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: TOWNSEND, MT **COOP ID: 248324**

Climate Division: MT 4 **NWS Call Sign:** **Elevation: 3,840 Feet** **Lat: 46˚20N** **Lon: 111˚32W**

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	34.5	12.6	23.6	64	1992	31	32.0	1994	-39+	1957	27	5.8	1979	1286	0	.0	.0	3.4	12.1	29.2	7.8
Feb	41.1	16.9	29.0	72	1995	24	38.1	1991	-38+	1996	2	8.2	1989	1008	0	.0	.0	7.3	6.3	25.9	3.9
Mar	50.3	24.3	37.3	77+	1994	15	44.3	1986	-26+	1955	25	29.2	1996	858	0	.0	.0	16.0	2.0	26.7	.8
Apr	59.9	31.3	45.6	88	1992	29	51.7	1980	6+	1997	6	37.0	1975	582	0	.0	.0	24.4	.2	17.0	.0
May	68.2	39.3	53.8	94	1954	20	57.6	1993	13	1954	2	49.4+	1996	352	2	.0	.2	30.0	.0	4.7	.0
Jun	75.8	46.6	61.2	100	1990	30	68.7	1988	19	1950	3	56.3	1998	156	41	@	1.9	30.0	.0	.3	.0
Jul	82.5	50.8	66.7	100	1951	19	71.1	1989	34+	1982	17	58.0	1993	70	121	.0	5.2	31.0	.0	.0	.0
Aug	82.4	49.0	65.7	105	1961	6	71.4	1971	25	1992	25	60.9	1980	80	102	.0	4.9	31.0	.0	.1	.0
Sep	72.4	40.2	56.3	99	1981	10	62.2	1998	12	1950	30	50.1	1985	279	19	.0	1.0	29.0	.0	4.5	.0
Oct	61.0	31.7	46.4	89	1963	1	50.8	1988	-11	1991	30	40.9	1984	577	0	.0	.0	26.0	.4	17.4	@
Nov	44.7	22.2	33.5	75+	1999	6	43.1	1999	-29	1959	15	17.3	1985	947	0	.0	.0	10.2	4.4	25.0	1.8
Dec	35.6	13.7	24.7	67	1957	10	36.4	1979	-37+	1990	22	9.1	1983	1251	0	.0	.0	3.4	11.6	28.8	5.8
Ann	59.0	31.6	45.3	105	Aug 1961	6	71.4	Aug 1971	-39+	Jan 1957	27	5.8	Jan 1979	7446	285	@	13.2	241.7	37.0	179.6	20.1

\+ 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: 1948-2001

(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	.35	.26	.67	1954	19	1.14	1975	.04	1987
Feb	.23	.20	.47	1970	28	.81	1986	.00	1991
Mar	.54	.46	.75	1972	19	1.29	1979	.04	1997
Apr	.71	.63	1.30	1951	30	1.66	1975	.20+	1987
May	1.73	1.51	1.72	1980	10	4.91	1980	.49	1983
Jun	2.03	1.82	2.10	1979	19	4.66	1997	.32	1974
Jul	1.36	.95	1.82	1983	10	4.70	1983	.07	1991
Aug	1.36	1.35	1.55	1979	25	2.89	1974	.12	1994
Sep	1.01	.73	1.26	1977	30	3.07	1976	.02	1990
Oct	.60	.45	1.11	1962	15	2.21	1975	.00+	1987
Nov	.40	.31	.75	1973	1	1.98	1973	.02	1999
Dec	.35	.26	.44	1996	25	1.31	1971	.08+	1999
Ann	10.67	9.85	2.10	Jun 1979	19	4.91	May 1980	.00+	Feb 1991

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	4.0	1.2	@	.0
Feb	2.9	.4	.0	.0
Mar	4.8	1.8	.2	.0
Apr	5.9	2.5	.1	@
May	10.1	5.4	.7	.1
Jun	11.3	6.1	.6	.2
Jul	8.1	3.8	.7	.1
Aug	7.7	4.0	.5	.1
Sep	6.4	3.2	.3	@
Oct	4.2	2.0	.2	.0
Nov	4.0	1.2	@	.0
Dec	4.4	1.0	.0	.0
Ann	73.8	32.6	3.3	.5

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	.06	.11	.16	.21	.27	.34	.43	.55	.74	.93
Feb	.00	.02	.05	.08	.11	.16	.21	.27	.37	.53	.68
Mar	.08	.12	.20	.27	.35	.44	.54	.67	.83	1.10	1.37
Apr	.19	.26	.36	.45	.54	.63	.73	.86	1.02	1.27	1.50
May	.64	.81	1.04	1.23	1.42	1.61	1.81	2.05	2.35	2.82	3.24
Jun	.56	.75	1.05	1.30	1.55	1.81	2.10	2.44	2.88	3.58	4.22
Jul	.12	.21	.39	.58	.78	1.02	1.30	1.65	2.14	2.95	3.75
Aug	.28	.40	.60	.78	.97	1.16	1.38	1.65	2.01	2.57	3.11
Sep	.09	.16	.30	.44	.59	.77	.97	1.23	1.59	2.18	2.76
Oct	.00	.05	.14	.24	.34	.45	.58	.74	.97	1.34	1.71
Nov	.04	.07	.13	.19	.25	.31	.39	.49	.62	.84	1.06
Dec	.06	.10	.15	.19	.24	.29	.35	.42	.52	.67	.81
Ann	6.56	7.31	8.29	9.05	9.74	10.42	11.12	11.91	12.88	14.31	15.57

