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: LEECH LAKE DAM, MN **COOP ID: 214652**

Climate Division: MN 2 **NWS Call Sign:** **Elevation: 1,302 Feet** **Lat: 47˚15N** **Lon: 94˚13W**

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	15.7	-5.7	5.0	53	1981	24	17.8	1990	-42	1996	20	-6.7	1982	1862	0	.0	.0	.1	27.2	31.0	18.8
Feb	25.0	1.9	13.5	61	1958	26	28.5	1998	-46	1996	2	1.4	1989	1443	0	.0	.0	.5	18.9	27.8	13.0
Mar	36.8	14.8	25.8	73	1963	31	34.7	1973	-36	1962	1	17.4	1996	1215	0	.0	.0	5.1	9.3	28.5	4.9
Apr	53.4	29.7	41.6	94	1980	21	49.5	1987	-10	1954	3	34.7	1996	703	0	.0	.1	18.5	.7	19.9	.3
May	67.2	42.7	55.0	93	1949	3	63.6	1977	15	1966	1	47.9	1979	335	23	.0	.2	29.4	.0	4.5	.0
Jun	75.6	52.5	64.1	95+	1988	7	69.6	1988	28	1964	1	59.1	1982	99	69	.0	.7	29.9	.0	.0	.0
Jul	79.3	57.4	68.4	99	1988	27	72.5	1975	38	1967	4	61.2	1992	37	140	.0	1.8	31.0	.0	.0	.0
Aug	77.2	55.1	66.2	100	1976	19	72.2	1983	31+	1977	24	60.5	1977	70	106	@	.9	31.0	.0	.1	.0
Sep	66.5	45.6	56.1	95+	1983	3	61.0	1998	19	1965	26	51.4	1993	278	9	.0	.2	29.2	.0	1.9	.0
Oct	53.5	34.1	43.8	88	1963	5	49.3	1973	3	1976	27	38.8	1976	658	0	.0	.0	21.1	.5	13.0	.0
Nov	34.5	19.8	27.2	72	1975	4	36.3	1999	-24	1964	30	18.2	1995	1136	0	.0	.0	3.8	12.8	27.4	1.8
Dec	20.3	2.7	11.5	58	1962	1	23.9	1997	-39	1955	19	-1.2	1983	1659	0	.0	.0	.1	25.0	30.9	13.3
Ann	50.4	29.2	39.9	100	Aug 1976	19	72.5	Jul 1975	-46	Feb 1996	2	-6.7	Jan 1982	9495	347	@	3.9	199.7	94.4	185.0	52.1

\+ 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: 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	.76	.74	.80	1997	5	2.29	1975	.11	1985
Feb	.50	.47	.82	1977	24	1.17	1979	.00	1988
Mar	1.06	1.04	1.10	1998	30	2.50	1979	.00	1991
Apr	1.57	1.29	1.61	1991	30	4.09	1986	.22	1983
May	2.71	2.38	2.65	1962	23	6.07	1987	.55	1980
Jun	3.87	3.32	2.90	1952	13	8.05	1981	.62	1987
Jul	4.40	4.13	7.02	1954	10	9.46	1995	1.02	1989
Aug	3.76	3.31	3.40	2000	15	9.32	1988	.56	1971
Sep	2.82	2.57	3.22	1951	10	4.83	1989	.72	1974
Oct	2.50	1.97	3.33	1969	5	6.89	1971	.17	1992
Nov	1.19	1.05	1.15	1977	9	3.07	1977	.00	1999
Dec	.71	.73	.85	1968	13	1.21	1988	.10	1997
Ann	25.85	25.96	7.02	Jul 1954	10	9.46	Jul 1995	.00+	Nov 1999

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	7.1	2.6	.1	.0
Feb	5.4	1.7	.1	.0
Mar	6.8	3.4	.5	@
Apr	7.1	4.2	1.0	.2
May	10.0	5.9	1.7	.5
Jun	12.0	7.4	2.7	.9
Jul	11.6	7.5	3.0	1.0
Aug	10.4	6.5	2.3	1.1
Sep	10.3	6.1	1.8	.4
Oct	7.9	4.4	1.5	.8
Nov	6.8	3.5	.7	.1
Dec	7.0	2.5	.2	.0
Ann	102.4	55.7	15.6	5.0

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	.18	.25	.36	.46	.56	.66	.78	.92	1.10	1.39	1.66
Feb	.04	.10	.18	.25	.33	.41	.50	.61	.76	1.00	1.24
Mar	.35	.50	.66	.78	.90	1.01	1.13	1.26	1.44	1.70	1.94
Apr	.35	.50	.73	.93	1.14	1.36	1.61	1.91	2.30	2.92	3.50
May	.75	1.00	1.39	1.73	2.07	2.42	2.81	3.26	3.86	4.80	5.67
Jun	1.26	1.63	2.17	2.63	3.07	3.53	4.04	4.62	5.38	6.56	7.65
Jul	1.29	1.71	2.34	2.88	3.41	3.96	4.57	5.28	6.20	7.65	8.99
Aug	.75	1.09	1.64	2.15	2.66	3.21	3.83	4.58	5.57	7.17	8.68
Sep	1.30	1.54	1.89	2.16	2.42	2.68	2.95	3.27	3.67	4.27	4.81
Oct	.24	.42	.76	1.11	1.49	1.91	2.42	3.05	3.92	5.36	6.77
Nov	.11	.25	.45	.62	.80	.99	1.21	1.47	1.83	2.39	2.94
Dec	.21	.27	.38	.46	.55	.63	.73	.85	.99	1.23	1.44
Ann	19.40	20.68	22.29	23.51	24.58	25.61	26.67	27.84	29.25	31.28	33.02

