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: FLATWILLOW 4 ENE, MT **COOP ID: 243013**

Climate Division: MT 4 **NWS Call Sign:** **Elevation: 3,138 Feet** **Lat: 46˚51N** **Lon: 108˚19W**

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	9.2	22.0	69	1931	29	36.4	1986	-42	1997	11	5.2	1979	1334	0	.0	.0	5.3	11.2	29.3	9.1
Feb	41.0	13.9	27.5	76+	1992	27	38.8	1991	-46+	1936	17	13.4	1989	1051	0	.0	.0	9.3	7.3	25.9	5.3
Mar	49.3	21.5	35.4	80	1978	30	44.6	1986	-30	1960	3	26.8	1996	918	0	.0	.0	16.4	3.2	26.4	1.3
Apr	59.8	29.8	44.8	91	1952	28	51.1	1987	-14	1940	11	35.9	1975	606	0	.0	@	24.3	.7	17.0	.1
May	69.4	38.6	54.0	98	1934	29	58.4	1985	8	1954	3	49.1	1974	346	5	.0	.7	29.8	@	4.9	.0
Jun	78.4	47.5	63.0	107	1936	27	73.0	1988	28	1969	13	58.1	1998	129	66	.2	3.5	30.0	.0	.2	.0
Jul	85.8	52.0	68.9	108+	1963	22	73.7	2000	34	1918	26	60.7	1993	47	167	.9	11.1	31.0	.0	.0	.0
Aug	85.7	50.7	68.2	108+	1961	5	74.8	1983	30	1992	25	62.1	1974	73	172	.4	11.5	31.0	.0	@	.0
Sep	74.5	41.2	57.9	104	1950	4	65.4	1998	8	1926	24	51.1	1985	256	40	.1	2.7	29.2	.0	2.9	.0
Oct	62.8	32.2	47.5	92+	1992	1	50.7	1974	-18	1925	28	41.8	1984	543	0	.0	.1	26.8	.4	13.6	.1
Nov	45.7	20.0	32.9	81	1917	2	43.3	1999	-29	1921	19	13.8	1985	964	0	.0	.0	13.6	5.0	25.2	2.1
Dec	37.1	11.5	24.3	70	1956	29	35.8	1999	-48	1924	18	5.3	1983	1261	0	.0	.0	6.6	9.5	29.0	6.1
Ann	60.4	30.7	45.5	108+	Jul 1963	22	74.8	Aug 1983	-48	Dec 1924	18	5.2	Jan 1979	7528	450	1.6	29.6	253.3	37.3	174.4	24.1

\+ 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: 1913-2001

(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	.57	.40	1.04	1996	27	2.22	1971	.03	1987
Feb	.34	.24	.60+	1978	12	1.48	1978	.00	1977
Mar	.70	.59	1.12	1942	14	1.53	1980	.15	1976
Apr	1.19	1.10	1.57	1970	28	3.55	1991	.13	1981
May	2.64	2.36	3.15+	1962	13	6.48	1981	.72	1992
Jun	2.32	1.94	2.65	1992	16	5.82	1992	.29	1985
Jul	1.46	1.30	1.69	1975	6	6.89	1993	.03	1984
Aug	1.25	1.15	1.62	1918	21	3.20	1985	.05	1996
Sep	.98	.72	2.05	1941	7	3.36	1986	.00	1990
Oct	.89	.92	1.90	1937	4	1.96	1980	.03	1987
Nov	.48	.51	.75	1978	12	1.51	1978	.03	1972
Dec	.48	.39	.83	1955	23	1.81	1989	.00	1991
Ann	13.30+	12.96+	3.15+	May 1962	13	6.89	Jul 1993	.00+	Dec 1991

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	5.4	2.0	.1	@
Feb	3.4	.9	.1	.0
Mar	6.1	2.5	.1	.0
Apr	7.0	4.0	.5	.0
May	10.2	5.9	1.5	.5
Jun	9.3	5.9	1.4	.3
Jul	6.6	3.8	.6	.3
Aug	6.1	3.2	.6	.1
Sep	5.0	2.8	.5	.2
Oct	4.8	2.5	.5	.1
Nov	4.7	2.0	.1	.0
Dec	4.6	1.7	@	.0
Ann	73.2	37.2	6.0	1.5

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	.08	.16	.23	.32	.42	.54	.69	.90	1.25	1.59
Feb	.01	.03	.08	.13	.18	.24	.32	.42	.56	.79	1.02
Mar	.19	.25	.36	.44	.53	.62	.72	.84	1.00	1.24	1.47
Apr	.23	.33	.51	.67	.83	1.01	1.21	1.45	1.77	2.28	2.76
May	.88	1.13	1.50	1.81	2.11	2.42	2.76	3.15	3.66	4.45	5.18
Jun	.67	.89	1.22	1.51	1.79	2.08	2.40	2.78	3.28	4.05	4.77
Jul	.14	.25	.45	.65	.87	1.12	1.41	1.78	2.28	3.12	3.93
Aug	.18	.28	.46	.64	.82	1.02	1.25	1.53	1.91	2.53	3.12
Sep	.04	.12	.26	.41	.56	.74	.95	1.21	1.56	2.16	2.75
Oct	.13	.21	.33	.46	.59	.73	.89	1.09	1.36	1.80	2.22
Nov	.05	.09	.15	.22	.29	.37	.46	.58	.74	1.01	1.27
Dec	.03	.08	.15	.22	.30	.38	.48	.60	.76	1.02	1.28
Ann	8.77	9.62	10.73	11.58	12.33	13.07	13.84	14.70	15.74	17.27	18.60

