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: BIG TIMBER, MT **COOP ID: 240780**

Climate Division: MT 5 **NWS Call Sign:** **Elevation: 4,100 Feet** **Lat: 45˚50N** **Lon: 109˚57W**

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	34.8	13.3	24.1	78	1922	8	36.2	1986	-36	1917	31	7.9	1979	1269	0	.0	.0	5.4	9.3	26.4	6.3
Feb	40.5	17.5	29.0	72	1950	26	39.5	1991	-47	1936	15	13.2	1989	1009	0	.0	.0	9.4	5.9	23.3	3.6
Mar	47.6	22.8	35.2	80	1928	22	44.1	1986	-30+	1932	10	27.4	1996	924	0	.0	.0	16.5	2.6	24.5	1.4
Apr	56.2	30.6	43.4	89	1962	19	51.2	1987	-10	1936	5	34.6	1975	648	0	.0	.0	23.3	.5	16.9	@
May	66.6	39.3	53.0	97+	1934	27	57.8	1987	10	1954	2	48.5	1996	376	2	.0	.3	29.4	.0	4.6	.0
Jun	77.0	47.4	62.2	106	1919	22	70.4	1988	26	1968	14	56.3	1998	140	56	.1	3.7	29.9	.0	.1	.0
Jul	84.8	52.1	68.5	110	1931	21	72.4	1985	30	1930	14	59.5	1993	49	156	.6	12.0	31.0	.0	.0	.0
Aug	84.5	50.8	67.7	107	1929	14	74.0	1971	28	1910	25	63.3	1974	62	144	.4	10.4	31.0	.0	.1	.0
Sep	72.3	41.0	56.7	100+	1950	4	63.8	1998	12	1926	24	51.5+	1985	274	24	.0	2.1	29.1	@	3.6	.0
Oct	59.7	31.9	45.8	88+	1992	2	50.9	1988	-14	1919	25	40.3	1984	595	0	.0	.0	26.1	.5	13.9	.1
Nov	43.8	23.0	33.4	78	1965	2	44.8	1999	-29	1959	13	16.9	1985	948	0	.0	.0	11.4	4.6	22.7	1.3
Dec	36.0	16.0	26.0	80	1897	30	36.0	1999	-38+	1983	24	9.2	1983	1209	0	.0	.0	5.6	7.9	26.1	4.3
Ann	58.7	32.1	45.4	110	Jul 1931	21	74.0	Aug 1971	-47	Feb 1936	15	7.9	Jan 1979	7503	382	1.1	28.5	248.1	31.3	162.2	17.0

\+ 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: 1894-2001

(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	.65	.61	.90	1925	24	1.50	1980	.00	1981
Feb	.50	.39	1.22	1953	28	1.61	1986	.00	1977
Mar	.93	.78	1.80	1918	13	2.48	1989	.15	1978
Apr	1.79	1.38	3.56	1900	25	4.11	1976	.07	1977
May	2.79	2.44	4.00	1938	19	7.69	1981	.54	1998
Jun	2.60	2.25	3.20	1969	25	7.34	1992	.38	1974
Jul	1.54	1.07	3.11	1994	6	4.54	1993	.13	1988
Aug	1.25	1.14	2.10	1933	27	2.89	1979	.04	1996
Sep	1.28	1.27	1.75	1926	8	2.66	1972	.00	1979
Oct	1.37	1.13	2.35	1938	17	4.74	1975	.02	1987
Nov	.72	.58	2.50	1922	3	2.27	1975	.10	1976
Dec	.69	.59	1.30	1928	28	1.83	1983	.02	1993
Ann	16.11	16.14	4.00	May 1938	19	7.69	May 1981	.00+	Jan 1981

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	5.6	2.2	.1	.0
Feb	4.7	1.9	.1	.0
Mar	6.6	3.1	.3	.0
Apr	9.2	5.0	.7	.1
May	11.8	6.1	1.7	.4
Jun	11.6	5.8	1.3	.5
Jul	8.0	3.7	.7	.2
Aug	7.2	3.0	.6	.1
Sep	7.0	3.5	.6	.1
Oct	6.7	3.2	.6	.2
Nov	5.5	2.5	.1	.0
Dec	5.2	2.2	.1	@
Ann	89.1	42.2	6.9	1.6

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	.05	.12	.23	.33	.42	.53	.66	.81	1.01	1.34	1.65
Feb	.01	.04	.11	.18	.26	.35	.46	.61	.81	1.15	1.48
Mar	.23	.32	.46	.57	.69	.82	.96	1.12	1.34	1.68	2.00
Apr	.23	.37	.62	.87	1.14	1.43	1.77	2.18	2.75	3.68	4.58
May	.78	1.05	1.45	1.80	2.14	2.50	2.89	3.36	3.96	4.91	5.80
Jun	.49	.73	1.11	1.46	1.82	2.20	2.64	3.17	3.87	4.99	6.07
Jul	.19	.31	.53	.74	.97	1.22	1.51	1.88	2.37	3.18	3.96
Aug	.11	.20	.37	.54	.73	.95	1.21	1.53	1.97	2.71	3.44
Sep	.15	.31	.52	.70	.89	1.09	1.31	1.58	1.93	2.50	3.04
Oct	.16	.27	.46	.65	.86	1.08	1.35	1.68	2.12	2.85	3.56
Nov	.13	.19	.30	.40	.50	.60	.72	.87	1.07	1.38	1.69
Dec	.06	.10	.19	.29	.39	.51	.65	.83	1.08	1.50	1.91
Ann	10.21	11.30	12.73	13.82	14.81	15.78	16.78	17.91	19.28	21.30	23.07