\+ 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: 1948-2001
(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	5.1	2.7	1	1
Feb	2.7	1.0	1	#
Mar	3.8	2.0	#	#
Apr	1.3	1.0	#	0
May	.1	.0	#	0
Jun	.0	.0	0	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	.1	.0	0	0
Oct	.9	.0	#	0
Nov	2.9	1.9	1	#
Dec	4.6	3.6	1	1
Ann	21.5	12.2	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	11.0	1975	26	19.0	1978	6	1989	24	3	1993
Feb	5.5	1980	29	9.6	1989	6	1988	10	5	1993
Mar	8.0	1989	17	14.0	1989	8	1989	17	3	1989
Apr	5.5	1995	10	6.5	1995	2	1986	12	#+	2000
May	1.5	1989	29	1.5	1989	#+	1997	2	#+	1997
Jun	.0	0	0	.0	0	0	0	0	0	0
Jul	.0	0	0	.0	0	0	0	0	0	0
Aug	.3	1992	23	.3	1992	0	0	0	0	0
Sep	1.0	1983	19	1.0	1983	0	0	0	0	0
Oct	7.0	1991	26	10.5	1991	7	1991	26	1	1991
Nov	8.0	1973	1	11.2	1996	7	1996	25	3	1996
Dec	4.0	1978	2	15.0	1996	11	1996	29	4	1996
Ann	11.0	Jan 1975	26	19.0	Jan 1978	11	Dec 1996	29	5	Feb 1993

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	4.0	1.8	.4	.1	@
Feb	2.5	1.0	.3	@	.0
Mar	2.6	1.2	.2	.1	.0
Apr	.9	.5	@	@	.0
May	.1	@	.0	.0	.0
Jun	.0	.0	.0	.0	.0
Jul	.0	.0	.0	.0	.0
Aug	@	.0	.0	.0	.0
Sep	.1	@	.0	.0	.0
Oct	.6	.3	.1	@	.0
Nov	2.5	1.1	.3	.1	.0
Dec	4.2	1.4	.4	.0	.0
Ann	17.5	7.3	1.7	.3	@

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	13.1	3.8	.2	.0
Feb	5.9	2.1	.8	.0
Mar	3.0	.9	.4	.0
Apr	.2	.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	.5	.3	.2	.0
Nov	5.1	2.3	.7	.0
Dec	12.7	5.8	1.0	.1
Ann	40.5	15.2	3.3	.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	7/06	6/28	6/23	6/18	6/14	6/10	6/05	5/31	5/23
32	6/09	6/03	5/30	5/27	5/23	5/20	5/17	5/13	5/07
28	5/27	5/21	5/17	5/13	5/09	5/06	5/02	4/28	4/22
24	5/10	5/05	5/01	4/29	4/26	4/23	4/20	4/17	4/12
20	4/30	4/24	4/21	4/17	4/14	4/11	4/08	4/04	3/30
16	4/17	4/10	4/05	4/01	3/28	3/24	3/20	3/15	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	8/22	8/27	8/30	9/02	9/05	9/08	9/10	9/14	9/19
32	9/04	9/08	9/11	9/13	9/16	9/18	9/20	9/23	9/27
28	9/11	9/16	9/19	9/22	9/25	9/27	9/30	10/04	10/08
24	9/22	9/26	9/30	10/03	10/05	10/08	10/11	10/14	10/19
20	10/01	10/06	10/09	10/12	10/15	10/18	10/21	10/25	10/30
16	10/10	10/17	10/21	10/25	10/28	11/01	11/05	11/09	11/15

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	104	97	91	87	82	78	73	68	60
32	132	126	122	118	114	111	107	102	96
28	163	154	148	143	138	133	127	121	112
24	186	177	172	167	162	157	152	146	138
20	207	199	193	188	183	178	173	168	159
16	240	231	224	219	214	208	203	196	187

***** 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	1286	1008	858	582	352	156	70	80	279	577	947	1251	7446
60	1131	868	703	435	213	71	21	27	165	423	797	1096	5950
57	1038	789	610	350	143	37	9	12	111	331	714	1003	5147
55	976	737	549	296	106	21	4	6	81	271	658	943	4648
50	824	606	402	179	39	4	0	1	28	142	520	797	3542
32	344	231	55	4	0	0	0	0	0	3	159	336	1132

Base	Cooling Degree Days (1)												
Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	81	147	219	412	674	875	1074	1046	729	448	202	108	6015
55	0	9	1	15	66	206	366	338	120	4	11	2	1138
57	0	5	0	8	42	162	309	283	90	1	7	0	907
60	0	0	0	3	18	106	228	204	55	0	0	0	614
65	0	0	0	0	2	41	121	102	19	0	0	0	285
70	0	0	0	0	0	11	49	36	5	0	0	0	101

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	7	21	66	191	422	635	827	803	490	227	49	10	7	28	94	285	707	1342	2169	2972	3462	3689	3738	3748
45	0	4	23	101	278	485	672	648	345	120	15	0	0	4	27	128	406	891	1563	2211	2556	2676	2691	2691
50	0	0	5	43	159	337	517	493	222	52	5	0	0	0	5	48	207	544	1061	1554	1776	1828	1833	1833
55	0	0	0	14	71	204	365	344	114	16	0	0	0	0	0	14	85	289	654	998	1112	1128	1128	1128
60	0	0	0	2	23	100	221	201	44	1	0	0	0	0	0	2	25	125	346	547	591	592	592	592
Base	Growing Degree Units for Corn (Monthly)												Growing Degree Units for Corn (Accumulated Monthly)											
50/86	2	20	72	160	283	395	524	516	339	190	38	6	2	22	94	254	537	932	1456	1972	2311	2501	2539	2545

(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

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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