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: POWDERVILLE 8 NNE, MT **COOP ID: 246691**

Climate Division: MT 7 **NWS Call Sign:** **Elevation: 2,800 Feet** **Lat: 45˚51N** **Lon: 105˚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	30.0	5.3	17.7	68	1992	31	29.7	1981	-36+	1998	12	.0	1979	1468	0	.0	.0	1.8	14.3	30.7	11.5
Feb	37.8	13.1	25.5	71	1995	24	35.6	1984	-39	1971	7	11.5+	1989	1107	0	.0	.0	6.3	9.1	27.0	5.5
Mar	47.7	21.2	34.5	82	1978	30	43.2	1986	-34	1996	8	23.9	1996	947	0	.0	.0	14.6	4.0	27.7	2.0
Apr	60.2	31.5	45.9	91	1980	20	52.4	1987	-2	1997	11	38.7	1997	574	0	.0	.1	24.1	.7	16.0	.1
May	71.0	41.7	56.4	102	1980	22	62.5	1988	15	1967	4	50.2	1979	292	24	@	1.0	30.2	.0	4.2	.0
Jun	81.6	51.1	66.4	108+	1988	26	80.0	1988	32+	2000	2	60.1	1998	95	134	.9	5.9	30.0	.0	.1	.0
Jul	90.0	56.4	73.2	109+	1989	8	79.0	1988	37	1972	4	64.4	1993	25	280	3.7	17.4	31.0	.0	.0	.0
Aug	89.2	54.5	71.9	108+	1983	7	79.3	1983	31	1977	11	64.5	1974	39	251	2.6	16.3	31.0	.0	.1	.0
Sep	77.1	42.9	60.0	105+	1978	5	68.1	1998	16	1995	21	54.4	1985	209	59	.5	4.6	29.3	.0	3.9	.0
Oct	62.3	31.4	46.9	93+	1992	2	49.9	1988	-13	1991	30	41.0	1991	563	0	.0	.2	26.5	.5	16.4	@
Nov	43.6	19.0	31.3	79	1999	7	41.6	1999	-28	1985	23	16.1	1985	1012	0	.0	.0	10.5	6.1	27.7	2.3
Dec	33.1	8.3	20.7	67	1995	1	31.0	1999	-45	1989	22	-.2	1983	1374	0	.0	.0	2.9	12.2	30.5	8.0
Ann	60.3	31.4	45.9	109+	Jul 1989	8	80.0	Jun 1988	-45	Dec 1989	22	-.2	Dec 1983	7705	748	7.7	45.5	238.2	46.9	184.3	29.4

\+ 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: 1964-2001

(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	.47	.45	.73	1996	3	1.60	1971	.00	1985
Feb	.38	.22	2.06	1998	25	2.32	1998	.00+	1992
Mar	.55	.38	.46	2001	14	1.94	1998	.00+	1985
Apr	1.59	1.39	1.80	1999	21	3.51	1973	.20+	1988
May	2.20	1.75	2.00	1975	5	6.83	1975	.28	1998
Jun	2.71	1.99	2.58	1964	8	7.58	1976	.48	1988
Jul	1.63	1.33	2.32	1969	15	7.72	1993	.00	1984
Aug	1.08	.83	1.90	1999	12	3.22	1998	.00	1976
Sep	1.39	1.00	1.67	1986	25	4.80	1986	.00	1975
Oct	1.38	1.03	3.29	1971	2	5.75	1971	.00+	1984
Nov	.57	.49	1.20+	2000	1	2.10	1978	.00	1972
Dec	.40	.31	.65	1966	31	1.14	1989	.00+	1984
Ann	14.35	14.43	3.29	Oct 1971	2	7.72	Jul 1993	.00+	Feb 1992

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	6.2	1.5	.2	.0
Feb	4.4	1.1	@	@
Mar	5.7	1.8	.0	.0
Apr	7.2	3.9	.9	.2
May	9.3	5.3	1.3	.2
Jun	8.7	5.1	1.7	.5
Jul	5.5	3.6	1.2	.2
Aug	4.1	2.6	.7	.1
Sep	4.9	3.0	1.0	.4
Oct	4.5	3.0	.9	.2
Nov	5.5	1.9	.1	.1
Dec	5.4	1.2	.0	.0
Ann	71.4	34.0	8.0	1.9

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	.03	.07	.15	.21	.29	.37	.46	.58	.74	1.00	1.25
Feb	.00	.00	.03	.09	.16	.24	.34	.47	.65	.96	1.27
Mar	.00	.03	.12	.20	.29	.40	.52	.68	.89	1.25	1.61
Apr	.21	.34	.57	.79	1.02	1.28	1.58	1.95	2.44	3.26	4.04
May	.40	.59	.91	1.21	1.52	1.85	2.23	2.68	3.29	4.27	5.21
Jun	.70	.96	1.35	1.70	2.04	2.40	2.80	3.28	3.90	4.88	5.79
Jul	.08	.23	.48	.72	.98	1.26	1.60	2.01	2.58	3.52	4.43
Aug	.03	.10	.24	.39	.56	.76	1.00	1.31	1.74	2.47	3.19
Sep	.04	.15	.34	.54	.76	1.01	1.32	1.70	2.23	3.11	3.99
Oct	.00	.14	.38	.60	.83	1.08	1.37	1.72	2.20	2.98	3.75
Nov	.04	.10	.20	.28	.37	.46	.57	.71	.89	1.18	1.46
Dec	.00	.00	.06	.12	.19	.27	.37	.49	.66	.96	1.25
Ann	7.34	8.54	10.15	11.44	12.62	13.80	15.05	16.47	18.24	20.90	23.27

