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: BALLANTINE, MT **COOP ID: 240432**

Climate Division: MT 5 **NWS Call Sign:** **Elevation: 3,000 Feet** **Lat: 45˚57N** **Lon: 108˚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	33.7	7.0	20.4	69	1931	29	33.4	1986	-41	1937	7	3.2	1979	1384	0	.0	.0	3.6	11.6	30.0	8.3
Feb	41.2	13.3	27.3	77	1934	13	38.6	1991	-50	1936	15	12.3	1989	1057	0	.0	.0	9.1	6.5	27.0	4.8
Mar	50.8	21.8	36.3	86	1978	30	45.0	1986	-35	1932	8	27.1	1996	891	0	.0	.0	17.9	2.6	27.0	1.4
Apr	61.2	31.2	46.2	94	1936	19	52.4	1987	-10	1936	2	37.3	1975	564	0	.0	.2	24.4	.7	15.0	.0
May	70.7	40.8	55.8	104	1936	26	60.9	1988	12	1954	3	50.9	1996	301	14	@	1.0	29.5	.0	2.5	.0
Jun	81.3	49.4	65.4	107	1919	28	75.4	1988	30+	1950	8	59.9	1998	97	107	.7	5.8	29.9	.0	.0	.0
Jul	89.2	53.7	71.5	110+	1936	5	75.4	1998	37	1972	4	62.8	1993	23	223	2.3	16.0	31.0	.0	.0	.0
Aug	88.6	51.8	70.2	108	1961	5	76.8	1971	35+	1965	30	64.8	1974	47	207	1.1	13.6	31.0	.0	.1	.0
Sep	76.8	41.0	58.9	104	1983	2	67.2	1998	19+	1985	30	53.0	1985	225	42	.1	3.2	29.2	@	2.4	.0
Oct	64.1	30.6	47.4	93	1963	4	51.5	1979	-13	1925	28	43.1	1984	548	0	.0	.2	27.1	.4	14.9	@
Nov	46.4	18.4	32.4	77+	1980	5	43.2	1999	-31	1959	16	15.4	1985	978	0	.0	.0	12.3	4.5	27.7	1.7
Dec	36.5	9.5	23.0	70+	1957	9	34.5	1999	-44	1983	24	3.6	1983	1301	0	.0	.0	4.5	9.5	30.0	6.0
Ann	61.7	30.7	46.2	110+	Jul 1936	5	76.8	Aug 1971	-50	Feb 1936	15	3.2	Jan 1979	7416	593	4.2	40.0	249.5	35.8	176.6	22.2

\+ 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: 1919-2001

(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	.60	.51	.78	1928	13	1.68	1978	.09	1987
Feb	.46	.30	1.30	2000	25	2.30	2000	.02	1974
Mar	.84	.69	1.01	1946	21	2.00	1985	.32	1978
Apr	1.61	1.38	1.48	1964	25	3.81	1991	.14	1983
May	2.37	1.99	2.14	1978	18	6.47	1981	.79	1984
Jun	2.07	1.76	3.15	1968	9	6.19	1982	.62	1972
Jul	1.20	.88	1.27	1968	26	4.50	1993	.07	1988
Aug	1.06	.78	1.55	1967	30	3.21	1972	.20	2000
Sep	1.44	1.36	2.88	1941	7	4.32	1978	.08+	1990
Oct	1.21	1.16	1.72	1974	31	3.41	1971	.05	1987
Nov	.70	.62	1.30	1968	4	1.97	1978	.13	1987
Dec	.59	.45	.58	1944	20	1.83	1989	.07	1986
Ann	14.15	14.04	3.15	Jun 1968	9	6.47	May 1981	.02	Feb 1974

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	6.1	1.9	.1	.0
Feb	4.9	1.7	.1	@
Mar	6.8	3.1	.3	.0
Apr	9.5	4.7	.8	.1
May	11.8	5.8	1.3	.2
Jun	12.5	5.8	1.2	.3
Jul	8.6	3.4	.6	.1
Aug	7.2	2.6	.5	.1
Sep	7.9	3.6	.7	.2
Oct	7.5	3.4	.7	.2
Nov	6.4	2.2	.1	.0
Dec	5.8	2.2	@	.0
Ann	95.0	40.4	6.4	1.2

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	.13	.18	.27	.35	.43	.51	.61	.72	.87	1.12	1.34
Feb	.03	.06	.12	.18	.25	.34	.43	.56	.73	1.02	1.30
Mar	.30	.38	.49	.58	.68	.77	.87	.99	1.14	1.38	1.59
Apr	.27	.41	.64	.86	1.09	1.34	1.62	1.96	2.41	3.15	3.86
May	.74	.97	1.30	1.59	1.86	2.15	2.47	2.84	3.31	4.06	4.74
Jun	.70	.90	1.18	1.42	1.66	1.90	2.16	2.46	2.86	3.47	4.03
Jul	.20	.31	.48	.64	.81	1.00	1.21	1.46	1.80	2.35	2.88
Aug	.17	.26	.41	.55	.71	.87	1.06	1.29	1.60	2.11	2.59
Sep	.25	.37	.58	.78	.98	1.20	1.45	1.75	2.16	2.81	3.43
Oct	.21	.31	.49	.66	.83	1.01	1.22	1.48	1.82	2.37	2.89
Nov	.19	.25	.35	.44	.53	.62	.72	.84	1.00	1.25	1.48
Dec	.10	.15	.23	.31	.40	.49	.59	.71	.88	1.15	1.41
Ann	9.20	10.12	11.31	12.23	13.06	13.86	14.70	15.63	16.77	18.44	19.90

