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: BOZEMAN 6 W EXP FARM, MT **COOP ID: 241047**

Climate Division: MT 2 **NWS Call Sign:** **Elevation: 4,775 Feet** **Lat: 45˚41N** **Lon: 111˚09W**

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	33.2	12.0	22.6	61	1974	16	32.6	1994	-32	1980	28	4.9	1979	1314	0	.0	.0	2.0	12.4	29.3	7.3
Feb	38.7	16.5	27.6	64	1995	24	36.9	1991	-35	1989	5	10.3	1989	1047	0	.0	.0	4.0	6.7	25.9	4.0
Mar	46.5	22.9	34.7	75	1986	28	43.2	1986	-20	1976	3	28.3+	1976	939	0	.0	.0	11.4	2.6	27.0	1.2
Apr	56.3	30.1	43.2	81+	1994	21	50.5	1987	-3+	1997	6	33.5	1975	654	0	.0	.0	20.6	.3	19.0	.1
May	65.3	37.8	51.6	90	2001	12	55.8	1992	16+	1983	13	47.5	1996	418	1	.0	.0	28.4	.0	7.2	.0
Jun	73.9	44.2	59.1	98	1990	30	66.2	1988	28	1979	8	54.5	1998	198	20	.0	.6	29.9	.0	1.0	.0
Jul	81.8	48.8	65.3	101	2000	31	69.7	1985	32	1981	8	57.0	1993	84	93	@	3.6	31.0	.0	@	.0
Aug	81.6	47.6	64.6	100+	2001	3	69.0	1991	26	1992	25	58.4	1993	100	87	.0	3.4	31.0	.0	.2	.0
Sep	71.2	39.7	55.5	95	2001	3	62.5	1998	13	1985	29	49.6	1985	303	15	.0	.6	28.8	.0	5.1	.0
Oct	58.9	31.5	45.2	85+	1997	1	50.3	1988	-10	1991	30	40.2	1984	614	0	.0	.0	24.5	.5	17.0	.1
Nov	41.8	20.4	31.1	75	1999	12	42.5	1999	-23	1977	21	17.2	1985	1017	0	.0	.0	8.4	6.2	26.1	2.1
Dec	33.9	12.5	23.2	63	1980	27	32.6	1980	-39	1983	24	8.2	1983	1296	0	.0	.0	2.9	12.1	29.0	5.5
Ann	56.9	30.3	43.6	101	Jul 2000	31	69.7	Jul 1985	-39	Dec 1983	24	4.9	Jan 1979	7984	216	@	8.2	222.9	40.8	186.8	20.3

\+ 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: 1966-2001

(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	.55	.52	.51	1995	27	1.27	1995	.10	1983
Feb	.54	.46	.60	1996	24	1.57	1980	.00	1977
Mar	1.10	1.06	.97	1967	29	2.25	1982	.41+	1987
Apr	1.61	1.63	.80+	2000	23	3.09	1971	.39	1977
May	2.81	2.68	2.18	1988	7	6.15	1981	1.08	1973
Jun	2.52	2.79	2.54	2001	13	4.80	1992	.43	1974
Jul	1.50	1.28	2.08	1993	3	5.21	1993	.06	1996
Aug	1.36	1.27	1.65	1995	8	2.63+	1995	.11	1996
Sep	1.59	1.47	1.56	1984	21	3.64	1978	.05	1979
Oct	1.36	1.23	1.29	1992	4	3.53	1975	.13	1987
Nov	.89	.84	.78	1996	14	2.10	1983	.18	1976
Dec	.62	.61	.58	1996	25	1.42	1975	.07	1976
Ann	16.45	15.99	2.54	Jun 2001	13	6.15	May 1981	.00	Feb 1977

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	6.6	1.8	.1	.0
Feb	5.7	2.1	@	.0
Mar	9.2	4.1	.1	.0
Apr	10.5	5.5	.6	.0
May	14.1	7.5	1.3	.3
Jun	12.4	6.8	1.3	.1
Jul	8.8	4.3	.6	.1
Aug	8.6	3.8	.5	@
Sep	8.3	4.5	1.0	.1
Oct	7.5	4.0	.7	@
Nov	7.4	3.0	.3	.0
Dec	6.5	2.1	.1	.0
Ann	105.6	49.5	6.6	.6

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	.15	.20	.28	.35	.42	.49	.57	.66	.79	.98	1.16
Feb	.08	.15	.24	.32	.39	.47	.56	.66	.80	1.02	1.22
Mar	.43	.53	.68	.80	.91	1.03	1.15	1.30	1.48	1.77	2.03
Apr	.52	.67	.90	1.09	1.27	1.47	1.68	1.93	2.24	2.74	3.20
May	1.09	1.35	1.72	2.03	2.32	2.62	2.94	3.32	3.79	4.52	5.18
Jun	.82	1.06	1.41	1.71	2.00	2.30	2.62	3.00	3.49	4.25	4.96
Jul	.15	.26	.47	.68	.90	1.16	1.46	1.83	2.34	3.18	4.01
Aug	.31	.43	.63	.81	.99	1.18	1.39	1.64	1.98	2.51	3.01
Sep	.24	.38	.61	.83	1.05	1.31	1.59	1.95	2.42	3.19	3.93
Oct	.37	.50	.70	.87	1.04	1.21	1.41	1.64	1.94	2.42	2.86
Nov	.28	.36	.49	.59	.70	.80	.92	1.06	1.24	1.51	1.77
Dec	.14	.19	.28	.37	.45	.53	.63	.75	.90	1.14	1.37
Ann	12.14	12.99	14.06	14.87	15.59	16.28	16.99	17.77	18.72	20.09	21.26

