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: BETHANY, MO **COOP ID: 230608**

Climate Division: MO 1 **NWS Call Sign:** **Elevation: 949 Feet** **Lat: 40˚15N** **Lon: 94˚02W**

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	32.2	12.6	22.4	69	1964	23	34.0	1990	-29	1974	12	7.6	1979	1321	0	.0	.0	3.0	13.7	29.6	5.7
Feb	38.8	17.9	28.4	81	1921	15	38.8	1998	-26	1979	9	14.4	1979	1027	0	.0	.0	7.1	9.0	24.2	2.8
Mar	50.6	28.0	39.3	88	1986	30	44.9	2000	-21	1960	5	31.7	1984	797	0	.0	.0	17.0	2.3	18.8	.4
Apr	61.7	38.9	50.3	93	1930	10	58.5	1981	5	1920	5	41.2	1983	449	7	.0	.1	26.0	.0	6.1	.0
May	72.5	50.6	61.6	102	1934	30	67.9	1998	28+	1976	3	55.9	1983	175	67	.0	.2	31.0	.0	.1	.0
Jun	82.0	60.1	71.1	103+	1936	19	75.2	1971	38	1969	3	65.7	1982	20	201	.2	5.9	30.0	.0	.0	.0
Jul	87.1	64.9	76.0	110+	1936	15	82.1	1980	42+	1972	5	71.4	1971	0	341	.9	13.2	31.0	.0	.0	.0
Aug	85.3	62.5	73.9	112	1934	9	82.2	1983	38	1950	20	68.3	1992	17	294	.9	10.1	31.0	.0	.0	.0
Sep	77.2	52.9	65.1	105	1939	3	71.7	1998	25	1942	28	58.9	1993	103	103	.1	3.2	29.9	.0	.3	.0
Oct	65.9	41.3	53.6	96+	1963	5	59.7	1971	13	1952	29	46.8	1976	362	9	.0	.1	29.0	.0	4.6	.0
Nov	49.0	29.2	39.1	84	1938	1	49.0	1999	-10	1964	30	31.8	1991	777	0	.0	.0	15.2	2.5	17.9	.2
Dec	36.1	18.1	27.1	72	1946	27	33.5	1994	-26	1924	28	14.5	1983	1175	0	.0	.0	4.8	10.1	28.2	2.9
Ann	61.5	39.8	50.7	112	Aug 1934	9	82.2	Aug 1983	-29	Jan 1974	12	7.6	Jan 1979	6223	1022	2.1	32.8	255.0	37.6	129.8	12.0

\+ 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	1.07	.89	1.64	1946	5	2.67	1979	.00+	1986
Feb	1.27	1.04	2.00	1997	21	4.05	1997	.02	1991
Mar	2.56	2.16	2.75	1983	20	7.33	1973	.12	1994
Apr	3.51	3.12	3.60	1978	10	7.54	1991	.82	1985
May	4.63	4.35	3.10	1972	7	10.65	1995	.80	1992
Jun	4.20	3.88	5.86	1929	1	10.28	2000	.13	1988
Jul	5.29	4.82	8.13	1992	13	22.67	1993	.00	1983
Aug	4.16	3.50	3.83	1989	29	14.07	1977	.19	1984
Sep	4.25	3.47	5.90	1959	23	9.96	1973	1.08	1987
Oct	3.02	2.65	6.09	1973	11	7.83	1973	.20	1975
Nov	2.42	2.27	3.05	1958	18	5.27	1992	.00	1989
Dec	1.51	1.39	2.60	1980	8	5.31	1982	.10	1996
Ann	37.89	36.30	8.13	Jul 1992	13	22.67	Jul 1993	.00+	Nov 1989

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	5.2	3.4	.5	@
Feb	5.3	3.2	.9	.1
Mar	7.3	5.1	1.8	.6
Apr	9.1	6.7	2.4	.8
May	10.6	7.9	3.2	1.3
Jun	9.0	6.7	2.8	1.4
Jul	8.3	6.0	3.4	2.0
Aug	8.1	6.4	2.4	1.4
Sep	7.7	5.8	2.6	1.4
Oct	6.6	4.9	1.7	.8
Nov	7.1	5.0	1.5	.6
Dec	5.5	3.5	.9	.3
Ann	89.8	64.6	24.1	10.7

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	.00	.23	.45	.62	.78	.94	1.13	1.33	1.61	2.06	2.47
Feb	.12	.21	.38	.55	.74	.96	1.22	1.54	1.99	2.73	3.45
Mar	.44	.66	1.03	1.38	1.74	2.13	2.58	3.12	3.84	5.00	6.12
Apr	.92	1.25	1.76	2.21	2.65	3.11	3.63	4.24	5.03	6.28	7.46
May	1.24	1.68	2.35	2.93	3.51	4.12	4.79	5.59	6.63	8.26	9.79
Jun	.87	1.25	1.87	2.43	3.00	3.60	4.29	5.11	6.19	7.93	9.57
Jul	.47	1.06	1.93	2.70	3.50	4.36	5.34	6.54	8.14	10.73	13.21
Aug	.67	1.02	1.63	2.20	2.79	3.44	4.18	5.08	6.28	8.24	10.11
Sep	1.19	1.59	2.20	2.73	3.25	3.80	4.40	5.11	6.04	7.48	8.84
Oct	.53	.79	1.24	1.65	2.07	2.53	3.05	3.69	4.53	5.89	7.19
Nov	.28	.57	.98	1.33	1.68	2.06	2.48	2.99	3.66	4.75	5.77
Dec	.26	.40	.62	.82	1.04	1.26	1.53	1.84	2.27	2.95	3.60
Ann	23.72	26.33	29.75	32.39	34.77	37.09	39.52	42.24	45.56	50.46	54.75

