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: WARRENTON 1 N, MO **COOP ID: 238725**

Climate Division: MO 2 **NWS Call Sign:** **Elevation: 850 Feet** **Lat: 38˚49N** **Lon: 91˚08W**

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	37.0	19.7	28.4	76+	1951	19	39.3	1989	-21	1918	12	14.3	1977	1137	0	.0	.0	6.0	10.1	27.1	2.5
Feb	42.5	23.2	32.9	84	1972	29	42.5	1976	-12+	1988	12	20.9	1978	900	0	.0	.0	8.9	6.8	23.1	1.5
Mar	54.0	33.2	43.6	92	1929	24	49.4	1974	-11	1948	12	36.1	1984	663	0	.0	.0	19.3	1.2	15.5	.1
Apr	65.3	44.2	54.8	94	1930	10	62.1	1981	13	1920	5	48.6	1983	321	14	.0	.2	27.2	.0	3.4	.0
May	74.4	52.6	63.5	100	1934	31	69.3	1977	29	1925	25	59.2+	1997	129	82	.0	.5	31.0	.0	.1	.0
Jun	83.0	62.7	72.9	106	1936	19	77.3	1987	39	1946	4	67.7	1982	12	248	.1	5.5	30.0	.0	.0	.0
Jul	88.2	67.3	77.8	114+	1954	15	83.2	1980	43	1947	22	72.5	1996	0	395	1.1	14.5	31.0	.0	.0	.0
Aug	86.8	64.9	75.9	110	1934	9	84.4	1983	42+	1986	28	69.6	1992	11	347	1.1	11.4	31.0	.0	.0	.0
Sep	79.2	56.3	67.8	105+	1954	6	73.4	1998	30	1942	28	61.6	1974	60	143	.1	4.0	30.0	.0	.1	.0
Oct	68.2	45.6	56.9	97	1953	2	65.7	1971	16	1972	19	47.8	1988	279	29	.0	.1	30.0	.0	3.4	.0
Nov	53.7	34.8	44.3	89	1927	29	52.9	1999	-3	1929	30	36.1	1986	625	1	.0	.0	18.7	1.0	14.1	.1
Dec	41.2	23.8	32.5	75+	1949	11	39.8	1971	-21	1989	22	17.7	1983	1008	0	.0	.0	7.8	6.3	25.2	1.5
Ann	64.5	44.0	54.3	114+	Jul 1954	15	84.4	Aug 1983	-21+	Dec 1989	22	14.3	Jan 1977	5145	1259	2.4	36.2	270.9	25.4	112.0	5.7

\+ 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: 1918-2001

(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	1.74	1.34	2.09	1993	10	5.82	1993	.00	1986
Feb	1.99	1.89	2.15	1985	23	4.27	1990	.25	1987
Mar	3.22	3.41	3.29	1927	19	8.32	1973	.21	1986
Apr	3.75	3.80	3.41	1996	29	12.40	1994	.36	1986
May	4.42	3.56	5.48	1995	17	13.10	1990	1.36	1979
Jun	3.86	2.92	4.13	1928	20	9.84	1990	.77	1991
Jul	3.78	3.01	5.85	1980	3	10.58	1981	1.01	1975
Aug	2.70	2.39	3.78	1934	16	7.48	1993	.43	1998
Sep	2.81	2.40	4.43	1993	23	12.50	1993	.00	1979
Oct	2.73	2.41	3.25	1919	28	6.69	1976	.43	1989
Nov	3.68	3.59	5.51	1946	1	8.06	1985	.03	1989
Dec	2.41	2.21	3.24	1942	27	7.90	1982	.00	2000
Ann	37.09	35.42	5.85	Jul 1980	3	13.10	May 1990	.00+	Dec 2000

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	5.1	3.6	1.2	.5
Feb	5.9	3.7	1.2	.4
Mar	8.8	6.3	2.2	.8
Apr	8.9	6.2	2.6	1.1
May	9.2	7.1	3.0	1.4
Jun	8.4	6.1	2.9	1.1
Jul	7.4	5.2	2.3	1.1
Aug	6.3	4.8	1.9	.8
Sep	6.6	4.7	2.2	.9
Oct	6.8	4.8	1.9	.6
Nov	7.1	5.4	2.6	1.1
Dec	5.4	4.2	1.6	.6
Ann	85.9	62.1	25.6	10.4

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	.11	.28	.55	.80	1.07	1.37	1.72	2.14	2.72	3.68	4.60
Feb	.43	.61	.90	1.17	1.43	1.71	2.03	2.42	2.92	3.73	4.49
Mar	.63	.92	1.40	1.83	2.27	2.74	3.28	3.93	4.78	6.15	7.46
Apr	.64	.97	1.52	2.03	2.56	3.13	3.78	4.57	5.63	7.34	8.97
May	1.22	1.63	2.27	2.83	3.37	3.94	4.57	5.32	6.29	7.82	9.24
Jun	.68	1.02	1.58	2.11	2.65	3.23	3.90	4.71	5.79	7.53	9.19
Jul	1.08	1.44	1.98	2.45	2.91	3.39	3.92	4.54	5.35	6.62	7.80
Aug	.61	.86	1.26	1.61	1.97	2.35	2.77	3.27	3.94	4.99	5.98
Sep	.41	.78	1.25	1.65	2.04	2.45	2.91	3.45	4.17	5.30	6.36
Oct	.70	.96	1.36	1.71	2.05	2.41	2.82	3.30	3.92	4.91	5.83
Nov	.69	1.02	1.56	2.06	2.57	3.12	3.74	4.49	5.48	7.08	8.60
Dec	.08	.25	.58	.93	1.32	1.76	2.29	2.95	3.88	5.43	6.97
Ann	23.01	25.60	28.98	31.60	33.97	36.28	38.70	41.40	44.72	49.60	53.88

