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: IONIA 2 SSW, MI **COOP ID: 204078**

Climate Division: MI 9 **NWS Call Sign:** **Elevation: 805 Feet** **Lat: 42˚57N** **Lon: 85˚05W**

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	28.0	13.6	20.8	69	1952	20	32.0	1990	-25	1963	15	11.0	1977	1370	0	.0	.0	1.0	19.1	29.9	4.6
Feb	31.2	15.0	23.1	69	1999	12	32.6	1998	-21+	1959	2	12.5	1979	1173	0	.0	.0	1.5	14.5	27.1	3.7
Mar	42.1	24.3	33.2	80	1989	28	41.8	1973	-15	1962	2	25.4	1984	987	0	.0	.0	8.6	5.0	25.6	.5
Apr	55.2	34.9	45.1	87+	1960	23	49.9+	1985	6	1982	7	39.9	1975	598	0	.0	.0	21.6	.3	13.3	.0
May	68.8	46.6	57.7	95+	1977	28	64.2	1977	22	1966	10	49.9	1997	271	45	.0	.9	30.4	.0	2.3	.0
Jun	78.0	55.5	66.8	102+	1953	19	72.1	1971	31+	1958	6	61.8+	1985	63	114	@	2.6	30.0	.0	@	.0
Jul	82.0	59.9	71.0	103	1988	6	75.4	1988	37	1963	4	67.1	1992	11	195	.2	5.1	31.0	.0	.0	.0
Aug	79.4	58.3	68.9	101	1988	17	74.5	1995	36	1982	29	64.2	1992	35	155	.1	2.7	31.0	.0	.0	.0
Sep	71.7	50.5	61.1	97	1973	3	65.2	1971	25	1991	28	56.8	1975	150	33	.0	.6	29.9	.0	1.0	.0
Oct	59.0	39.3	49.2	89	1971	2	56.9	1971	16+	1960	25	42.4	1988	495	2	.0	.0	26.4	@	9.2	.0
Nov	44.7	29.9	37.3	79	1950	1	43.2	1975	-7	1958	30	29.8	1976	831	0	.0	.0	10.8	2.3	20.9	.0
Dec	32.9	20.1	26.5	68	2001	6	34.4	1982	-14	1976	31	16.9	2000	1193	0	.0	.0	2.2	12.8	28.9	1.6
Ann	56.1	37.3	46.7	103	Jul 1988	6	75.4	Jul 1988	-25	Jan 1963	15	11.0	Jan 1977	7177	544	.3	11.9	224.4	54.0	158.2	10.4

\+ 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

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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	1.97	1.89	1.40	1967	27	4.38	1998	.78+	1983
Feb	1.72	1.22	3.05	1990	22	5.13	1990	.38	1978
Mar	2.69	2.42	4.30	1999	6	5.14	1985	.77	1996
Apr	3.20	3.03	2.60	1999	23	6.29	1999	1.37	1997
May	3.28	3.39	2.57	1996	21	8.25	2000	.11	1977
Jun	3.61	3.63	3.72	1994	24	8.46	1994	.26	1988
Jul	2.98	2.55	2.90	1949	9	6.89	1990	.82	1996
Aug	4.22	3.83	4.10	1958	21	12.22	1987	1.25	1990
Sep	3.86	3.62	4.76	1986	10	14.72	1986	.03	1979
Oct	2.95	2.64	5.12	1981	1	7.13	1981	1.02	1975
Nov	2.88	2.67	2.18	1995	11	6.19	1994	.72	1999
Dec	2.53	2.64	2.40	1971	10	6.48	1971	.70	1989
Ann	35.89	35.59	5.12	Oct 1981	1	14.72	Sep 1986	.03	Sep 1979

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	12.3	5.6	.9	.2
Feb	9.7	4.2	.7	.2
Mar	10.4	5.7	1.4	.3
Apr	11.4	7.4	2.0	.4
May	10.3	6.7	2.1	.8
Jun	9.2	6.1	2.1	.8
Jul	9.0	5.8	2.1	.6
Aug	9.9	6.6	2.6	1.1
Sep	10.0	6.3	2.6	1.0
Oct	10.5	6.1	2.0	.5
Nov	11.6	6.3	1.9	.6
Dec	12.3	6.2	1.2	.3
Ann	126.6	73.0	21.6	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	.67	.85	1.13	1.36	1.58	1.81	2.06	2.35	2.72	3.30	3.83
Feb	.38	.54	.79	1.02	1.24	1.49	1.76	2.09	2.51	3.20	3.84
Mar	.88	1.14	1.51	1.83	2.14	2.46	2.80	3.21	3.73	4.55	5.30
Apr	1.46	1.74	2.13	2.45	2.74	3.04	3.35	3.71	4.17	4.86	5.48
May	.63	.93	1.41	1.85	2.30	2.79	3.34	4.00	4.88	6.28	7.62
Jun	.79	1.13	1.65	2.13	2.61	3.12	3.69	4.38	5.29	6.73	8.09
Jul	.88	1.17	1.59	1.96	2.32	2.69	3.10	3.58	4.20	5.18	6.08
Aug	1.11	1.51	2.12	2.66	3.19	3.75	4.36	5.10	6.05	7.56	8.96
Sep	.57	.89	1.45	1.98	2.54	3.15	3.85	4.72	5.87	7.76	9.57
Oct	1.01	1.29	1.69	2.04	2.37	2.71	3.08	3.51	4.06	4.92	5.71
Nov	.76	1.03	1.45	1.82	2.18	2.56	2.98	3.48	4.13	5.16	6.12
Dec	.64	.88	1.25	1.58	1.90	2.23	2.61	3.06	3.64	4.57	5.43
Ann	27.74	29.37	31.43	32.97	34.33	35.64	36.97	38.44	40.20	42.73	44.90

