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: WILSALL 8 ENE, MT **COOP ID: 249023**

Climate Division: MT 5 **NWS Call Sign:** **Elevation: 5,835 Feet** **Lat: 46˚02N** **Lon: 110˚31W**

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	33.8	12.6	23.2	61	1981	22	33.4	1981	-35+	1997	13	10.1	1979	1295	0	.0	.0	1.4	12.8	30.1	6.3
Feb	37.7	15.6	26.7	62	1981	19	35.0	1991	-42	1989	3	11.9	1989	1074	0	.0	.0	3.1	7.5	27.0	3.4
Mar	43.6	20.5	32.1	70	1994	15	39.1	1986	-24	1960	2	25.7	1975	1022	0	.0	.0	8.2	3.9	28.0	1.5
Apr	52.0	26.8	39.4	79+	1987	28	47.4	1987	-10	1975	1	29.9	1975	768	0	.0	.0	16.3	1.0	23.2	.1
May	61.4	34.4	47.9	83+	1986	31	51.9	1994	13	1972	1	43.2	1975	531	0	.0	.0	26.7	@	11.7	.0
Jun	70.7	40.8	55.8	92	1990	30	63.6	1988	21	1969	14	50.2	1998	287	9	.0	.1	29.6	.0	1.9	.0
Jul	79.0	44.9	62.0	99	2000	30	66.2	1985	30	1981	8	52.9	1993	150	55	.0	1.3	30.9	.0	.1	.0
Aug	79.1	44.0	61.6	96	1961	5	67.8	1971	26	1992	26	55.6	1993	163	56	.0	1.0	30.9	.0	.3	.0
Sep	68.2	36.5	52.4	92	1998	4	59.8	1998	10	1985	29	45.4	1985	390	10	.0	.2	28.0	.1	6.4	.0
Oct	56.5	29.3	42.9	83	1992	1	48.5	1988	-11	1991	30	37.3	1984	685	0	.0	.0	22.3	.9	18.7	.1
Nov	40.7	20.1	30.4	70+	1999	15	41.8	1999	-31	1959	13	13.9	1985	1038	0	.0	.0	6.7	6.6	26.0	2.0
Dec	34.5	14.0	24.3	59	1990	9	31.0	1980	-41	1983	24	10.8	1983	1263	0	.0	.0	1.8	11.8	29.6	4.5
Ann	54.8	28.3	41.6	99	Jul 2000	30	67.8	Aug 1971	-42	Feb 1989	3	10.1	Jan 1979	8666	130	.0	2.6	205.9	44.6	203.0	17.9

\+ 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: 1957-2001

(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	.93	.86	.88	1980	10	2.17	1996	.16	1987
Feb	.75	.73	.77	1982	21	1.73	1986	.12	1995
Mar	1.51	1.38	1.90	1980	30	3.46	1980	.35	1976
Apr	2.10	2.01	1.61	1993	11	4.28	1993	.37	1985
May	3.46	3.63	2.32	1987	27	6.47	1981	.77	1973
Jun	3.27	3.17	2.82	1969	25	6.66	1992	.93	1974
Jul	2.00	1.79	2.01	1993	3	7.19	1993	.12	1971
Aug	1.74	1.70	2.03	1974	20	3.99	1974	.00	1996
Sep	1.83	1.83	2.37	1978	12	5.49	1978	.20	1979
Oct	1.40	1.18	1.95	1992	4	4.11	1975	.00	1987
Nov	1.07	1.05	.70	1973	1	2.21	1978	.35	1979
Dec	.90	.77	.69	1988	6	2.29	1996	.24	1986
Ann	20.96	19.90	2.82	Jun 1969	25	7.19	Jul 1993	.00+	Aug 1996

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	6.2	3.3	.2	.0
Feb	5.6	2.8	.1	.0
Mar	8.0	5.2	.5	.1
Apr	9.2	6.8	1.0	.1
May	11.3	8.7	2.1	.4
Jun	10.4	8.2	1.8	.4
Jul	7.7	5.8	.9	.1
Aug	7.2	4.7	.8	.2
Sep	6.6	5.1	1.0	.2
Oct	5.6	4.2	.6	.1
Nov	6.0	4.2	.2	.0
Dec	6.0	3.5	.2	.0
Ann	89.8	62.5	9.4	1.6

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	.24	.33	.46	.58	.70	.82	.96	1.12	1.34	1.67	1.99
Feb	.23	.30	.41	.50	.59	.68	.78	.89	1.05	1.28	1.50
Mar	.52	.66	.87	1.04	1.21	1.39	1.58	1.80	2.09	2.53	2.93
Apr	.66	.86	1.15	1.41	1.65	1.91	2.19	2.51	2.93	3.59	4.20
May	1.32	1.65	2.11	2.49	2.85	3.22	3.63	4.09	4.68	5.59	6.42
Jun	1.09	1.40	1.86	2.24	2.61	2.99	3.41	3.90	4.53	5.50	6.40
Jul	.31	.48	.77	1.04	1.33	1.64	2.00	2.44	3.03	3.98	4.90
Aug	.28	.51	.81	1.05	1.28	1.53	1.81	2.14	2.57	3.24	3.88
Sep	.39	.56	.83	1.07	1.32	1.57	1.87	2.22	2.68	3.41	4.11
Oct	.19	.37	.61	.81	1.00	1.21	1.44	1.72	2.09	2.66	3.21
Nov	.39	.49	.63	.75	.87	.99	1.12	1.27	1.46	1.75	2.02
Dec	.26	.35	.48	.59	.70	.81	.93	1.08	1.27	1.57	1.85
Ann	14.31	15.58	17.21	18.46	19.57	20.65	21.77	23.01	24.52	26.72	28.63