\+ 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: 1966-2001
(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	10.0	8.4	5	5	10.0	1997	10	25.0	1997	20	1979	28	17	1979	6.4	3.4	1.2	.4	@	22.9	15.5	10.8	3.0
Feb	7.9	7.2	3	2	11.0	1996	24	20.5	1986	19	1979	4	9	1985	5.0	3.2	1.1	.2	@	15.8	10.5	6.7	1.4
Mar	12.7	12.0	2	2	16.0	1991	11	26.0	1977	15	1980	30	7	1980	6.3	3.8	1.6	.5	.1	12.2	7.8	3.6	.3
Apr	9.1	7.1	#	#	9.0	1993	11	20.9	1982	10	1980	2	3	1982	4.1	3.0	1.4	.6	.0	3.2	2.0	.9	.0
May	1.8	.3	#	0	6.0	1975	6	16.0	1975	6	1975	7	1	1975	1.1	.7	.2	.1	.0	.5	.1	.1	.0
Jun	.1	.0	0	0	1.5	1973	17	2.0	1973	0	0	0	0	0	.2	@	.0	.0	.0	.0	.0	.0	.0
Jul	#	.0	0	0	#	1972	19	#	1972	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Aug	.1	.0	#	0	2.5	1992	24	2.5	1992	#	1972	2	#	1972	@	@	.0	.0	.0	.0	.0	.0	.0
Sep	.6	.0	#	0	3.0	1983	19	3.0	1983	3	1985	27	#+	1988	.4	.3	@	.0	.0	.1	.1	.0	.0
Oct	4.9	4.0	#	#	8.8	1991	27	13.0	1996	8+	1991	31	1	1996	2.2	1.6	.5	.2	.0	2.2	1.0	.4	.0
Nov	9.9	10.0	2	1	10.9	1979	19	19.0	1973	12	1973	8	5	1996	5.2	3.6	1.0	.4	@	10.1	6.4	3.2	.4
Dec	9.0	8.7	3	3	16.0	1996	25	19.0	1994	26	1996	25	16	1996	5.8	3.4	1.3	.3	@	20.0	13.8	7.6	1.0
Ann	66.1	57.7	N/A	N/A	16.0+	Dec 1996	25	26.0	Mar 1977	26	Dec 1996	25	17	Jan 1979	36.7	23.0	8.3	2.7	.1	87.0	57.2	33.3	6.1

+ 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	7/09	7/04	6/30	6/27	6/24	6/21	6/18	6/15	6/09
32	6/22	6/16	6/11	6/07	6/04	5/31	5/27	5/23	5/17
28	5/24	5/18	5/14	5/11	5/08	5/04	5/01	4/27	4/21
24	5/08	5/04	4/30	4/27	4/24	4/22	4/19	4/15	4/10
20	5/01	4/25	4/21	4/17	4/13	4/10	4/06	4/01	3/26
16	4/25	4/18	4/13	4/09	4/05	4/01	3/27	3/22	3/15

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	8/19	8/23	8/27	8/30	9/01	9/04	9/07	9/10	9/15
32	9/02	9/06	9/08	9/11	9/13	9/15	9/18	9/21	9/24
28	9/09	9/14	9/17	9/20	9/22	9/25	9/28	10/01	10/06
24	9/17	9/23	9/28	10/02	10/06	10/10	10/14	10/18	10/25
20	9/27	10/03	10/07	10/11	10/14	10/18	10/21	10/26	11/01
16	10/13	10/19	10/23	10/26	10/29	11/01	11/05	11/09	11/14

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	89	82	77	72	68	64	60	55	48
32	120	113	109	104	101	97	92	88	81
28	161	153	147	142	137	133	128	122	114
24	191	182	175	169	164	158	152	146	136
20	210	201	194	188	183	178	172	166	156
16	228	221	216	211	207	203	198	193	186

***** 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	1314	1047	939	654	418	198	84	100	303	614	1017	1296	7984
60	1159	907	784	505	273	97	26	37	184	459	867	1141	6439
57	1066	823	691	420	195	54	11	18	127	368	777	1048	5598
55	1004	767	629	366	151	33	6	10	95	308	717	986	5072
50	851	635	483	240	68	7	0	2	37	176	578	832	3909
32	362	227	94	15	0	0	0	0	0	5	177	341	1221

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	71	104	178	351	606	812	1032	1011	703	413	151	68	5500
55	0	0	0	12	44	155	325	308	107	4	0	0	955
57	0	0	0	7	26	116	268	253	80	1	0	0	751
60	0	0	0	2	11	69	190	180	47	0	0	0	499
65	0	0	0	0	1	20	93	87	15	0	0	0	216
70	0	0	0	0	0	4	30	29	4	0	0	0	67

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	13	46	157	364	574	788	768	467	215	41	7	1	14	60	217	581	1155	1943	2711	3178	3393	3434	3441
45	0	0	12	78	229	424	633	613	329	115	14	0	0	0	12	90	319	743	1376	1989	2318	2433	2447	2447
50	0	0	0	31	122	283	478	458	204	51	0	0	0	0	0	31	153	436	914	1372	1576	1627	1627	1627
55	0	0	0	8	47	161	326	308	106	11	0	0	0	0	0	8	55	216	542	850	956	967	967	967
60	0	0	0	0	18	73	184	172	39	1	0	0	0	0	0	0	18	91	275	447	486	487	487	487
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	10	42	125	244	369	504	495	322	169	28	1	0	10	52	177	421	790	1294	1789	2111	2280	2308	2309

(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