\+ 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	14.6	14.5	6	5	12.0	1978	26	26.5	1978	26	1979	16	17	1979	10.7	5.0	1.3	.3	.1	24.6	21.3	18.2	6.4
Feb	9.6	8.7	6	5	11.5	1985	11	20.8	1985	25	1985	14	20	1979	6.9	3.1	1.0	.3	.1	21.6	18.0	13.4	4.9
Mar	8.2	5.4	2	2	10.3	1973	17	23.5	1971	19	1978	9	13	1978	4.7	2.4	.8	.2	@	10.8	8.1	5.5	1.6
Apr	2.3	1.0	#	#	6.8	1975	3	10.5	1975	10	1975	3	1	1975	1.4	.7	.2	.1	.0	1.2	.4	.1	@
May	.0	.0	#	0	.4	1994	1	.4	1994	#+	1994	1	#+	1994	@	.0	.0	.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	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Oct	.4	.0	#	0	5.2	1997	27	5.2	1997	5	1997	27	#+	1997	.2	.1	.1	@	.0	.1	.1	@	.0
Nov	3.9	3.2	#	#	6.5	1991	29	15.3	1991	8	1989	17	1+	2000	3.6	1.5	.2	.1	.0	3.3	.8	.1	.0
Dec	13.7	13.9	3	2	7.2	1994	7	29.0	1983	17	2000	24	10	2000	8.8	4.7	.9	.3	.0	19.8	13.5	7.6	1.1
Ann	52.7	46.7	N/A	N/A	12.0	Jan 1978	26	29.0	Dec 1983	26	Jan 1979	16	20	Feb 1979	36.3	17.5	4.5	1.3	.2	81.4	62.2	44.9	14.0

+ 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	6/12	6/05	5/30	5/26	5/22	5/18	5/13	5/08	5/01
32	5/27	5/21	5/16	5/12	5/09	5/05	5/01	4/26	4/20
28	5/10	5/06	5/03	4/30	4/27	4/25	4/22	4/19	4/14
24	4/24	4/20	4/17	4/15	4/12	4/10	4/07	4/05	3/31
20	4/15	4/11	4/08	4/06	4/04	4/01	3/30	3/27	3/24
16	4/10	4/06	4/03	3/31	3/29	3/26	3/23	3/20	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	9/09	9/13	9/16	9/18	9/21	9/23	9/25	9/28	10/02
32	9/18	9/23	9/27	10/01	10/04	10/07	10/10	10/14	10/19
28	9/25	10/02	10/06	10/10	10/13	10/17	10/21	10/25	10/31
24	10/10	10/16	10/21	10/25	10/28	11/01	11/05	11/09	11/15
20	10/22	10/29	11/03	11/07	11/10	11/14	11/18	11/23	11/30
16	11/06	11/13	11/18	11/22	11/25	11/29	12/03	12/08	12/15

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	143	135	130	125	121	117	112	107	99
32	170	162	156	152	147	143	138	132	125
28	192	184	178	173	168	163	158	152	144
24	223	214	208	203	198	193	188	182	173
20	244	236	230	225	220	215	210	204	196
16	266	257	251	246	241	236	231	225	216

***** 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	1370	1173	987	598	271	63	11	35	150	495	831	1193	7177
60	1215	1033	832	451	170	20	0	7	64	349	681	1038	5860
57	1122	949	739	366	120	9	0	2	33	271	591	945	5147
55	1060	893	677	312	93	5	0	0	20	223	532	883	4698
50	905	753	529	192	42	1	0	0	4	125	388	728	3667
32	388	302	124	5	0	0	0	0	0	2	48	253	1122

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	40	53	160	397	797	1042	1207	1144	873	533	207	82	6535
55	0	0	0	14	176	357	494	431	203	41	1	0	1717
57	0	0	0	8	142	301	432	370	156	26	0	0	1435
60	0	0	0	3	98	222	339	283	97	12	0	0	1054
65	0	0	0	0	45	114	195	155	33	2	0	0	544
70	0	0	0	0	17	43	85	68	6	0	0	0	219

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	1	5	68	225	564	812	965	900	641	306	83	11	1	6	74	299	863	1675	2640	3540	4181	4487	4570	4581
45	0	0	33	132	413	662	810	745	492	189	40	2	0	0	33	165	578	1240	2050	2795	3287	3476	3516	3518
50	0	0	15	71	280	512	655	590	349	97	14	1	0	0	15	86	366	878	1533	2123	2472	2569	2583	2584
55	0	0	4	37	166	368	500	435	220	47	4	0	0	0	4	41	207	575	1075	1510	1730	1777	1781	1781
60	0	0	0	13	88	233	348	286	119	13	0	0	0	0	0	13	101	334	682	968	1087	1100	1100	1100
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	3	43	148	350	527	640	591	398	186	51	4	0	3	46	194	544	1071	1711	2302	2700	2886	2937	2941

(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