+ 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: 1913-2001
(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	6.4	4.0	3	1
Feb	4.0	2.5	2	#
Mar	5.2	3.5	1	#
Apr	3.0	1.0	#	#
May	.6	.0	#	0
Jun	.0	.0	0	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	.3	.0	#	0
Oct	2.0	.3	#	#
Nov	3.6	3.5	1	#
Dec	6.1	6.0	2	1
Ann	31.2	20.8	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	6.0	1989	23	21.0	1989	25	1978	31	18	1978
Feb	6.0	1978	12	15.0	1979	23	1978	12	23	1978
Mar	7.0	1985	2	19.0	1985	14	1985	3	7	1985
Apr	10.0	1973	20	14.0	1973	11	1973	20	1	1997
May	4.0	1983	11	9.0	1983	8	1983	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	3.0	1983	19	3.5	1984	5	1984	24	#+	2000
Oct	10.0	1980	16	16.0	1980	12	1985	8	1	1985
Nov	8.0	1978	12	9.0	1976	13	1985	30	6	1985
Dec	10.0	1984	23	17.5	1977	18	1989	20	8	1985
Ann	10.0+	Dec 1984	23	21.0	Jan 1989	25	Jan 1978	31	23	Feb 1978

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	3.9	3.3	.8	.2	.0
Feb	2.4	1.9	.4	.2	.0
Mar	3.0	2.4	.6	.1	.0
Apr	1.2	1.0	.4	.1	@
May	.3	.3	.1	.0	.0
Jun	.0	.0	.0	.0	.0
Jul	.0	.0	.0	.0	.0
Aug	.0	.0	.0	.0	.0
Sep	.2	.1	@	.0	.0
Oct	.8	.6	.2	.1	.1
Nov	2.3	1.9	.5	.1	.0
Dec	3.4	3.0	.6	.2	@
Ann	17.5	14.5	3.6	1.0	.1

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	-9.9	-9.9	-9.9	-9.9
Feb	.8	.1	.0	.0
Mar	2.7	.8	.2	.0
Apr	1.0	.5	.2	.0
May	.1	.1	@	.0
Jun	.0	.0	.0	.0
Jul	.0	.0	.0	.0
Aug	.0	.0	.0	.0
Sep	.1	.0	.0	.0
Oct	.6	.3	.1	.1
Nov	2.4	.8	.3	.0
Dec	4.2	2.2	.8	.6
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

Complete documentation available from:
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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	6/26	6/19	6/15	6/11	6/07	6/03	5/30	5/25	5/19
32	6/05	5/31	5/27	5/24	5/21	5/18	5/15	5/11	5/06
28	5/22	5/17	5/14	5/11	5/08	5/06	5/03	4/29	4/25
24	5/08	5/04	4/30	4/27	4/24	4/22	4/19	4/15	4/11
20	4/29	4/24	4/20	4/17	4/14	4/11	4/08	4/04	3/30
16	4/19	4/13	4/10	4/06	4/03	3/31	3/28	3/25	3/19

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	8/27	8/31	9/03	9/06	9/09	9/12	9/14	9/18	9/22
32	9/07	9/12	9/15	9/18	9/20	9/23	9/26	9/29	10/04
28	9/16	9/20	9/24	9/26	9/29	10/02	10/05	10/08	10/13
24	9/22	9/28	10/02	10/06	10/09	10/13	10/16	10/20	10/26
20	9/28	10/05	10/10	10/14	10/18	10/22	10/26	10/31	11/06
16	10/13	10/20	10/24	10/29	11/02	11/06	11/10	11/15	11/22

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	116	108	103	98	93	89	84	79	71
32	145	137	131	126	122	117	113	107	99
28	163	156	151	147	143	139	135	130	123
24	188	181	176	171	167	163	158	153	146
20	213	204	197	191	186	181	175	168	159
16	241	231	224	217	211	206	199	192	182

***** 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	1334	1051	918	606	346	129	47	73	256	543	964	1261	7528
60	1182	918	763	459	211	56	14	29	153	389	814	1106	6094
57	1096	839	670	374	144	28	6	16	104	299	733	1015	5324
55	1040	786	609	321	107	17	1	9	77	241	676	962	4846
50	895	657	463	201	42	3	0	2	29	121	538	815	3766
32	444	285	90	8	0	0	0	0	0	2	175	366	1370

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	133	159	195	392	682	927	1143	1122	774	482	200	128	6337
55	16	15	1	15	76	254	431	418	161	8	12	11	1418
57	10	12	0	9	51	205	374	363	129	3	9	2	1167
60	3	7	0	3	25	143	288	283	87	1	0	0	840
65	0	0	0	0	5	66	167	172	40	0	0	0	450
70	0	0	0	0	0	22	82	91	15	0	0	0	210

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	16	31	77	217	465	718	920	904	567	300	61	18	16	47	124	341	806	1524	2444	3348	3915	4215	4276	4294
45	3	7	30	118	318	568	765	749	422	176	26	4	3	10	40	158	476	1044	1809	2558	2980	3156	3182	3186
50	0	2	5	55	192	418	610	594	286	91	8	0	0	2	7	62	254	672	1282	1876	2162	2253	2261	2261
55	0	0	0	16	94	273	455	440	172	42	0	0	0	0	0	16	110	383	838	1278	1450	1492	1492	1492
60	0	0	0	2	36	149	304	289	88	10	0	0	0	0	0	2	38	187	491	780	868	878	878	878
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	15	39	81	180	311	445	580	570	379	222	60	23	15	54	135	315	626	1071	1651	2221	2600	2822	2882	2905

(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