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: LIBBY 32 SSE, MT **COOP ID: 245020**

Climate Division: MT 1 **NWS Call Sign:** **Elevation: 3,600 Feet** **Lat: 47˚58N** **Lon: 115˚14W**

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	30.6	11.8	21.2	51+	1989	30	29.9	1994	-44	1950	30	6.0	1979	1357	0	.0	.0	.2	15.4	30.4	6.3
Feb	36.6	14.9	25.8	59	1995	24	32.8	1991	-39	1996	2	13.4	1989	1098	0	.0	.0	.8	7.3	27.6	3.4
Mar	44.6	20.6	32.6	69	1972	17	38.4	1992	-23+	1989	3	27.6	1976	1005	0	.0	.0	6.7	1.5	29.9	.8
Apr	55.0	26.1	40.6	84+	1987	28	45.2	1987	4	1997	11	35.1	1975	733	0	.0	.0	19.1	.0	24.4	.0
May	64.1	32.1	48.1	89	1986	30	52.9	1993	8	1954	1	43.9	1974	523	0	.0	.0	28.4	.0	14.8	.0
Jun	71.4	37.7	54.6	93+	1961	17	58.8	1992	21	1951	1	50.8	1976	315	2	.0	.2	29.7	.0	5.7	.0
Jul	78.9	39.6	59.3	98+	1960	19	64.5	1975	26+	1999	4	53.5	1993	197	18	.0	2.1	31.0	.0	2.4	.0
Aug	79.3	38.3	58.8	102	1961	4	63.3	1971	22	2000	28	52.5	1980	213	19	.0	2.5	31.0	.0	4.5	.0
Sep	68.8	31.2	50.0	100	1950	3	56.4	1998	8	2000	23	45.1	1971	452	2	.0	.3	28.6	.0	15.2	.0
Oct	55.1	24.8	40.0	81+	1987	3	45.7	1988	-11	1991	30	36.6	1972	776	0	.0	.0	20.5	.5	23.9	.1
Nov	37.7	19.6	28.7	65	1999	12	35.4	1999	-26+	1993	25	16.4	1985	1091	0	.0	.0	2.1	7.2	27.6	1.6
Dec	30.0	12.5	21.3	52	1957	9	27.7	1999	-43	1990	29	8.8	1983	1358	0	.0	.0	.1	17.6	30.2	5.0
Ann	54.3	25.8	40.1	102	Aug 1961	4	64.5	Jul 1975	-44	Jan 1950	30	6.0	Jan 1979	9118	41	.0	5.1	198.2	49.5	236.6	17.2

\+ 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: 1949-2001

(3) Derived from 1971-2000 serially complete daily data

Issue Date: February 2004

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Climate Division: MT 1 **NWS Call Sign:** **Elevation: 3,600 Feet** **Lat: 47˚58N** **Lon: 115˚14W**

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	2.80	2.16	2.00	1953	9	9.16	1974	.28	1985
Feb	2.25	1.65	1.21	1954	12	5.68	1972	.25	1973
Mar	1.84	1.73	1.26	1963	30	4.00	1997	.43	1981
Apr	1.49	1.35	1.41	1972	6	3.27	1996	.13	1977
May	2.16	1.77	2.14	1998	27	5.89	1998	.47	1999
Jun	2.23	2.19	2.27	1964	8	4.74	1980	.19	1977
Jul	1.22	1.06	1.60	1954	17	3.97	1993	.05	1985
Aug	1.24	1.13	1.60	1966	27	3.19	1976	.02	2000
Sep	1.30	1.18	1.31	1957	18	3.67	1985	.00	1990
Oct	1.82	1.39	1.59	1994	27	5.14	1994	.02	1987
Nov	3.06	2.97	1.77	1996	19	5.52	1973	.33	1979
Dec	2.94	2.99	1.86	1964	22	7.38	1996	.64	1986
Ann	24.35	23.20	2.27	Jun 1964	8	9.16	Jan 1974	.00	Sep 1990

