29.9	41.3	87+	1962	27	45.7	1991	-11	1954	3	36.1	1982	712	0	.0	.0	17.6	1.1	18.9	.0
May	66.7	40.3	53.5	92+	1977	25	60.2	1998	17	1966	9	45.9	1997	377	19	.0	.1	29.3	.0	6.2	.0
Jun	75.5	49.3	62.4	99+	1966	29	67.1	1995	24	1949	8	56.0	1982	130	53	.0	1.1	30.0	.0	.5	.0
Jul	79.9	53.6	66.8	99	1977	18	70.7	1987	31	1985	7	61.6	1992	43	98	.0	2.1	31.0	.0	@	.0
Aug	77.2	52.1	64.7	99	1955	21	70.0	1995	27	1982	29	60.5	1992	94	82	.0	.8	31.0	.0	.2	.0
Sep	68.6	44.1	56.4	95+	1953	1	61.5	1998	20+	1957	27	52.0	1993	265	5	.0	.0	29.7	.0	3.0	.0
Oct	56.3	34.3	45.3	85	1963	6	53.7	1971	15	1952	18	40.2	1980	610	0	.0	.0	22.8	.1	14.2	.0
Nov	42.1	25.5	33.8	75	1950	1	40.2	1975	-13	1950	25	26.7	1995	937	0	.0	.0	7.3	5.4	23.5	.3
Dec	30.6	14.7	22.7	64	2001	6	30.1	1982	-25+	1976	29	12.3	1976	1314	0	.0	.0	1.1	18.0	29.9	4.1
Ann	53.6	31.4	42.6	99+	Jul 1977	18	70.7	Jul 1987	-37	Jan 1951	30	8.3	Jan 1994	8414	257	.0	4.1	205.5	73.7	182.6	24.5

\+ 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	1.58	1.59	1.34	1974	27	2.82	1974	.45	1972
Feb	1.21	1.02	1.00	1968	1	2.74	1971	.42	1987
Mar	2.01	2.01	1.62	1976	5	5.09	1976	.53	1981
Apr	2.77	2.50	2.84	1979	26	5.57	1991	1.07	1997
May	2.80	2.43	2.59	2001	16	5.53	1983	.51	1977
Jun	2.95	2.54	3.19	1969	26	5.94	1990	.74	1988
Jul	2.86	2.58	6.77	1957	8	8.55	1994	.78	1981
Aug	3.66	3.33	3.04	1996	20	8.78	1975	.96	1980
Sep	3.72	2.97	2.39	1992	18	11.42	1986	.11	1979
Oct	2.94	2.87	3.43	1991	25	8.73	1991	.49	1971
Nov	2.48	2.40	1.93	1952	17	6.20	1988	.72	1986
Dec	1.81	1.69	1.35	1971	10	3.96	1982	.43	1994
Ann	30.79	30.32	6.77	Jul 1957	8	11.42	Sep 1986	.11	Sep 1979

Mean Number of Days (3)

Month	Daily Precipitation >= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	14.3	4.8	.4	@
Feb	11.3	3.5	.3	.0
Mar	11.4	5.5	1.1	.2
Apr	11.6	6.8	1.3	.4
May	10.9	6.4	1.8	.4
Jun	10.7	6.0	2.1	.5
Jul	10.9	6.1	1.7	.6
Aug	11.7	6.7	2.3	.8
Sep	12.8	7.6	2.3	.8
Oct	13.2	7.2	1.5	.5
Nov	13.6	6.2	1.2	.3
Dec	14.3	5.2	.6	.2
Ann	146.7	72.0	16.6	4.7

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	.96	1.14	1.30	1.47	1.65	1.86	2.13	2.54	2.91
Feb	.40	.52	.68	.83	.97	1.11	1.26	1.45	1.68	2.04	2.38
Mar	.64	.84	1.12	1.36	1.59	1.83	2.10	2.41	2.80	3.42	4.00
Apr	1.03	1.29	1.66	1.97	2.27	2.57	2.90	3.28	3.77	4.51	5.20
May	.82	1.09	1.49	1.83	2.17	2.52	2.90	3.36	3.95	4.87	5.73
Jun	.90	1.18	1.60	1.96	2.31	2.67	3.07	3.54	4.14	5.09	5.96
Jul	.97	1.24	1.63	1.97	2.29	2.63	2.99	3.41	3.96	4.80	5.58
Aug	.99	1.34	1.87	2.33	2.78	3.26	3.79	4.41	5.22	6.50	7.68
Sep	.78	1.12	1.67	2.17	2.67	3.20	3.80	4.53	5.48	7.01	8.45
Oct	.95	1.23	1.64	1.99	2.33	2.68	3.06	3.51	4.09	4.99	5.82
Nov	.75	.99	1.34	1.64	1.94	2.24	2.58	2.97	3.48	4.28	5.01
Dec	.58	.75	1.00	1.22	1.43	1.65	1.89	2.17	2.53	3.09	3.61
Ann	24.43	25.72	27.33	28.54	29.60	30.62	31.66	32.79	34.16	36.11	37.78

