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: LIVINGSTON AP, MT **COOP ID: 245086**

Climate Division: MT 5 **NWS Call Sign: LVM** **Elevation: 4,653 Feet** **Lat: 45˚42N** **Lon: 110˚27W**

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	35.1	16.0	25.6	67	1981	22	36.3	1986	-32+	1997	13	8.9	1979	1223	0	.0	.0	4.6	10.3	25.6	5.7
Feb	40.5	20.1	30.3	70+	1995	24	40.1	1991	-33	1989	3	12.4	1989	971	0	.0	.0	7.6	6.2	21.9	3.0
Mar	46.9	24.9	35.9	75	1997	19	43.5	1986	-21	1965	24	27.6	1975	903	0	.0	.0	13.9	3.5	23.9	1.0
Apr	55.3	30.7	43.0	86	1962	19	50.6	1987	-2	1983	6	34.4	1975	659	0	.0	.0	20.8	.8	16.9	.1
May	65.0	38.2	51.6	93	1954	19	55.4	1985	13	1954	2	47.6	1975	417	0	.0	.0	28.5	.0	5.8	.0
Jun	75.0	45.5	60.3	99	1990	30	68.3	1988	27	1998	5	54.7	1998	178	35	.0	1.4	29.7	.0	.3	.0
Jul	84.6	50.0	67.3	104+	2000	30	71.9	1985	35+	1972	4	58.5	1993	68	140	.4	8.2	30.9	.0	.0	.0
Aug	84.9	48.3	66.6	105	1961	5	72.0	1983	28	1992	25	60.7	1993	79	129	.2	8.0	31.0	.0	.1	.0
Sep	73.0	39.7	56.4	99	1998	4	62.8	1998	10	1985	29	50.7	1985	284	25	.0	1.7	28.5	@	3.9	.0
Oct	60.3	32.6	46.5	88	1996	10	52.1	1988	-11	1991	30	40.6	1984	576	0	.0	.0	24.4	.7	12.8	.1
Nov	43.5	23.9	33.7	77+	1999	13	47.6	1999	-31	1959	13	17.7	1985	939	0	.0	.0	9.9	5.6	21.1	1.5
Dec	36.3	17.7	27.0	62+	1995	1	34.3	1979	-41	1983	24	11.2	1983	1178	0	.0	.0	4.2	9.6	25.5	4.0
Ann	58.4	32.3	45.4	105	Aug 1961	5	72.0	Aug 1983	-41	Dec 1983	24	8.9	Jan 1979	7475	329	.6	19.3	234.0	36.7	157.8	15.4

\+ 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	.64	.55	1.60	1980	10	2.41	1989	.06	1988
Feb	.48	.38	.93	1955	17	1.76	1986	.00	1977
Mar	.85	.87	1.11	1981	27	1.61	1982	.21	1987
Apr	1.58	1.39	1.19	1989	27	3.22	1984	.23	1980
May	2.83	2.64	2.17	1980	25	6.48	1981	.40	1998
Jun	2.46	2.60	2.90	1992	16	6.77	1992	.54	1974
Jul	1.54	1.23	2.04	1994	6	4.39	1993	.00	1991
Aug	1.37	1.23	2.61	1979	24	3.90	1979	.19	1981
Sep	1.48	1.59	1.43	1970	8	2.83	1980	.09	1979
Oct	1.20	.98	1.74	1992	4	3.47	1975	.00	1987
Nov	.74	.67	1.00	1973	12	2.40	1973	.13	1976
Dec	.56	.45	1.35	1955	23	1.91	1998	.02	1976
Ann	15.73	15.29	2.90	Jun 1992	16	6.77	Jun 1992	.00+	Jul 1991