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	14.8	8.2	1.3	.2
Feb	12.5	6.5	1.2	.3
Mar	12.5	6.5	.3	@
Apr	9.9	5.0	.5	.1
May	12.0	6.8	1.0	.2
Jun	11.2	6.2	1.2	.1
Jul	6.8	3.5	.6	@
Aug	6.7	3.4	.6	.1
Sep	8.1	4.2	.5	@
Oct	9.8	5.6	.8	@
Nov	15.2	9.2	1.4	.1
Dec	15.3	8.5	1.3	.2
Ann	134.8	73.6	10.7	1.3

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	.47	.71	1.12	1.50	1.90	2.33	2.82	3.42	4.22	5.51	6.75
Feb	.41	.61	.93	1.24	1.55	1.89	2.27	2.74	3.35	4.35	5.30
Mar	.53	.70	.97	1.19	1.42	1.65	1.90	2.21	2.60	3.21	3.78
Apr	.43	.57	.78	.97	1.15	1.34	1.55	1.79	2.11	2.61	3.07
May	.59	.80	1.11	1.38	1.65	1.93	2.24	2.60	3.08	3.83	4.52
Jun	.42	.62	.95	1.25	1.56	1.89	2.27	2.72	3.33	4.30	5.22
Jul	.13	.22	.39	.56	.75	.95	1.19	1.49	1.90	2.58	3.24
Aug	.15	.24	.42	.59	.78	.98	1.22	1.52	1.92	2.59	3.23
Sep	.15	.30	.52	.71	.90	1.10	1.33	1.60	1.96	2.55	3.10
Oct	.18	.31	.55	.81	1.08	1.39	1.76	2.22	2.85	3.90	4.92
Nov	.86	1.15	1.59	1.97	2.34	2.73	3.17	3.68	4.34	5.38	6.35
Dec	.66	.94	1.37	1.76	2.14	2.56	3.02	3.57	4.30	5.46	6.55
Ann	16.53	18.02	19.94	21.40	22.71	23.98	25.30	26.76	28.54	31.13	33.39

\+ 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: 1949-2001
(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	21.6	18.5	16	15
Feb	15.7	13.2	18	17
Mar	10.4	10.6	14	13
Apr	5.0	3.2	3	#
May	.8	.0	#	0
Jun	.1	.0	#	0
Jul	.0	.0	0	0
Aug	.2	.0	#	0
Sep	.2	.0	#	0
Oct	2.9	.5	#	0
Nov	16.3	14.6	3	2
Dec	20.8	16.1	9	8
Ann	94.0	76.7	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	10.2	1982	23	52.5	1972	41	1971	25	34	1997
Feb	9.6	1993	19	44.5	1975	43	1975	10	34+	1997
Mar	10.0	1996	4	24.0	1974	47	1997	15	37	1997
Apr	9.1	2000	14	14.9	2000	33	1975	9	21	1975
May	3.5	1975	24	4.5	1974	4	1975	1	#+	1991
Jun	2.1	1995	7	3.4	1995	1	1995	6	#	1995
Jul	.0	0	0	.0	0	0	0	0	0	0
Aug	3.4	1992	23	6.6	1992	2	1992	22	#	1992
Sep	1.5	1974	27	1.5	1974	1	1983	18	#+	1983
Oct	5.1	1984	28	18.9	1984	10	1984	30	2	1991
Nov	18.1	1996	19	57.1	1996	28	1996	20	11	1996
Dec	17.1	1984	29	70.9	1996	49	1996	29	31	1996
Ann	18.1	Nov 1996	19	70.9	Dec 1996	49	Dec 1996	29	37	Mar 1997

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	11.8	7.2	2.4	.8	.1
Feb	8.3	5.1	1.9	.8	.0
Mar	7.3	4.4	1.3	.4	@
Apr	3.2	1.8	.4	.1	.0
May	.7	.2	@	.0	.0
Jun	.1	.1	.0	.0	.0
Jul	.0	.0	.0	.0	.0
Aug	.1	.1	.1	.0	.0
Sep	.2	@	.0	.0	.0
Oct	1.7	1.1	.3	.1	.0
Nov	9.1	5.3	1.9	.5	@
Dec	12.6	7.0	2.7	1.0	.1
Ann	55.1	32.3	11.0	3.7	.2

