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: SHONKIN 7 S, MT **COOP ID: 247540**

Climate Division: MT 3 **NWS Call Sign:** **Elevation: 4,300 Feet** **Lat: 47˚32N** **Lon: 110˚35W**

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	34.1	13.8	24.0	67	1981	22	38.8	1986	-35	1971	14	9.3	1982	1274	0	.0	.0	3.9	11.2	27.3	8.4
Feb	38.2	18.5	28.4	68	1986	28	40.7	1991	-36	1989	2	13.7	1989	1026	0	.0	.0	6.3	7.3	23.6	5.0
Mar	44.6	24.4	34.5	75	1978	29	44.0	1986	-26	1960	2	25.5	1996	946	0	.0	.0	11.2	4.4	24.8	1.8
Apr	53.8	31.8	42.8	85	1980	20	51.5	1987	-8	1975	1	31.6	1975	667	0	.0	.0	18.9	1.0	17.2	.1
May	61.9	39.7	50.8	89+	1988	16	55.8	1987	2	1954	2	45.6	1996	442	1	.0	.0	27.6	@	5.4	.0
Jun	70.8	46.1	58.5	97	1988	22	66.7	1988	26	1969	13	53.7	1998	224	28	.0	.4	29.8	.0	.3	.0
Jul	78.8	50.3	64.6	97	1953	13	70.1	1985	32+	1972	20	56.0	1993	113	100	.0	2.5	31.0	.0	.1	.0
Aug	79.2	49.7	64.5	104	1961	5	70.5	1983	27	1992	24	57.8	1980	131	114	.0	2.9	30.9	.0	.1	.0
Sep	68.1	42.7	55.4	95+	1979	8	63.4	1998	11	1985	30	46.1	1985	323	33	.0	.5	27.8	.1	3.8	.0
Oct	57.1	34.5	45.8	88+	1992	2	49.7	1974	-6	1991	28	38.4	1984	594	0	.0	.0	23.9	.9	12.9	.2
Nov	42.3	24.9	33.6	76+	1999	7	45.7	1999	-26	1985	23	13.0	1985	942	0	.0	.0	9.2	5.5	23.5	2.0
Dec	35.6	18.0	26.8	65	1988	1	37.1	1999	-42	1968	29	7.8	1983	1184	0	.0	.0	5.3	9.2	26.0	5.4
Ann	55.4	32.9	44.1	104	Aug 1961	5	70.5	Aug 1983	-42	Dec 1968	29	7.8	Dec 1983	7866	276	.0	6.3	225.8	39.6	165.0	22.9

\+ 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: 1953-2001

(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	1.25	1.33	1.05	1975	18	2.41	1984	.06	1987
Feb	.98	.86	.82	1958	26	2.01	1989	.24	1998
Mar	2.03	1.82	2.34	1981	17	6.23	1981	.44	1986
Apr	2.60	2.25	3.10	1973	20	6.20	1973	.47	1996
May	4.43	3.15	5.29	1962	21	11.63	1982	1.51	1998
Jun	3.98	3.88	6.52	1953	3	9.89	1975	.60	1972
Jul	2.16	1.90	3.63	1983	10	9.70	1993	.07	1984
Aug	1.96	1.36	3.55	1968	15	6.20	1974	.15	2000
Sep	2.72	2.33	5.80	1978	12	9.09	1978	.00	1990
Oct	1.85	1.77	1.95	1966	2	4.83	1994	.41	1990
Nov	1.30	1.39	1.32	1975	24	2.81	1991	.10	1997
Dec	1.20	1.01	1.20	1967	17	3.35	1989	.28	1991
Ann	26.46	25.24	6.52	Jun 1953	3	11.63	May 1982	.00	Sep 1990

Mean Number of Days (3)