\+ 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: 1894-2001
(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	5.6	5.2	2	1
Feb	5.4	7.1	1	1
Mar	3.4	-99.9	2	1
Apr	2.8	.0	#	0
May	.3	.0	0	0
Jun	.0	.0	0	0
Jul	.0	.0	0	0
Aug	.1	.0	0	0
Sep	.5	.0	#	0
Oct	1.4	.0	#	0
Nov	4.4	4.0	1	#
Dec	7.7	8.5	2	1
Ann	31.6	-9.9	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	24.0	1975	26	24.0	1975	13	1993	11	12	1971
Feb	8.0	2000	25	10.0	1988	15	1986	20	5	1986
Mar	10.0	1977	29	13.5	1977	16	1989	2	8	1980
Apr	9.0	1982	7	14.0	1982	12	1997	5	3	1997
May	6.5	1981	11	6.5	1981	11	1983	12	1	1983
Jun	.0	0	0	.0	0	0	0	0	0	0
Jul	.0	0	0	.0	0	0	0	0	0	0
Aug	3.0	1992	24	3.0	1992	0	0	0	0	0
Sep	6.0	2000	22	8.0	2000	5	1983	19	#+	1999
Oct	11.0	1980	15	11.0	1980	11	1985	8	1	1993
Nov	13.0	1973	1	13.0	1973	14	1978	18	3	1986
Dec	18.0	1989	21	18.0	1989	24	1996	28	7	1983
Ann	24.0	Jan 1975	26	24.0	Jan 1975	24	Dec 1996	28	12	Jan 1971

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	1.6	1.0	.5	.4	.1
Feb	2.0	1.4	.5	.1	.0
Mar	1.5	1.3	.9	.3	.1
Apr	.6	.6	.3	.1	.0
May	@	@	@	@	.0
Jun	.0	.0	.0	.0	.0
Jul	.0	.0	.0	.0	.0
Aug	@	@	@	.0	.0
Sep	.1	.1	.1	@	.0
Oct	.5	.4	.2	.1	@
Nov	1.7	1.4	.8	.2	.1
Dec	2.2	1.8	.9	.4	.2
Ann	10.2	8.0	4.2	1.6	.5

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	-9.9	-9.9	-9.9	-9.9
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	.1	.1	.0	.0
Nov	-9.9	-9.9	-9.9	-9.9
Dec	-9.9	-9.9	-9.9	-9.9
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	6/24	6/18	6/13	6/09	6/05	6/01	5/28	5/23	5/16
32	5/31	5/26	5/23	5/20	5/18	5/15	5/13	5/09	5/05
28	5/19	5/14	5/11	5/08	5/05	5/02	4/29	4/25	4/20
24	5/03	4/29	4/25	4/22	4/19	4/17	4/14	4/10	4/05
20	4/22	4/16	4/12	4/08	4/05	4/01	3/28	3/24	3/18
16	4/14	4/07	4/03	3/30	3/26	3/22	3/18	3/14	3/08

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	8/28	9/01	9/04	9/07	9/10	9/12	9/15	9/18	9/22
32	9/05	9/09	9/13	9/16	9/18	9/21	9/24	9/27	10/02
28	9/17	9/21	9/24	9/27	9/29	10/02	10/05	10/08	10/12
24	9/24	9/29	10/03	10/06	10/09	10/12	10/16	10/20	10/25
20	10/08	10/13	10/18	10/21	10/24	10/28	10/31	11/04	11/10
16	10/16	10/23	10/27	10/31	11/04	11/08	11/12	11/17	11/23

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	122	113	107	101	96	91	85	79	70
32	142	136	131	127	123	119	115	110	103
28	167	160	155	151	147	143	139	134	127
24	197	188	182	177	172	167	162	156	148
20	226	217	212	207	202	197	192	186	178
16	246	238	232	227	222	218	213	207	199

***** 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	1269	1009	924	648	376	140	49	62	274	595	948	1209	7503
60	1114	869	769	500	236	62	14	21	163	441	798	1054	6041
57	1021	785	676	416	164	32	5	9	110	350	710	961	5239
55	959	729	614	361	124	19	2	4	81	293	657	900	4743
50	817	601	470	236	51	3	0	1	30	167	517	757	3650
32	353	214	92	15	0	0	0	0	0	4	149	304	1131

Base	Cooling Degree Days (1)												
Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	106	129	191	357	650	906	1130	1105	740	432	191	118	6055
55	0	0	1	13	60	235	419	396	131	8	8	1	1272
57	0	0	0	7	39	188	361	339	100	3	2	0	1039
60	0	0	0	2	17	128	276	257	63	1	0	0	744
65	0	0	0	0	2	56	156	144	24	0	0	0	382
70	0	0	0	0	0	17	73	66	7	0	0	0	163

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	24	40	86	205	439	689	910	887	546	279	74	25	24	64	150	355	794	1483	2393	3280	3826	4105	4179	4204
45	2	14	34	111	297	539	755	732	400	162	31	5	2	16	50	161	458	997	1752	2484	2884	3046	3077	3082
50	0	2	7	49	174	392	600	577	265	81	11	0	0	2	9	58	232	624	1224	1801	2066	2147	2158	2158
55	0	0	0	17	82	249	446	422	150	30	0	0	0	0	0	17	99	348	794	1216	1366	1396	1396	1396
60	0	0	0	2	25	138	300	273	69	8	0	0	0	0	0	2	27	165	465	738	807	815	815	815
Base	Growing Degree Units for Corn (Monthly)												Growing Degree Units for Corn (Accumulated Monthly)											
50/86	10	34	77	164	295	431	568	555	370	203	48	11	10	44	121	285	580	1011	1579	2134	2504	2707	2755	2766

(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