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: BENTON HARBOR AP, MI **COOP ID: 200710**

Climate Division: MI 8 **NWS Call Sign: BEH** **Elevation: 628 Feet** **Lat: 42˚08N** **Lon: 86˚25W**

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	30.2	17.4	23.8	68	1950	25	31.8	1998	-17+	1994	16	13.0	1977	1278	0	.0	.0	1.6	16.0	29.3	2.3
Feb	34.5	19.8	27.2	71	1976	27	36.4	1998	-13	1978	7	15.9	1978	1060	0	.0	.0	2.9	11.1	24.8	1.5
Mar	44.9	27.5	36.2	84	1986	31	44.7	1973	-6	1960	12	28.5	1984	892	0	.0	.0	11.1	3.1	22.7	.1
Apr	56.1	36.6	46.4	88	1986	26	52.9	1977	9	1982	7	40.0	1982	562	2	.0	.0	21.6	.1	10.6	.0
May	67.8	46.4	57.1	93+	1962	17	64.6	1991	24	1992	27	50.3	1997	293	48	.0	.4	30.0	.0	2.1	.0
Jun	77.0	56.2	66.6	101	1953	20	70.9	1971	31	1993	1	60.3	1992	69	117	.0	3.0	30.0	.0	.1	.0
Jul	81.0	60.9	71.0	104	1999	30	76.5	1999	37	2001	2	66.0	1992	21	205	.1	4.9	31.0	.0	.0	.0
Aug	79.5	58.8	69.2	100	1988	17	76.5	1995	37	1982	28	63.3	1992	43	172	@	2.8	31.0	.0	.0	.0
Sep	72.5	51.6	62.1	98+	1953	1	67.9	1978	23	1989	27	56.0	1993	144	55	.0	.7	30.0	.0	.6	.0
Oct	61.2	41.8	51.5	87	1971	1	58.7	1971	15+	1988	30	43.8	1988	428	10	.0	.0	28.1	.0	5.4	.0
Nov	46.9	32.6	39.8	82	1950	1	45.4	1975	-19	1950	25	33.5	1995	759	0	.0	.0	13.6	1.6	16.5	.0
Dec	34.7	22.7	28.7	69+	1970	1	37.7	1982	-15	1989	23	17.0	1989	1126	0	.0	.0	3.0	9.4	26.6	.9
Ann	57.2	39.4	48.3	104	Jul 1999	30	76.5+	Jul 1999	-19	Nov 1950	25	13.0	Jan 1977	6675	609	.1	11.8	233.9	41.3	138.7	4.8

+ 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

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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	2.32	2.19	2.15	1960	12	5.34	1974	.42	1980
Feb	1.68	1.35	2.37	1997	21	3.88	1997	.00	1987
Mar	2.43	2.41	2.20	1985	28	5.61	1985	.70	1996
Apr	3.77	3.90	4.00	1950	24	6.15	1999	1.02	1971
May	3.33	3.16	2.70	1949	19	6.24	1982	.92	1977
Jun	3.53	3.82	3.10	1950	2	8.87	1993	.15	1988
Jul	3.24	3.04	3.14	1989	9	7.80	1992	.89	1974
Aug	3.47	2.79	3.25	1987	14	8.19	1987	.61	1976
Sep	4.17	3.75	2.75	1968	1	9.92	1986	.00	1979
Oct	3.09	2.90	2.81	1985	19	7.41	1991	.98	1982
Nov	3.30	2.62	2.78	1990	5	8.68	1990	.97	1999
Dec	2.71	2.37	2.37	1982	3	6.04	1972	.95	1986
Ann	37.04	36.49	4.00	Apr 1950	24	9.92	Sep 1986	.00+	Feb 1987

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	12.5	6.3	.8	.3
Feb	9.8	4.9	.6	.2
Mar	10.5	6.4	1.1	.3
Apr	12.3	8.2	2.5	.7
May	10.5	6.8	2.4	.7
Jun	9.9	6.8	2.5	.8
Jul	8.6	5.6	2.4	.8
Aug	9.5	6.2	2.5	.8
Sep	9.7	7.3	2.9	1.3
Oct	11.0	7.0	1.7	.5
Nov	11.2	7.0	2.0	.6
Dec	13.1	7.3	1.2	.3
Ann	128.6	79.8	22.6	7.3

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	.45	.66	1.00	1.31	1.63	1.97	2.36	2.82	3.44	4.43	5.38
Feb	.31	.54	.82	1.05	1.27	1.50	1.76	2.05	2.44	3.05	3.62
Mar	.69	.93	1.27	1.58	1.87	2.18	2.52	2.93	3.45	4.27	5.03
Apr	1.72	2.05	2.51	2.88	3.23	3.58	3.95	4.37	4.91	5.72	6.45
May	.98	1.29	1.77	2.18	2.58	3.00	3.46	4.00	4.71	5.81	6.83
Jun	.98	1.32	1.82	2.27	2.70	3.15	3.65	4.25	5.02	6.23	7.35
Jul	1.08	1.38	1.84	2.22	2.59	2.97	3.38	3.87	4.49	5.46	6.36
Aug	1.01	1.33	1.83	2.26	2.68	3.12	3.60	4.17	4.90	6.06	7.13
Sep	.75	1.33	2.04	2.60	3.15	3.72	4.36	5.10	6.08	7.59	9.01
Oct	1.10	1.39	1.81	2.16	2.50	2.85	3.22	3.66	4.22	5.09	5.88
Nov	1.00	1.31	1.78	2.18	2.57	2.98	3.43	3.96	4.64	5.71	6.69
Dec	.82	1.08	1.47	1.80	2.12	2.45	2.82	3.25	3.81	4.68	5.49
Ann	28.88	30.52	32.58	34.13	35.48	36.79	38.12	39.58	41.34	43.86	46.02