Month	Daily Precipitation >= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	8.2	4.3	.3	@
Feb	5.9	3.2	.3	.0
Mar	7.8	5.0	.7	.2
Apr	8.3	5.4	1.3	.3
May	9.6	6.7	2.6	1.1
Jun	9.6	7.0	2.5	1.0
Jul	6.7	4.5	1.2	.4
Aug	5.7	3.7	1.3	.3
Sep	6.7	4.8	1.3	.5
Oct	5.7	3.9	1.0	.2
Nov	6.2	3.8	.5	.1
Dec	7.2	3.9	.5	.0
Ann	87.6	56.2	13.5	4.1

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	.26	.38	.56	.73	.89	1.07	1.27	1.51	1.83	2.34	2.82
Feb	.34	.43	.56	.68	.79	.90	1.03	1.17	1.36	1.64	1.91
Mar	.50	.69	.99	1.25	1.51	1.79	2.09	2.46	2.94	3.69	4.40
Apr	.55	.79	1.17	1.52	1.87	2.24	2.66	3.16	3.82	4.88	5.88
May	1.22	1.64	2.28	2.84	3.38	3.95	4.58	5.33	6.30	7.83	9.25
Jun	.82	1.18	1.77	2.30	2.84	3.41	4.06	4.84	5.87	7.52	9.09
Jul	.21	.36	.65	.95	1.28	1.65	2.08	2.63	3.38	4.62	5.84
Aug	.24	.40	.68	.95	1.24	1.56	1.94	2.40	3.03	4.06	5.06
Sep	.38	.73	1.19	1.58	1.96	2.36	2.81	3.35	4.06	5.18	6.24
Oct	.43	.61	.88	1.12	1.36	1.61	1.90	2.24	2.68	3.39	4.05
Nov	.23	.35	.54	.71	.89	1.09	1.31	1.58	1.94	2.52	3.08
Dec	.26	.37	.55	.71	.87	1.04	1.23	1.46	1.76	2.24	2.69
Ann	16.87	18.65	20.97	22.76	24.37	25.94	27.57	29.40	31.64	34.92	37.79

\+ 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: 1953-2001
(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	22.9	24.0	5	4
Feb	13.2	14.0	4	3
Mar	21.5	19.0	4	2
Apr	14.7	10.0	3	1
May	8.1	2.0	1	#
Jun	#	.0	#	0
Jul	.0	.0	0	0
Aug	.2	.0	#	0
Sep	1.8	.0	#	0
Oct	9.7	6.0	1	1
Nov	13.4	9.5	3	3
Dec	19.8	16.8	4	4
Ann	125.3	101.3	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	1972	2	44.0	1984	28	1974	10	19	1979
Feb	12.0	1981	8	20.5	1971	27	1978	1	19	1978
Mar	26.0	1977	29	44.0	1977	40	1995	27	21	1995
Apr	34.0	1973	20	54.0	1975	50	1975	9	22	1997
May	48.0	1982	29	74.0	1982	56	1982	29	11	1982
Jun	#	1983	2	#	1983	24	1982	1	2	1982
Jul	.0	0	0	.0	0	0	0	0	0	0
Aug	6.0	1992	23	6.0	1992	2	1992	23	#	1992
Sep	10.0	2000	21	15.0	2000	14	2000	22	1+	2000
Oct	24.0	1972	29	31.0	1985	25	1985	8	3	1998
Nov	18.0	1978	9	33.0	1983	23	1975	30	8	1978
Dec	12.0	1971	6	35.0	1978	32	1989	20	15	1983
Ann	48.0	May 1982	29	74.0	May 1982	56	May 1982	29	22	Apr 1997

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	7.0	6.9	2.7	1.3	.3
Feb	4.9	4.7	1.6	.8	.1
Mar	5.7	5.6	3.1	1.3	.5
Apr	4.2	4.2	2.1	1.0	.3
May	1.2	1.2	.5	.4	.2
Jun	.0	.0	.0	.0	.0
Jul	.0	.0	.0	.0	.0
Aug	@	@	@	@	.0
Sep	.5	.5	.3	.1	@
Oct	2.0	2.0	1.2	.8	.3
Nov	4.5	4.4	1.9	.9	.2
Dec	6.9	6.8	2.9	1.3	.2
Ann	36.9	36.3	16.3	7.9	2.1