\+ 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: 1964-2001
(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	5.6	5.2	4	5	7.0	1995	16	13.3	1994	16	1971	31	11	1972	3.3	1.8	.3	.1	.0	18.3	12.8	9.7	.2
Feb	3.3	3.3	3	2	3.0	1973	6	8.9	1994	16	1971	1	10	1972	2.4	1.4	.1	.0	.0	10.0	5.7	4.0	1.7
Mar	4.4	1.5	2	1	5.5	1987	21	14.7	1989	18	1998	11	12	1998	2.0	1.3	.3	.1	.0	5.8	3.2	1.6	.3
Apr	1.8	.9	#	#	5.0	1994	26	7.0	1999	7	1989	28	3	1997	.8	.6	.3	.1	.0	1.6	.9	.1	.0
May	1.2	.0	#	0	12.0	1983	12	16.0	1983	#+	1999	11	#+	1999	.2	.2	.2	.1	.1	.0	.0	.0	.0
Jun	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Jul	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Aug	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Sep	.2	.0	#	0	4.0	1972	25	4.0	1972	2	1972	25	#	1972	@	@	@	.0	.0	.1	.0	.0	.0
Oct	.5	.0	#	0	2.0	1976	23	3.0	1992	5	1991	23	1	1991	.3	.3	.0	.0	.0	.5	.0	.0	.0
Nov	3.6	3.1	1	#	12.0	1978	9	12.0	1978	11	1985	30	5+	2000	2.6	1.5	.7	.2	.1	6.1	3.4	1.1	.0
Dec	5.5	5.3	3	2	4.0	1985	17	12.0	1985	14	1996	30	9	1985	3.3	1.6	.3	.0	.0	14.0	5.9	3.7	1.6
Ann	26.1	19.3	N/A	N/A	12.0+	May 1983	12	16.0	May 1983	18	Mar 1998	11	12	Mar 1998	14.9	8.7	2.2	.6	.2	56.4	31.9	20.2	3.8

+ 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	5/31	5/28	5/25	5/21	5/17	5/11
32	6/03	5/29	5/25	5/21	5/18	5/15	5/11	5/07	5/02
28	5/18	5/14	5/11	5/08	5/06	5/04	5/01	4/28	4/24
24	5/07	5/03	4/30	4/27	4/24	4/22	4/19	4/15	4/11
20	4/29	4/23	4/19	4/15	4/12	4/09	4/05	4/01	3/27
16	4/20	4/15	4/11	4/08	4/04	4/01	3/29	3/25	3/20

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	8/25	8/31	9/03	9/07	9/10	9/13	9/16	9/19	9/25
32	9/01	9/06	9/10	9/13	9/16	9/18	9/21	9/25	9/30
28	9/11	9/16	9/20	9/24	9/27	9/30	10/03	10/07	10/13
24	9/18	9/25	9/30	10/04	10/08	10/11	10/15	10/20	10/27
20	9/28	10/04	10/08	10/12	10/15	10/19	10/22	10/26	11/01
16	10/08	10/14	10/18	10/22	10/25	10/28	11/01	11/05	11/11

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	125	118	113	108	104	100	95	90	82
32	143	135	129	124	120	115	110	104	96
28	163	156	151	147	143	139	135	131	124
24	186	179	174	170	166	162	157	153	146
20	205	199	194	189	185	181	177	172	165
16	226	218	212	207	203	198	193	188	180

***** 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	1468	1107	947	574	292	95	25	39	209	563	1012	1374	7705
60	1313	971	792	428	177	40	8	14	117	409	862	1219	6350
57	1220	894	700	344	123	22	2	6	76	320	772	1126	5605
55	1160	842	640	292	92	14	0	3	54	263	718	1064	5142
50	1012	712	496	177	37	3	0	0	19	144	578	916	4094
32	524	326	119	5	0	0	0	0	0	4	190	433	1601

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	80	144	196	421	754	1029	1278	1235	840	464	168	83	6692
55	2	15	3	18	133	353	565	525	204	11	6	0	1835
57	1	12	1	10	102	301	505	465	165	5	0	0	1567
60	0	4	0	4	64	230	418	381	117	2	0	0	1220
65	0	0	0	0	24	134	280	251	59	0	0	0	748
70	0	0	0	0	6	66	169	149	24	0	0	0	414

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	11	61	227	519	791	1035	993	606	262	39	3	0	11	72	299	818	1609	2644	3637	4243	4505	4544	4547
45	0	1	22	131	373	641	880	838	463	150	11	0	0	1	23	154	527	1168	2048	2886	3349	3499	3510	3510
50	0	0	4	61	236	491	725	683	325	65	0	0	0	0	4	65	301	792	1517	2200	2525	2590	2590	2590
55	0	0	0	22	130	344	570	530	205	20	0	0	0	0	0	22	152	496	1066	1596	1801	1821	1821	1821
60	0	0	0	4	59	212	415	375	112	4	0	0	0	0	0	4	63	275	690	1065	1177	1181	1181	1181
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	24	74	182	337	497	648	618	409	216	46	6	0	24	98	280	617	1114	1762	2380	2789	3005	3051	3057

(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