\+ 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	20.3	22.0	6	3
Feb	11.0	7.5	6	3
Mar	6.2	6.0	1	#
Apr	.7	#	#	0
May	#	.0	0	0
Jun	.0	.0	#	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	.0	.0	0	0
Oct	.4	.0	#	0
Nov	2.7	1.0	#	#
Dec	14.4	13.5	3	2
Ann	55.7	50.0	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	20.0	1986	27	38.4	1997	61	1999	15	30	1999
Feb	14.0	1985	12	32.0	1994	80	1985	15	46	1985
Mar	8.0	1998	9	16.0	1971	19	1978	5	9	1978
Apr	3.5	1975	3	6.0	1975	6	1975	4	1	1975
May	#	1989	6	#	1989	0	0	0	0	0
Jun	.0	0	0	.0	0	#	1994	13	#	1994
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	4.0	1989	19	6.0	1989	4	1989	19	#+	1997
Nov	8.0	1971	22	15.9	1971	7+	1997	16	1	1996
Dec	10.0	1989	19	28.0	1983	72	1989	26	32	1989
Ann	20.0	Jan 1986	27	38.4	Jan 1997	80	Feb 1985	15	46	Feb 1985

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	7.0	6.1	2.8	1.0	.1
Feb	5.5	4.9	2.1	.9	.1
Mar	2.5	2.3	.8	.3	.0
Apr	.4	.4	.1	.0	.0
May	.0	.0	.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	.2	.2	@	.0	.0
Nov	1.6	1.4	.4	.1	.0
Dec	6.2	5.7	2.3	1.1	@
Ann	23.4	21.0	8.5	3.4	.2

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	14.6	10.3	6.8	2.5
Feb	8.8	6.0	3.6	1.7
Mar	3.4	2.0	.9	.1
Apr	@	.0	.0	.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	.1	@	.0	.0
Nov	1.6	.5	.2	.0
Dec	8.4	4.4	2.6	.8
Ann	36.9	23.2	14.1	5.1

+ 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	6/03	5/29	5/25	5/21	5/17	5/13	5/08	5/01
32	5/31	5/25	5/20	5/16	5/13	5/09	5/05	5/01	4/25
28	5/12	5/06	5/02	4/28	4/24	4/21	4/17	4/13	4/07
24	4/27	4/21	4/17	4/13	4/10	4/06	4/03	3/29	3/23
20	4/16	4/11	4/06	4/03	3/30	3/27	3/23	3/19	3/13
16	4/06	3/30	3/26	3/22	3/18	3/15	3/11	3/06	2/28

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	9/15	9/20	9/23	9/27	9/30	10/03	10/06	10/09	10/15
32	9/21	9/28	10/02	10/06	10/09	10/13	10/17	10/21	10/27
28	10/02	10/09	10/15	10/19	10/24	10/28	11/01	11/07	11/14
24	10/11	10/20	10/25	10/30	11/04	11/09	11/14	11/20	11/28
20	10/28	11/04	11/10	11/14	11/19	11/23	11/28	12/03	12/11
16	11/12	11/19	11/23	11/27	12/01	12/05	12/09	12/13	12/20

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	158	149	142	136	131	125	120	113	103
32	179	168	161	155	149	143	137	129	119
28	213	202	194	188	181	175	169	161	150
24	242	230	222	214	208	201	194	185	173
20	266	254	246	239	233	226	219	211	199
16	284	274	268	262	257	252	246	240	230

***** 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	1278	1060	892	562	293	69	21	43	144	428	759	1126	6675
60	1123	920	737	418	191	24	5	12	67	294	609	971	5371
57	1030	836	644	336	141	11	0	4	37	225	520	878	4662
55	968	780	584	286	112	6	0	1	23	184	462	816	4222
50	813	641	439	175	56	1	0	0	6	101	324	667	3223
32	309	218	77	5	0	0	0	0	0	1	31	220	861

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	54	82	208	435	778	1038	1207	1152	901	605	262	117	6839
55	0	0	1	26	177	354	494	440	234	75	3	0	1804
57	0	0	0	17	144	299	432	381	188	54	1	0	1516
60	0	0	0	8	101	222	344	296	128	31	0	0	1130
65	0	0	0	2	48	117	205	172	55	10	0	0	609
70	0	0	0	0	19	47	104	84	16	2	0	0	272

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	17	97	259	564	828	991	932	689	392	125	24	5	22	119	378	942	1770	2761	3693	4382	4774	4899	4923
45	0	6	50	155	416	678	836	777	539	260	67	7	0	6	56	211	627	1305	2141	2918	3457	3717	3784	3791
50	0	1	30	93	283	528	681	622	393	152	27	3	0	1	31	124	407	935	1616	2238	2631	2783	2810	2813
55	0	0	9	46	176	385	526	467	257	76	8	0	0	0	9	55	231	616	1142	1609	1866	1942	1950	1950
60	0	0	2	22	94	252	372	316	151	32	2	0	0	0	2	24	118	370	742	1058	1209	1241	1243	1243
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	11	66	158	350	537	669	620	432	227	67	8	0	11	77	235	585	1122	1791	2411	2843	3070	3137	3145

(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