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: BOWMAN, ND **COOP ID: 320995**

Climate Division: ND 7 **NWS Call Sign:** **Elevation: 2,960 Feet** **Lat: 46˚11N** **Lon: 103˚24W**

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	25.4	3.7	14.6	66	1981	24	28.6	1992	-43	1916	12	-.6	1979	1564	0	.0	.0	1.1	18.5	30.8	12.1
Feb	31.8	9.9	20.9	69	1992	2	31.8	1998	-43+	1936	16	5.2	1979	1236	0	.0	.0	3.7	12.7	27.8	7.0
Mar	41.3	18.4	29.9	85	1963	29	38.5	1986	-28	1998	11	20.4	1996	1090	0	.0	.0	9.3	8.2	29.2	3.1
Apr	54.4	29.3	41.9	90+	2001	29	48.4	1977	-11	1997	8	33.9	1975	694	0	.0	@	19.5	1.6	19.0	.2
May	66.3	40.9	53.6	99+	1934	29	60.5	1977	9	1967	3	48.0	1996	365	12	.0	.3	28.5	@	4.5	.0
Jun	76.1	50.1	63.1	106	1919	29	74.5	1988	25	1919	2	57.8	1998	138	81	.1	2.0	29.9	.0	.1	.0
Jul	83.8	55.0	69.4	112	1936	6	73.3	1989	35+	1995	1	61.0	1993	47	183	.8	7.0	31.0	.0	.0	.0
Aug	83.7	52.9	68.3	108	1949	7	75.0	1983	33+	1992	25	62.3	1974	70	173	.4	8.1	31.0	.0	.0	.0
Sep	71.6	41.6	56.6	102+	1998	5	64.4	1998	9	1934	26	51.2	1984	283	32	.2	1.8	28.3	.0	3.8	.0
Oct	58.0	30.4	44.2	94	1997	3	48.1	1973	-11	1925	29	39.9	1972	645	0	.0	.1	22.6	.9	16.0	.1
Nov	39.8	17.2	28.5	80+	1999	9	40.4	1999	-24	1985	28	13.8	1985	1095	0	.0	.0	7.6	8.8	27.9	2.8
Dec	29.3	6.9	18.1	68	1939	9	28.8	1999	-36	1989	21	-.2	1983	1455	0	.0	.0	2.3	16.2	30.8	8.4
Ann	55.1	29.7	42.4	112	Jul 1936	6	75.0	Aug 1983	-43+	Feb 1936	16	-.6	Jan 1979	8682	481	1.5	19.3	214.8	66.9	189.9	33.7

+ 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: 1915-2001

(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	.49	.35	1.30	1997	4	1.50	1997	.00	1974
Feb	.48	.37	.79	1922	22	1.88	1978	.03	1974
Mar	.73	.55	1.13	1937	23	2.62	1982	.03	1999
Apr	1.32	1.10	2.17	1932	23	4.08	1975	.03	1988
May	2.53	2.13	2.63	1929	26	6.73	1982	.39+	1984
Jun	3.07	3.03	2.80	1964	9	5.53	1971	1.33	1987
Jul	2.03	1.69	5.40	1966	13	4.97	1993	.41	1980
Aug	1.20	.97	1.93	1970	7	2.53	1977	.14	1971
Sep	1.31	.91	2.50	1973	2	4.63	1986	.21	1974
Oct	1.33	.88	2.15	1982	28	5.26	1982	.13	1978
Nov	.59	.45	1.43	2000	2	2.86	2000	.04+	1990
Dec	.42	.41	.67	1964	17	1.16	1977	.02	1991
Ann	15.50	15.31	5.40	Jul 1966	13	6.73	May 1982	.00	Jan 1974

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	7.7	1.5	.1	@
Feb	6.7	1.6	.1	.0
Mar	8.2	2.4	.2	.0
Apr	9.9	3.7	.7	.1
May	11.2	6.0	1.7	.3
Jun	11.9	6.8	2.0	.6
Jul	9.0	4.6	1.3	.3
Aug	7.4	3.5	.6	.1
Sep	7.3	3.1	.7	.2
Oct	6.5	2.8	.9	.3
Nov	7.0	2.0	.1	.1
Dec	8.0	1.6	.0	.0
Ann	100.8	39.6	8.4	2.0

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	.04	.09	.17	.24	.31	.39	.49	.60	.75	1.00	1.24
Feb	.03	.06	.12	.19	.26	.35	.45	.58	.77	1.08	1.39
Mar	.08	.13	.23	.34	.44	.57	.71	.89	1.13	1.53	1.92
Apr	.11	.20	.37	.55	.76	.99	1.26	1.61	2.09	2.89	3.69
May	.41	.63	1.00	1.34	1.70	2.09	2.54	3.08	3.81	4.99	6.11
Jun	1.50	1.76	2.12	2.41	2.67	2.94	3.22	3.54	3.95	4.55	5.10
Jul	.39	.57	.87	1.14	1.42	1.72	2.06	2.47	3.02	3.90	4.73
Aug	.21	.31	.49	.65	.82	1.00	1.21	1.46	1.80	2.34	2.86
Sep	.12	.21	.38	.57	.77	.99	1.26	1.60	2.07	2.85	3.61
Oct	.09	.17	.34	.52	.73	.96	1.25	1.61	2.12	2.97	3.82
Nov	.03	.06	.13	.21	.30	.41	.54	.70	.94	1.34	1.75
Dec	.06	.09	.15	.21	.27	.34	.41	.51	.64	.84	1.05
Ann	9.60	10.68	12.10	13.20	14.19	15.15	16.17	17.30	18.69	20.73	22.52