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	6.7	1.8	.2	.1
Feb	6.0	1.7	@	.0
Mar	9.3	2.5	.2	@
Apr	10.4	5.2	.5	.1
May	12.5	6.5	1.8	.4
Jun	12.2	6.2	1.4	.3
Jul	9.4	3.8	.7	.2
Aug	8.1	3.9	.7	.1
Sep	8.0	3.9	.8	.1
Oct	7.4	3.4	.4	.1
Nov	6.7	2.4	.1	@
Dec	6.7	1.9	.1	@
Ann	103.4	43.2	6.9	1.4

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	.07	.12	.20	.29	.39	.49	.62	.78	.99	1.35	1.69
Feb	.03	.07	.14	.21	.29	.37	.47	.59	.75	1.01	1.27
Mar	.31	.39	.51	.60	.69	.78	.88	1.00	1.15	1.38	1.59
Apr	.39	.54	.77	.97	1.18	1.39	1.63	1.91	2.29	2.88	3.43
May	.75	1.02	1.43	1.79	2.14	2.51	2.93	3.42	4.06	5.07	6.01
Jun	.79	1.02	1.36	1.66	1.94	2.24	2.56	2.94	3.43	4.18	4.89
Jul	.14	.31	.57	.79	1.03	1.28	1.56	1.91	2.37	3.12	3.83
Aug	.27	.39	.60	.78	.97	1.17	1.40	1.67	2.04	2.62	3.17
Sep	.25	.37	.59	.79	1.00	1.23	1.49	1.81	2.23	2.92	3.58
Oct	.22	.39	.59	.75	.91	1.08	1.26	1.47	1.75	2.18	2.59
Nov	.12	.18	.29	.39	.50	.61	.74	.90	1.12	1.46	1.79
Dec	.09	.14	.22	.30	.38	.46	.56	.68	.84	1.09	1.34
Ann	10.94	11.86	13.04	13.94	14.74	15.52	16.32	17.21	18.29	19.86	21.22

\+ 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	9.7	9.8	1	1
Feb	7.3	5.9	1	1
Mar	10.1	8.2	1	1
Apr	7.9	6.5	#	1
May	1.9	1.0	#	0
Jun	.0	.0	#	0
Jul	#	.0	0	0
Aug	.2	.0	#	0
Sep	1.4	.0	#	0
Oct	3.9	2.8	#	0
Nov	7.6	7.4	1	0
Dec	8.4	5.7	1	1
Ann	58.4	47.3	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	14.7	1980	10	29.0	1980	13+	1989	23	3+	1980
Feb	9.8	1996	24	24.3	1986	22	1975	9	5	1975
Mar	12.8	1991	11	33.4	1980	17	1980	31	2+	1996
Apr	10.7	1983	3	29.7	1976	15	1980	1	2+	1991
May	8.2	1997	1	9.2	1997	7	1975	7	#	2000
Jun	.3	1998	3	.3	1998	0	0	0	#	1999
Jul	#	1972	19	#	1972	0	0	0	0	0
Aug	6.1	1992	24	6.1	1992	3	1992	24	#	1992
Sep	9.0	1983	19	9.0	1983	4+	2000	22	#	2000
Oct	6.6	1973	31	11.7	1975	7	1985	8	1+	1991
Nov	10.8	1975	16	24.2	1973	20	1973	8	5	1978
Dec	16.4	1998	4	23.8	1998	18	1998	4	4	1978
Ann	16.4	Dec 1998	4	33.4	Mar 1980	22	Feb 1975	9	5+	Nov 1978

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	5.8	3.0	1.0	.5	@
Feb	5.3	2.4	.7	.2	.0
Mar	6.9	3.2	1.1	.3	.1
Apr	5.1	2.5	.8	.3	@
May	1.3	.6	.2	.1	.0
Jun	.1	.0	.0	.0	.0
Jul	.0	.0	.0	.0	.0
Aug	.0	.0	@	@	.0
Sep	.8	.5	.2	@	.0
Oct	2.8	1.6	.3	.1	.0
Nov	5.0	2.5	.8	.3	@
Dec	5.4	2.4	.9	.3	.1
Ann	38.5	18.7	6.0	2.1	.2