\+ 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	19.1	17.0	9	7	9.0	1978	27	42.7	1978	37	1978	29	22	1979	14.7	6.6	1.7	.7	.0	28.1	25.6	21.8	9.1
Feb	13.7	13.5	11	10	10.0	1974	22	34.1	1976	32	1978	1	29	1978	11.7	4.9	1.4	.4	@	24.8	22.8	20.3	11.6
Mar	11.0	10.0	7	6	12.0	1971	19	25.7	1989	30	1978	3	25	1978	8.7	3.8	1.3	.3	@	16.1	12.3	10.3	5.8
Apr	4.1	3.9	1	#	7.0	2000	8	13.7	1985	15	1971	2	3	1978	3.7	1.8	.4	.1	.0	3.6	1.5	.9	.2
May	.5	.0	#	0	5.2	1994	1	5.2	1994	5	1994	1	#+	1996	.1	.1	.1	@	.0	.1	@	@	.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	#	1989	23	#+	1989	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Oct	1.4	.0	#	#	6.5	1988	12	6.7	1988	5	1988	12	#+	2000	.9	.4	.2	@	.0	.4	.1	@	.0
Nov	9.3	7.5	1	1	8.0	1987	21	26.4	1995	12	1995	28	4	1995	7.1	3.7	.9	.3	.0	7.9	3.4	1.5	@
Dec	15.6	14.5	4	3	8.5	1971	30	36.5	1972	18+	1976	28	10+	1976	13.4	5.7	1.3	.3	.0	22.6	15.5	8.9	2.0
Ann	74.7	66.4	N/A	N/A	12.0	Mar 1971	19	42.7	Jan 1978	37	Jan 1978	29	29	Feb 1978	60.3	27.0	7.3	2.1	@	103.6	81.2	63.7	28.7

+ 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	7/18	7/09	7/02	6/26	6/21	6/15	6/09	6/02	5/24
32	6/14	6/09	6/04	6/01	5/29	5/25	5/22	5/18	5/12
28	5/25	5/20	5/17	5/13	5/10	5/07	5/04	5/01	4/25
24	5/14	5/09	5/05	5/02	4/29	4/26	4/23	4/20	4/15
20	4/25	4/21	4/18	4/15	4/13	4/11	4/08	4/05	4/01
16	4/17	4/13	4/10	4/07	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	8/19	8/25	8/30	9/03	9/07	9/10	9/14	9/19	9/25
32	8/31	9/05	9/09	9/13	9/16	9/20	9/23	9/27	10/03
28	9/16	9/22	9/25	9/29	10/02	10/05	10/08	10/12	10/17
24	10/01	10/07	10/12	10/16	10/19	10/23	10/27	11/01	11/07
20	10/18	10/23	10/27	10/30	11/02	11/05	11/08	11/11	11/16
16	11/01	11/06	11/10	11/13	11/16	11/19	11/22	11/26	12/01

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	114	102	92	85	77	70	62	53	40
32	133	125	119	114	110	105	100	95	87
28	167	159	153	148	144	139	134	128	120
24	197	189	183	177	172	167	162	156	147
20	222	215	210	206	202	198	194	189	182
16	249	240	234	229	224	219	214	208	200

***** 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	1491	1296	1145	712	377	130	43	94	265	610	937	1314	8414
60	1336	1156	990	562	254	57	7	31	140	460	787	1159	6939
57	1243	1072	897	474	192	30	1	13	84	373	697	1066	6142
55	1181	1016	835	416	155	18	0	7	56	318	637	1004	5643
50	1026	876	680	281	82	5	0	0	15	200	489	849	4503
32	483	396	219	17	0	0	0	0	0	8	79	341	1543

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	15	24	98	295	665	912	1077	1011	730	421	132	50	5430
55	0	0	0	4	107	241	364	305	96	18	0	0	1135
57	0	0	0	2	82	193	303	249	64	11	0	0	904
60	0	0	0	1	51	129	217	174	30	4	0	0	606
65	0	0	0	0	19	53	98	82	5	0	0	0	257
70	0	0	0	0	6	13	27	26	0	0	0	0	72

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	25	144	436	686	844	776	506	217	45	2	0	0	25	169	605	1291	2135	2911	3417	3634	3679	3681
45	0	0	11	78	298	536	689	621	363	120	18	0	0	0	11	89	387	923	1612	2233	2596	2716	2734	2734
50	0	0	2	39	184	389	534	467	230	58	5	0	0	0	2	41	225	614	1148	1615	1845	1903	1908	1908
55	0	0	0	18	101	255	383	318	129	23	0	0	0	0	0	18	119	374	757	1075	1204	1227	1227	1227
60	0	0	0	4	48	145	237	184	60	4	0	0	0	0	0	4	52	197	434	618	678	682	682	682
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	0	18	101	285	436	552	497	310	134	25	0	0	0	18	119	404	840	1392	1889	2199	2333	2358	2358

(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