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	17.4	14.9	11.6	4.8
Feb	14.6	11.9	8.4	2.7
Mar	10.7	7.6	5.3	2.3
Apr	6.0	4.9	3.6	1.8
May	1.5	.9	.6	.3
Jun	.1	.1	.1	.1
Jul	.0	.0	.0	.0
Aug	@	.0	.0	.0
Sep	.7	.4	.1	.1
Oct	2.8	2.0	1.1	.4
Nov	6.2	3.7	2.7	1.3
Dec	15.4	10.4	6.9	3.0
Ann	75.4	56.8	40.4	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	7/10	7/02	6/27	6/22	6/18	6/13	6/09	6/03	5/27
32	6/17	6/09	6/04	5/31	5/27	5/22	5/18	5/13	5/06
28	5/22	5/17	5/14	5/11	5/08	5/05	5/02	4/28	4/23
24	5/08	5/02	4/28	4/25	4/22	4/19	4/15	4/11	4/06
20	4/28	4/22	4/18	4/15	4/11	4/08	4/05	4/01	3/26
16	4/19	4/14	4/10	4/06	4/03	3/31	3/27	3/23	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	8/16	8/22	8/27	8/30	9/03	9/07	9/10	9/15	9/21
32	9/05	9/09	9/12	9/15	9/18	9/20	9/23	9/26	10/01
28	9/12	9/17	9/22	9/25	9/29	10/02	10/06	10/10	10/16
24	9/21	9/26	10/01	10/04	10/08	10/11	10/15	10/19	10/25
20	9/29	10/05	10/10	10/14	10/17	10/21	10/25	10/30	11/05
16	10/05	10/13	10/19	10/24	10/28	11/02	11/07	11/13	11/21

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	105	95	88	82	77	71	65	58	48
32	139	130	124	118	113	108	103	96	88
28	168	160	154	148	143	138	133	127	118
24	195	186	179	173	168	163	157	151	142
20	212	204	198	193	188	184	179	173	165
16	234	225	219	213	208	202	197	190	181

***** 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	1274	1026	946	667	442	224	113	131	323	594	942	1184	7866
60	1119	886	791	521	296	124	46	63	213	440	798	1030	6327
57	1039	806	698	437	216	78	23	37	158	350	714	947	5503
55	980	754	638	382	170	54	14	25	127	293	657	888	4982
50	836	624	495	258	81	16	2	8	63	167	522	744	3816
32	401	242	114	23	0	0	0	0	0	5	168	320	1273

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	150	139	191	346	582	794	1010	1006	701	434	216	159	5728
55	17	8	2	15	39	157	311	318	138	9	15	14	1043
57	14	3	0	10	23	122	258	267	109	4	11	11	832
60	0	0	0	4	10	77	188	201	74	1	5	0	560
65	0	0	0	0	1	28	100	114	33	0	0	0	276
70	0	0	0	0	0	8	38	50	13	0	0	0	109

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	19	31	60	156	355	555	763	766	464	244	55	30	19	50	110	266	621	1176	1939	2705	3169	3413	3468	3498
45	2	6	23	82	224	407	608	612	330	143	26	4	2	8	31	113	337	744	1352	1964	2294	2437	2463	2467
50	0	0	3	31	116	266	454	460	209	72	10	0	0	0	3	34	150	416	870	1330	1539	1611	1621	1621
55	0	0	0	9	50	147	304	310	113	30	2	0	0	0	0	9	59	206	510	820	933	963	965	965
60	0	0	0	1	16	65	167	180	51	8	0	0	0	0	0	1	17	82	249	429	480	488	488	488
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	6	15	43	104	222	338	483	487	295	164	29	9	6	21	64	168	390	728	1211	1698	1993	2157	2186	2195

(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