\+ 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)

Extremes (2)

Mean Number of Days (1)

Snow Fall >= Thresholds

Snow Depth >= Thresholds

Month	Snow Fall Mean	Snow Fall Median	Snow Depth Mean	Snow Depth Median	Highest Daily Snow Fall	Year	Day	Highest Monthly Snow Fall	Year	Highest Daily Snow Depth	Year	Day	Highest Monthly Mean Snow Depth	Year	0.1	1.0	3.0	5.0	10.0	1	3	5	10
Jan	12.6	10.4	12	11	14.0	1988	12	35.0	1975	28	1975	12	23	1997	6.6	4.2	1.4	.4	.2	30.2	29.5	25.9	15.5
Feb	6.7	6.8	15	14	8.0	1971	27	17.0	1979	31	1979	23	26	1975	4.1	2.7	.6	.2	.0	27.6	27.6	27.2	19.9
Mar	8.7	8.5	12	10	15.0	1985	4	17.5	1985	30	1997	8	27	1997	3.9	2.8	.9	.3	.1	19.3	16.8	14.9	10.3
Apr	2.2	1.0	2	#	7.0	1974	1	9.0	1994	24+	1996	4	13	1979	1.0	.8	.2	.1	.0	3.8	3.1	2.7	1.3
May	.1	.0	#	0	1.0	1971	19	1.0	1971	#+	1997	15	#+	1997	.1	@	.0	.0	.0	.0	.0	.0	.0
Jun	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Jul	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Aug	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Sep	#	.0	0	0	#	1974	22	#	1974	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Oct	.6	.0	#	0	4.0	1972	31	5.0	1972	4	1972	31	#+	1996	.5	.3	.1	.0	.0	.4	@	.0	.0
Nov	5.3	3.5	2	2	8.0	1995	26	18.0	1993	12+	1991	13	7	1991	3.5	2.8	.7	.2	.0	11.8	5.7	2.8	.4
Dec	9.2	9.5	6	5	8.0	1990	20	16.5	1981	18	1995	15	14+	1995	5.8	3.7	.9	.2	.0	28.0	21.5	16.3	6.3
Ann	45.4	39.7	N/A	N/A	15.0	Mar 1985	4	35.0	Jan 1975	31	Feb 1979	23	27	Mar 1997	25.5	17.3	4.8	1.4	.3	121.1	104.2	89.8	53.7

+ 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	6/07	6/03	5/31	5/28	5/26	5/23	5/21	5/17	5/13
32	5/24	5/20	5/18	5/16	5/14	5/12	5/10	5/07	5/04
28	5/15	5/11	5/08	5/06	5/04	5/01	4/29	4/26	4/22
24	5/06	5/01	4/28	4/25	4/22	4/19	4/16	4/12	4/07
20	4/21	4/18	4/15	4/13	4/11	4/09	4/07	4/04	4/01
16	4/15	4/11	4/09	4/06	4/04	4/02	3/31	3/28	3/24

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	8/31	9/05	9/08	9/11	9/13	9/16	9/19	9/22	9/27
32	9/08	9/13	9/17	9/20	9/23	9/26	9/29	10/02	10/08
28	9/20	9/25	9/29	10/01	10/04	10/07	10/10	10/13	10/18
24	9/30	10/05	10/10	10/13	10/16	10/20	10/23	10/27	11/02
20	10/17	10/22	10/25	10/28	10/31	11/02	11/05	11/09	11/14
16	10/25	10/29	11/02	11/04	11/07	11/10	11/12	11/15	11/20

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	128	122	117	114	110	106	103	98	92
32	150	144	139	135	131	128	124	119	113
28	173	166	161	157	153	149	145	140	133
24	202	194	187	182	177	172	167	160	152
20	221	214	210	206	202	198	194	190	183
16	232	227	223	219	216	213	209	205	200

***** 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	1862	1443	1215	703	335	99	37	70	278	658	1136	1659	9495
60	1707	1303	1060	557	218	36	8	21	156	503	986	1504	8059
57	1614	1219	967	472	160	17	1	8	98	412	896	1411	7275
55	1552	1163	905	417	127	9	0	3	68	353	836	1349	6782
50	1397	1023	751	292	64	1	0	0	20	219	687	1194	5648
32	850	552	270	32	0	0	0	0	0	9	234	663	2610

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	11	33	77	319	711	960	1127	1059	721	375	88	27	5508
55	0	0	0	14	125	279	414	350	99	5	0	0	1286
57	0	0	0	9	96	227	352	293	69	2	0	0	1048
60	0	0	0	4	60	156	266	212	37	0	0	0	735
65	0	0	0	0	23	69	140	106	9	0	0	0	347
70	0	0	0	0	6	19	57	39	1	0	0	0	122

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	14	143	486	724	890	821	504	202	18	0	0	0	14	157	643	1367	2257	3078	3582	3784	3802	3802
45	0	0	2	73	346	574	735	666	359	105	7	0	0	0	2	75	421	995	1730	2396	2755	2860	2867	2867
50	0	0	0	34	219	427	580	511	228	49	1	0	0	0	0	34	253	680	1260	1771	1999	2048	2049	2049
55	0	0	0	13	120	284	425	359	124	15	0	0	0	0	0	13	133	417	842	1201	1325	1340	1340	1340
60	0	0	0	2	56	163	275	219	57	1	0	0	0	0	0	2	58	221	496	715	772	773	773	773
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	0	13	112	308	447	579	522	295	118	10	0	0	0	13	125	433	880	1459	1981	2276	2394	2404	2404

(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