\+ 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	9.0	9.4	2	#
Feb	5.8	6.0	1	1
Mar	3.8	.8	#	#
Apr	.8	.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	1.9	.5	#	#
Dec	5.6	5.6	1	#
Ann	26.9	22.3	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	15.0	1979	13	30.0	1979	13	1974	11	6	1982
Feb	10.0	1978	13	22.0	1978	11	1994	25	3	1989
Mar	9.0	1998	8	20.0	1978	8	1995	6	1	1995
Apr	12.0	1997	11	12.0	1997	7	1975	3	1	1975
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	.5	1980	27	.5	1980	0	0	0	0	0
Nov	5.0	1991	23	10.5	1991	5	1991	24	1	1991
Dec	8.0	1987	15	17.8	2000	12	2000	21	4	2000
Ann	15.0	Jan 1979	13	30.0	Jan 1979	13	Jan 1974	11	6	Jan 1982

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	3.2	2.6	1.2	.4	@
Feb	2.6	2.0	.5	.1	@
Mar	1.1	.9	.5	.2	.0
Apr	.4	.4	.2	@	@
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
Nov	.9	.6	.2	@	.0
Dec	2.3	1.6	.7	.2	.0
Ann	10.5	8.1	3.3	.9	@

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	11.6	6.9	3.2	.4
Feb	9.2	4.8	1.5	.1
Mar	1.2	.7	.3	.0
Apr	.4	.2	.1	.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	1.6	.7	.2	.0
Dec	5.3	2.2	.9	.0
Ann	29.3	15.5	6.2	.5

+ 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	5/17	5/11	5/07	5/04	5/01	4/28	4/25	4/21	4/16
32	4/29	4/25	4/22	4/19	4/17	4/14	4/11	4/08	4/04
28	4/20	4/15	4/12	4/09	4/06	4/03	3/31	3/28	3/23
24	4/13	4/08	4/04	4/01	3/29	3/27	3/23	3/20	3/15
20	4/05	3/30	3/26	3/23	3/20	3/16	3/13	3/09	3/04
16	3/29	3/22	3/17	3/13	3/09	3/04	2/28	2/23	2/16

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	9/14	9/19	9/23	9/26	9/29	10/02	10/05	10/09	10/14
32	9/25	10/01	10/05	10/09	10/12	10/15	10/18	10/22	10/28
28	10/11	10/16	10/19	10/22	10/25	10/28	10/31	11/04	11/09
24	10/20	10/26	10/30	11/03	11/06	11/10	11/13	11/18	11/23
20	10/29	11/04	11/09	11/12	11/16	11/20	11/24	11/28	12/05
16	11/05	11/11	11/16	11/19	11/23	11/27	11/30	12/05	12/11

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	175	166	160	155	150	145	140	134	126
32	199	191	186	182	177	173	169	164	156
28	223	215	210	206	202	197	193	188	180
24	244	236	231	226	221	216	212	206	198
20	267	258	252	246	241	236	230	223	214
16	286	277	270	264	259	253	247	241	231

***** 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	1321	1027	797	449	175	20	0	17	103	362	777	1175	6223
60	1166	887	642	316	93	4	0	4	43	232	628	1020	5035
57	1073	809	556	245	58	1	0	1	22	167	542	927	4401
55	1012	757	498	203	41	0	0	0	13	130	486	865	4005
50	864	627	361	116	14	0	0	0	2	61	354	717	3116
32	387	252	60	2	0	0	0	0	0	0	58	263	1022

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	89	149	287	550	916	1172	1364	1300	991	670	271	111	7870
55	1	11	11	61	243	482	651	587	313	86	9	0	2455
57	0	7	8	43	199	423	589	526	262	61	5	0	2123
60	0	0	1	24	141	335	496	436	193	34	1	0	1661
65	0	0	0	7	67	201	341	294	103	9	0	0	1022
70	0	0	0	1	24	96	199	174	45	1	0	0	540

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	9	46	154	390	712	974	1152	1084	793	467	138	20	9	55	209	599	1311	2285	3437	4521	5314	5781	5919	5939
45	2	17	86	266	557	824	997	929	645	325	72	5	2	19	105	371	928	1752	2749	3678	4323	4648	4720	4725
50	0	4	45	161	406	674	842	774	496	204	30	1	0	4	49	210	616	1290	2132	2906	3402	3606	3636	3637
55	0	0	18	91	270	525	687	619	360	112	9	0	0	0	18	109	379	904	1591	2210	2570	2682	2691	2691
60	0	0	4	41	151	378	532	465	238	49	2	0	0	0	4	45	196	574	1106	1571	1809	1858	1860	1860
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	6	33	107	241	441	655	785	732	515	288	82	13	6	39	146	387	828	1483	2268	3000	3515	3803	3885	3898

(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