\+ 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: 1957-2001
(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	14.1	13.0	11	9
Feb	11.2	12.0	13	12
Mar	18.9	16.3	10	7
Apr	14.0	12.0	4	#
May	5.9	3.0	#	#
Jun	.3	.0	#	0
Jul	.0	.0	0	0
Aug	.1	.0	0	0
Sep	2.3	.0	#	0
Oct	5.3	4.0	#	#
Nov	11.5	10.5	2	1
Dec	13.3	12.0	7	5
Ann	96.9	82.8	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	12.0	1975	26	29.7	1997	34	1997	11	27	1997
Feb	10.0	1973	6	22.0	1979	32+	1997	28	29	1997
Mar	16.0	1977	29	41.0+	1995	42	1989	3	31	1989
Apr	18.0	1993	11	47.0	1982	32	1975	9	23	1975
May	16.0	1983	12	28.0	1975	24	1975	7	7	1975
Jun	4.0	1981	14	4.0	1981	3	1973	2	#+	1998
Jul	.0	0	0	.0	0	0	0	0	0	0
Aug	2.0	1992	25	2.0	1992	0	0	0	0	0
Sep	12.0	1978	12	27.0	1978	12	1978	12	1	1983
Oct	10.0	1975	13	31.5	1975	8	1994	16	2	1975
Nov	14.0	1973	1	32.5	1978	18	1975	30	6	1996
Dec	13.0	1996	25	30.0	1977	36	1996	28	19	1996
Ann	18.0	Apr 1993	11	47.0	Apr 1982	42	Mar 1989	3	31	Mar 1989

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	5.6	5.4	2.5	.8	.1
Feb	4.7	4.6	1.9	.6	@
Mar	5.9	5.7	2.5	1.0	.3
Apr	4.1	4.0	2.1	.9	.2
May	1.3	1.3	.9	.5	.2
Jun	.1	.1	.1	.0	.0
Jul	.0	.0	.0	.0	.0
Aug	@	@	.0	.0	.0
Sep	.7	.6	.3	.1	.1
Oct	1.8	1.8	.8	.2	.1
Nov	3.8	3.6	1.7	.6	@
Dec	4.9	4.7	2.0	.8	.1
Ann	32.9	31.8	14.8	5.5	1.1

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	12.3	11.1	9.9	5.5
Apr	2.6	2.2	1.1	.5
May	.7	.5	.3	.1
Jun	.1	@	.0	.0
Jul	.0	.0	.0	.0
Aug	.0	.0	.0	.0
Sep	.5	.3	.2	.1
Oct	1.5	1.0	.3	.0
Nov	7.6	5.9	3.1	.6
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	7/20	7/14	7/10	7/07	7/03	6/30	6/26	6/22	6/17
32	6/29	6/23	6/18	6/15	6/11	6/08	6/04	5/31	5/25
28	6/06	5/31	5/27	5/24	5/20	5/17	5/13	5/09	5/04
24	5/20	5/15	5/11	5/08	5/05	5/02	4/29	4/25	4/20
20	5/14	5/08	5/04	5/01	4/28	4/24	4/21	4/17	4/11
16	5/04	4/28	4/23	4/19	4/16	4/12	4/08	4/04	3/29

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	8/12	8/18	8/22	8/25	8/28	9/01	9/04	9/08	9/14
32	8/30	9/03	9/06	9/08	9/11	9/13	9/15	9/18	9/22
28	9/06	9/10	9/13	9/16	9/19	9/21	9/24	9/27	10/01
24	9/17	9/22	9/26	9/29	10/01	10/04	10/07	10/10	10/15
20	9/23	9/29	10/03	10/07	10/10	10/13	10/17	10/21	10/27
16	10/02	10/08	10/12	10/15	10/19	10/22	10/26	10/30	11/05

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	81	72	66	60	55	50	45	39	30
32	110	103	98	94	90	87	82	78	71
28	142	135	129	125	121	116	112	106	99
24	169	162	157	153	149	144	140	135	128
20	191	182	176	170	165	160	154	148	139
16	214	204	197	191	185	180	174	167	157

***** 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	1295	1074	1022	768	531	287	150	163	390	685	1038	1263	8666
60	1140	934	867	618	378	165	69	80	260	530	888	1108	7037
57	1047	850	774	528	291	108	36	45	194	438	798	1015	6124
55	985	794	712	471	236	77	22	29	155	377	738	953	5549
50	830	654	558	332	123	24	5	8	78	236	596	798	4242
32	327	214	111	30	1	0	0	0	0	8	182	304	1177

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	54	64	112	252	493	712	928	916	610	346	135	64	4686
55	0	0	0	3	15	99	236	232	76	2	0	0	663
57	0	0	0	0	8	70	188	186	54	1	0	0	507
60	0	0	0	0	2	37	129	128	31	0	0	0	327
65	0	0	0	0	0	9	55	56	10	0	0	0	130
70	0	0	0	0	0	1	16	17	2	0	0	0	36

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	3	30	94	267	480	693	687	401	176	31	1	0	3	33	127	394	874	1567	2254	2655	2831	2862	2863
45	0	0	1	42	147	338	538	533	268	89	9	0	0	0	1	43	190	528	1066	1599	1867	1956	1965	1965
50	0	0	0	10	64	206	384	382	155	35	0	0	0	0	0	10	74	280	664	1046	1201	1236	1236	1236
55	0	0	0	0	22	103	241	234	72	8	0	0	0	0	0	0	22	125	366	600	672	680	680	680
60	0	0	0	0	0	36	117	111	22	0	0	0	0	0	0	0	0	36	153	264	286	286	286	286
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	4	25	83	190	312	453	453	282	138	21	0	0	4	29	112	302	614	1067	1520	1802	1940	1961	1961

(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