\+ 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: 1915-2001
(3) Derived from 1971-2000 serially complete daily data

Complete documentation available from:
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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	8.0	6.8	7	4
Feb	7.4	6.2	7	3
Mar	7.9	5.6	5	3
Apr	6.8	4.6	2	1
May	.9	.0	#	0
Jun	.0	.0	0	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	.7	.0	#	0
Oct	2.0	1.0	#	#
Nov	6.8	4.0	2	1
Dec	7.8	8.4	4	3
Ann	48.3	36.6	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	9.0	1989	24	21.0	1994	39	1978	31	33	1978
Feb	7.0	1998	26	23.1	1978	62	1978	22	54	1978
Mar	12.0	1994	23	24.0	1982	61	1978	8	41	1978
Apr	18.0	1997	5	25.0	1997	24	1997	7	10	1975
May	10.0	1983	12	10.0	1983	10	1983	12	1	1984
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	9.0	1984	24	12.0	1984	6	1984	24	1	1984
Oct	6.0	1991	23	6.1+	1995	10	1991	30	2	1991
Nov	7.0	1986	8	30.3	1985	18	1977	28	8	1978
Dec	8.0	1988	26	16.0	1988	29	1977	31	22	1977
Ann	18.0	Apr 1997	5	30.3	Nov 1985	62	Feb 1978	22	54	Feb 1978

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	6.4	4.8	.8	.1	.0
Feb	5.5	4.1	1.0	.1	.0
Mar	5.1	4.1	.9	.2	@
Apr	2.6	2.1	.7	.5	.1
May	.3	.3	.1	.1	@
Jun	.0	.0	.0	.0	.0
Jul	.0	.0	.0	.0	.0
Aug	.0	.0	.0	.0	.0
Sep	.2	.2	.1	@	.0
Oct	1.1	1.0	.4	.1	.0
Nov	5.1	4.1	1.0	.2	.0
Dec	6.3	4.8	.7	.1	.0
Ann	32.6	25.5	5.7	1.4	.1

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	25.1	14.9	9.5	5.6
Feb	16.3	8.7	5.0	2.0
Mar	15.7	10.0	7.4	3.8
Apr	6.0	3.5	2.5	1.0
May	.7	.3	.2	@
Jun	.0	.0	.0	.0
Jul	.0	.0	.0	.0
Aug	.0	.0	.0	.0
Sep	.2	.1	@	.0
Oct	1.5	.6	.2	.1
Nov	12.0	6.5	3.6	1.2
Dec	21.1	11.3	7.3	3.1
Ann	98.6	55.9	35.7	16.8

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

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

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	124	117	112	108	104	100	96	91	84
32	142	136	132	129	125	122	118	114	108
28	168	162	157	153	149	145	141	136	129
24	192	185	179	174	170	166	161	155	148
20	208	201	196	192	188	184	179	174	167
16	233	226	220	215	211	207	202	196	189

***** 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	1564	1236	1090	694	365	138	47	70	283	645	1095	1455	8682
60	1409	1096	935	547	237	66	15	27	174	490	945	1300	7241
57	1316	1016	842	461	173	37	7	14	121	398	855	1207	6447
55	1255	966	780	406	137	24	2	8	91	338	795	1145	5947
50	1106	834	634	279	66	6	0	2	37	200	656	991	4811
32	609	417	197	26	0	0	0	0	0	7	236	495	1987

Base	Cooling Degree Days (1)												
Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	67	105	130	322	670	933	1158	1125	739	385	130	64	5828
55	1	10	0	12	93	266	447	420	140	3	0	0	1392
57	0	5	0	7	68	220	390	365	110	1	0	0	1166
60	0	0	0	3	39	159	305	285	73	0	0	0	864
65	0	0	0	0	12	81	183	173	32	0	0	0	481
70	0	0	0	0	2	31	95	91	11	0	0	0	230

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	4	39	165	442	702	918	887	516	215	33	0	0	4	43	208	650	1352	2270	3157	3673	3888	3921	3921
45	0	0	10	90	301	552	763	733	378	123	14	0	0	0	10	100	401	953	1716	2449	2827	2950	2964	2964
50	0	0	1	43	184	403	608	578	253	56	2	0	0	0	1	44	228	631	1239	1817	2070	2126	2128	2128
55	0	0	0	14	99	265	454	424	148	16	0	0	0	0	0	14	113	378	832	1256	1404	1420	1420	1420
60	0	0	0	2	41	151	305	278	75	3	0	0	0	0	0	2	43	194	499	777	852	855	855	855
Base	Growing Degree Units for Corn (Monthly)												Growing Degree Units for Corn (Accumulated Monthly)											
50/86	0	7	43	126	270	427	584	558	329	162	33	2	0	7	50	176	446	873	1457	2015	2344	2506	2539	2541

(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