+ 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: 1919-2001
(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	6.0	-99.9	6	3
Feb	2.7	-99.9	6	6
Mar	5.5	-99.9	#	#
Apr	2.0	-99.9	#	0
May	#	.0	#	0
Jun	.0	.0	0	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	.0	.0	#	0
Oct	.0	-99.9	#	0
Nov	1.7	-99.9	1	1
Dec	6.7	-99.9	2	1
Ann	24.6	-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	8.0	1971	9	24.0	1989	14	1972	18	14	1972
Feb	9.0	2000	25	13.3	2000	11	1971	3	9	1971
Mar	9.0	1989	1	27.6	1989	2+	2000	8	#+	2000
Apr	6.0	1990	28	6.0	1990	14	1975	9	2	1975
May	#	2000	12	#	2000	#	2000	12	#	2000
Jun	.0	0	0	.0	0	0	0	0	0	0
Jul	.0	0	0	.0	0	0	0	0	0	0
Aug	.0	0	0	.0	0	0	0	0	0	0
Sep	.0	0	0	.0	0	1	1972	25	#	1972
Oct	.1	1987	8	.1	1987	1+	1972	28	#+	1972
Nov	3.5	2000	16	5.0	1988	7	1975	30	2	2000
Dec	8.0	1989	19	33.5	1989	10	1975	11	9	1975
Ann	9.0+	Feb 2000	25	33.5	Dec 1989	14+	Apr 1975	9	14	Jan 1972

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	-9.9	-9.9	-9.9	-9.9	-9.9
Feb	-9.9	-9.9	-9.9	-9.9	-9.9
Mar	-9.9	-9.9	-9.9	-9.9	-9.9
Apr	-9.9	-9.9	-9.9	-9.9	-9.9
May	-9.9	-9.9	-9.9	-9.9	-9.9
Jun	-9.9	-9.9	-9.9	-9.9	-9.9
Jul	-9.9	-9.9	-9.9	-9.9	-9.9
Aug	-9.9	-9.9	-9.9	-9.9	-9.9
Sep	-9.9	-9.9	-9.9	-9.9	-9.9
Oct	-9.9	-9.9	-9.9	-9.9	-9.9
Nov	-9.9	-9.9	-9.9	-9.9	-9.9
Dec	-9.9	-9.9	-9.9	-9.9	-9.9
Ann	-9.9	-9.9	-9.9	-9.9	-9.9

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	-9.9	-9.9	-9.9	-9.9
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	.0	.0	.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	6/05	5/30	5/27	5/24	5/21	5/18	5/15	5/11	5/06
32	5/23	5/18	5/15	5/12	5/10	5/07	5/04	5/01	4/27
28	5/14	5/08	5/04	5/01	4/28	4/25	4/21	4/17	4/12
24	4/27	4/22	4/19	4/16	4/13	4/10	4/07	4/03	3/30
20	4/20	4/15	4/11	4/08	4/05	4/02	3/30	3/26	3/21
16	4/13	4/06	4/01	3/27	3/24	3/20	3/15	3/10	3/03

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	9/05	9/09	9/12	9/14	9/16	9/18	9/20	9/23	9/26
32	9/09	9/13	9/17	9/19	9/22	9/24	9/27	9/30	10/05
28	9/20	9/25	9/29	10/02	10/05	10/08	10/11	10/14	10/19
24	10/03	10/08	10/11	10/15	10/18	10/21	10/24	10/27	11/02
20	10/10	10/15	10/19	10/22	10/25	10/29	11/01	11/05	11/10
16	10/27	10/31	11/02	11/05	11/07	11/10	11/12	11/15	11/19

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	137	130	126	121	118	114	109	105	98
32	153	146	142	138	134	131	127	123	116
28	179	172	167	163	159	155	151	146	139
24	208	201	196	191	187	183	179	174	166
20	226	218	212	208	203	198	194	188	180
16	249	242	237	232	228	224	219	214	207

***** 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	1384	1057	891	564	301	97	23	47	225	548	978	1301	7416
60	1229	923	736	419	178	39	6	16	126	393	828	1146	6039
57	1139	846	644	337	120	19	1	7	81	303	739	1053	5289
55	1080	793	584	285	89	11	0	4	57	245	686	993	4827
50	937	664	440	174	34	2	0	0	18	125	546	850	3790
32	466	291	84	5	0	0	0	0	0	2	171	383	1402

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	105	158	217	431	736	1000	1223	1183	807	478	183	105	6626
55	6	16	3	21	112	321	510	474	174	8	8	1	1654
57	3	12	1	13	81	269	448	415	138	3	1	0	1384
60	0	6	0	5	46	199	361	331	93	1	0	0	1042
65	0	0	0	0	14	107	223	207	42	0	0	0	593
70	0	0	0	0	2	45	119	113	15	0	0	0	294

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	2	26	90	244	508	772	1002	937	588	292	47	5	2	28	118	362	870	1642	2644	3581	4169	4461	4508	4513
45	0	3	37	139	362	622	847	782	447	175	15	0	0	3	40	179	541	1163	2010	2792	3239	3414	3429	3429
50	0	0	8	67	235	472	692	628	310	85	3	0	0	0	8	75	310	782	1474	2102	2412	2497	2500	2500
55	0	0	0	25	123	330	538	474	190	30	0	0	0	0	0	25	148	478	1016	1490	1680	1710	1710	1710
60	0	0	0	5	51	198	384	323	96	7	0	0	0	0	0	5	56	254	638	961	1057	1064	1064	1064
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	1	36	95	187	327	477	618	581	390	240	56	10	1	37	132	319	646	1123	1741	2322	2712	2952	3008	3018

(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:
www.ncdc.noaa.gov/oa/climate/normals/usnormals.html

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