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	29.4	28.0	25.6	21.3
Feb	27.7	26.3	23.1	18.6
Mar	23.5	19.6	17.5	14.3
Apr	5.0	3.9	3.2	2.0
May	.2	@	.0	.0
Jun	@	.0	.0	.0
Jul	.0	.0	.0	.0
Aug	.1	.0	.0	.0
Sep	.0	.0	.0	.0
Oct	1.2	.3	.3	@
Nov	15.6	10.8	6.9	2.1
Dec	29.2	25.6	20.2	13.5
Ann	131.9	114.5	96.8	71.8

+ 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	8/05	7/30	7/26	7/22	7/19	7/15	7/12	7/07	7/02
32	8/02	7/24	7/18	7/13	7/08	7/04	6/28	6/22	6/14
28	7/09	6/30	6/24	6/18	6/13	6/08	6/02	5/27	5/18
24	5/30	5/24	5/19	5/15	5/12	5/08	5/04	4/30	4/24
20	5/15	5/09	5/04	4/29	4/26	4/22	4/17	4/12	4/06
16	4/21	4/15	4/10	4/06	4/03	3/30	3/26	3/21	3/15

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	7/29	8/02	8/05	8/08	8/11	8/13	8/16	8/20	8/24
32	7/31	8/05	8/10	8/14	8/18	8/22	8/26	8/31	9/07
28	8/17	8/22	8/26	8/30	9/02	9/06	9/09	9/13	9/19
24	8/31	9/07	9/11	9/16	9/20	9/24	9/28	10/03	10/10
20	9/08	9/16	9/22	9/27	10/01	10/06	10/10	10/16	10/24
16	9/19	9/28	10/05	10/11	10/17	10/22	10/28	11/04	11/13

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	50	40	33	28	22	17	11	4	0
32	81	67	57	48	40	32	24	13	0
28	115	103	95	87	81	74	66	58	46
24	163	152	144	137	130	124	117	109	97
20	194	181	172	165	158	151	143	134	122
16	232	220	211	203	196	189	182	173	161

***** 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	1357	1098	1005	733	523	315	197	213	452	776	1091	1358	9118
60	1202	958	850	583	369	179	94	108	309	621	941	1203	7417
57	1109	874	757	493	281	114	50	62	231	528	851	1110	6460
55	1047	818	695	433	225	79	29	40	185	466	791	1048	5856
50	892	678	540	290	112	22	6	10	89	312	641	893	4485
32	388	232	91	10	0	0	0	0	0	11	195	369	1296

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	54	58	109	266	500	677	845	830	540	258	94	35	4266
55	0	0	0	0	13	67	160	156	34	0	0	0	430
57	0	0	0	0	6	41	120	117	21	0	0	0	305
60	0	0	0	0	1	17	70	69	9	0	0	0	166
65	0	0	0	0	0	2	18	19	2	0	0	0	41
70	0	0	0	0	0	0	3	3	0	0	0	0	6

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	0	2	90	264	449	617	604	330	102	9	0	0	0	2	92	356	805	1422	2026	2356	2458	2467	2467
45	0	0	0	30	141	304	462	449	199	35	0	0	0	0	0	30	171	475	937	1386	1585	1620	1620	1620
50	0	0	0	9	59	172	312	301	92	7	0	0	0	0	0	9	68	240	552	853	945	952	952	952
55	0	0	0	0	16	76	170	164	27	0	0	0	0	0	0	0	16	92	262	426	453	453	453	453
60	0	0	0	0	1	19	73	65	5	0	0	0	0	0	0	0	1	20	93	158	163	163	163	163
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	1	19	98	215	311	434	439	280	109	3	0	0	1	20	118	333	644	1078	1517	1797	1906	1909	1909

(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