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	10.7	5.1	2.0	.4
Feb	8.0	3.0	1.0	.2
Mar	8.3	3.4	1.5	.2
Apr	4.2	2.1	1.0	.2
May	.6	.2	.1	.0
Jun	.0	.0	.0	.0
Jul	.0	.0	.0	.0
Aug	@	@	.0	.0
Sep	.5	.1	.0	.0
Oct	2.3	.6	.1	.0
Nov	7.5	3.5	1.9	.6
Dec	9.7	3.7	2.2	.3
Ann	51.8	21.7	9.8	1.9

+ 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	6/29	6/23	6/18	6/15	6/11	6/07	6/03	5/30	5/24
32	6/09	6/04	5/31	5/29	5/26	5/23	5/20	5/17	5/12
28	5/23	5/18	5/14	5/10	5/07	5/04	4/30	4/26	4/20
24	5/10	5/04	4/30	4/27	4/23	4/20	4/17	4/12	4/07
20	4/24	4/19	4/15	4/12	4/09	4/06	4/03	3/30	3/25
16	4/23	4/16	4/10	4/05	4/01	3/28	3/23	3/17	3/10

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	8/25	8/29	9/02	9/05	9/07	9/10	9/13	9/16	9/21
32	9/04	9/08	9/11	9/13	9/16	9/18	9/20	9/23	9/27
28	9/10	9/15	9/19	9/22	9/25	9/28	10/01	10/04	10/09
24	9/21	9/26	9/30	10/03	10/06	10/09	10/12	10/16	10/21
20	9/30	10/06	10/10	10/14	10/17	10/21	10/24	10/29	11/04
16	10/13	10/19	10/23	10/26	10/30	11/02	11/06	11/10	11/16

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	113	104	98	93	88	83	77	71	62
32	132	125	120	116	112	108	104	99	93
28	164	156	150	145	140	135	130	124	116
24	188	180	174	169	165	160	155	150	142
20	214	206	200	195	190	186	181	175	167
16	237	228	222	216	211	206	200	194	185

***** 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	1223	971	903	659	417	178	68	79	284	576	939	1178	7475
60	1068	831	748	509	268	86	22	29	173	422	789	1023	5968
57	975	747	655	424	189	47	10	14	120	332	707	930	5150
55	913	699	593	368	143	29	5	7	90	277	651	869	4644
50	765	568	449	239	59	6	0	1	36	155	514	720	3512
32	302	197	79	13	0	0	0	0	0	5	156	265	1017

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	102	150	199	344	607	847	1095	1074	731	452	207	110	5918
55	0	7	1	9	37	186	387	368	131	11	12	1	1150
57	0	0	0	5	21	145	330	313	101	4	8	0	927
60	0	0	0	0	7	93	249	234	64	1	0	0	648
65	0	0	0	0	0	35	140	129	25	0	0	0	329
70	0	0	0	0	0	9	64	57	8	0	0	0	138

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	27	45	81	180	385	623	855	832	518	279	80	30	27	72	153	333	718	1341	2196	3028	3546	3825	3905	3935
45	5	11	35	97	248	475	700	677	376	167	37	6	5	16	51	148	396	871	1571	2248	2624	2791	2828	2834
50	0	3	11	41	138	329	545	524	248	86	14	0	0	3	14	55	193	522	1067	1591	1839	1925	1939	1939
55	0	0	1	12	54	199	392	371	142	37	6	0	0	0	1	13	67	266	658	1029	1171	1208	1214	1214
60	0	0	0	1	17	93	247	228	65	11	0	0	0	0	0	1	18	111	358	586	651	662	662	662
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	1	21	58	133	252	384	533	522	347	193	42	7	1	22	80	213	465	849	1382	1904	2251	2444	2486	2493

(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