\+ 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: 1918-2001
(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	4.1	2.8	#	0
Feb	3.6	3.5	#	0
Mar	1.0	.0	#	0
Apr	.5	.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	#	.0	0	0
Nov	1.5	.0	0	0
Dec	4.1	.0	#	0
Ann	14.8	6.3	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	6.5	1997	9	17.7	1977	8	1996	3	1+	1999
Feb	5.2	1981	10	8.3	1988	6	1975	24	1	1975
Mar	10.0	2000	10	10.0	2000	#	1988	18	#	1988
Apr	5.0	1980	14	5.0+	1997	#	1997	11	#	1997
May	.0	0	0	.0	0	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	#	1993	31	#	1993	0	0	0	0	0
Nov	8.0	1975	26	8.0	1975	0	0	0	0	0
Dec	14.0	1973	19	27.5	1973	10	1995	19	1	1995
Ann	14.0	Dec 1973	19	27.5	Dec 1973	10	Dec 1995	19	1+	Jan 1999

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	1.3	.9	.4	.1	.0
Feb	.7	.6	.3	.1	.0
Mar	.2	.2	.2	.2	.1
Apr	.1	.1	.1	.1	.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	.0	.0	.0	.0	.0
Nov	.3	.3	.2	.1	.0
Dec	.6	.4	.2	.1	.1
Ann	3.2	2.5	1.4	.7	.2

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	-9.9	-9.9	-9.9	-9.9
Feb	-9.9	-9.9	-9.9	-9.9
Mar	.0	.0	.0	.0
Apr	.0	.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	.0	.0	.0	.0
Nov	.0	.0	.0	.0
Dec	.0	.0	.0	.0
Ann	-9.9	-9.9	-9.9	-9.9

+ 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	5/06	5/02	4/29	4/26	4/24	4/21	4/19	4/16	4/11
32	4/24	4/19	4/16	4/13	4/11	4/08	4/05	4/02	3/29
28	4/14	4/09	4/06	4/04	4/01	3/30	3/27	3/24	3/20
24	4/09	4/04	3/31	3/28	3/25	3/21	3/18	3/14	3/09
20	3/29	3/23	3/19	3/15	3/12	3/08	3/05	2/28	2/22
16	3/18	3/12	3/07	3/03	2/28	2/24	2/20	2/16	2/10

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

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	185	179	174	170	166	162	158	153	147
32	209	201	195	191	186	182	177	172	164
28	233	226	220	216	211	207	203	197	190
24	257	249	243	238	233	228	223	216	208
20	281	272	265	260	254	249	243	237	228
16	303	293	286	280	275	269	263	256	246

***** 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	1137	900	663	321	129	12	0	11	60	279	625	1008	5145
60	982	760	511	201	58	2	0	1	20	170	484	854	4043
57	889	681	426	143	32	0	0	0	8	119	403	766	3467
55	828	629	370	110	20	0	0	0	4	91	352	709	3113
50	686	499	245	48	5	0	0	0	0	40	240	567	2330
32	252	151	21	0	0	0	0	0	0	0	26	182	632

Base	Cooling Degree Days (1)												
Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	138	175	382	683	976	1226	1418	1360	1072	773	393	197	8793
55	1	9	17	103	283	536	705	647	386	150	29	11	2877
57	0	4	11	76	233	476	643	585	331	116	20	6	2501
60	0	0	3	44	166	388	550	493	252	75	11	1	1983
65	0	0	0	14	82	248	395	347	143	29	1	0	1259
70	0	0	0	3	30	132	248	217	66	8	0	0	704

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	33	73	206	457	752	991	1179	1117	837	527	201	50	33	106	312	769	1521	2512	3691	4808	5645	6172	6373	6423
45	9	35	126	328	597	841	1024	962	688	380	120	22	9	44	170	498	1095	1936	2960	3922	4610	4990	5110	5132
50	2	11	69	212	442	691	869	807	538	251	60	6	2	13	82	294	736	1427	2296	3103	3641	3892	3952	3958
55	0	5	35	122	298	541	714	652	393	145	25	2	0	5	40	162	460	1001	1715	2367	2760	2905	2930	2932
60	0	1	14	62	169	393	559	497	262	68	6	0	0	1	15	77	246	639	1198	1695	1957	2025	2031	2031
Base	Growing Degree Units for Corn (Monthly)												Growing Degree Units for Corn (Accumulated Monthly)											
50/86	22	56	135	279	467	670	801	756	543	324	120	36	22	78	213	492	959	1629	2430	3186	3729	4053	4173	4209

(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