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: LEEDS, ND **COOP ID: 325078**

Climate Division: ND 2 **NWS Call Sign:** **Elevation: 1,530 Feet** **Lat: 48˚17N** **Lon: 99˚26W**

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	14.3	-6.2	4.1	52	1990	11	19.5	1990	-41	1954	26	-12.1	1982	1890	0	.0	.0	@	26.9	31.0	20.0
Feb	21.5	.8	11.2	60	1988	28	24.3	1998	-42+	1996	2	-6.1	1979	1509	0	.0	.0	.3	20.6	28.2	13.7
Mar	32.9	11.9	22.4	73	1963	23	34.2	1973	-36	1972	2	14.2+	1980	1319	0	.0	.0	2.6	13.1	30.3	6.3
Apr	51.4	26.1	38.8	97	1980	22	47.2	1987	-12	1979	6	27.0	1979	788	0	.0	.1	16.8	2.4	21.4	.5
May	67.2	39.7	53.5	97	1980	23	61.1	1977	12	1967	2	45.5	1979	376	17	.0	.6	28.8	.0	5.8	.0
Jun	75.5	49.8	62.7	105	1988	28	72.5	1988	25	1964	1	55.8	1985	141	70	.1	1.8	29.9	.0	.1	.0
Jul	80.1	53.8	67.0	105	1988	29	72.8	1989	34	1967	3	61.4	1992	58	119	.2	3.0	31.0	.0	.0	.0
Aug	80.0	50.1	65.1	105	1949	7	70.3	1983	28	1958	31	57.8	1977	106	107	.3	4.7	31.0	.0	.1	.0
Sep	68.2	40.2	54.2	103	1978	6	59.2	1998	17+	1974	30	48.8	1984	334	10	.1	1.0	28.5	.0	3.5	.0
Oct	54.7	29.4	42.1	95	1989	1	47.6	1973	-11	1991	31	37.0	1976	712	0	.0	.1	19.6	1.1	18.5	.1
Nov	33.6	14.9	24.3	74	1999	7	35.3	1999	-31	1985	29	12.1	1985	1222	0	.0	.0	3.8	14.2	28.9	4.0
Dec	19.6	.3	10.0	57	1969	1	24.2	1997	-39	1983	23	-4.8	1983	1706	0	.0	.0	.1	25.0	31.0	15.4
Ann	49.9	25.9	38.0	105+	Jul 1988	29	72.8	Jul 1989	-42+	Feb 1996	2	-12.1	Jan 1982	10161	323	.7	11.3	192.4	103.3	198.8	60.0

\+ 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

Issue Date: February 2004

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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	.55	.39	1.31	1989	7	1.72	1989	.00	1973
Feb	.51	.35	1.23	2000	25	1.98	1998	.00+	1988
Mar	.83	.71	1.07	1995	27	2.30	1995	.08	1986
Apr	1.28	1.01	2.82	1953	24	3.65	1984	.00+	1987
May	2.08	1.81	2.37	1994	20	5.91	1974	.31	1984
Jun	2.98	2.85	2.66	1964	18	6.67	1993	.45	1974
Jul	3.17	3.09	3.31	2000	11	8.45	1993	.21	1985
Aug	2.07	1.60	1.90	1955	17	5.65	1980	.16	1996
Sep	1.61	1.38	2.06	1994	4	4.13	1980	.31	1993
Oct	1.53	1.01	2.98	1994	7	5.86	1994	.00	1976
Nov	.84	.68	1.65	1986	9	3.08	1998	.00	1976
Dec	.48	.44	.80	1982	2	1.19	1992	.05+	1989
Ann	17.93	17.62	3.31	Jul 2000	11	8.45	Jul 1993	.00+	Feb 1988

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	4.1	1.5	.1	.1
Feb	3.6	1.6	.1	.1
Mar	4.3	2.4	.3	.1
Apr	5.5	3.5	.6	.1
May	8.3	5.1	1.1	.4
Jun	10.0	5.9	2.0	.7
Jul	8.8	6.2	2.3	.8
Aug	8.3	5.1	1.4	.4
Sep	6.8	3.8	.9	.3
Oct	5.8	3.1	.9	.3
Nov	4.3	2.4	.5	.1
Dec	3.9	1.8	.1	.0
Ann	73.7	42.4	10.3	3.4

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	.03	.09	.17	.25	.34	.43	.54	.68	.86	1.16	1.45
Feb	.00	.04	.12	.20	.28	.38	.49	.63	.82	1.15	1.46
Mar	.16	.23	.35	.47	.58	.70	.84	1.01	1.24	1.60	1.94
Apr	.00	.13	.36	.56	.78	1.01	1.28	1.60	2.04	2.77	3.47
May	.39	.58	.88	1.16	1.45	1.76	2.11	2.54	3.10	4.01	4.88
Jun	.90	1.18	1.60	1.97	2.32	2.69	3.09	3.57	4.18	5.14	6.04
Jul	.67	.96	1.43	1.85	2.27	2.73	3.24	3.85	4.66	5.94	7.16
Aug	.51	.70	1.00	1.27	1.54	1.82	2.13	2.50	2.99	3.76	4.48
Sep	.31	.46	.69	.91	1.13	1.37	1.63	1.95	2.38	3.07	3.72
Oct	.02	.09	.26	.46	.71	1.00	1.36	1.84	2.51	3.68	4.86
Nov	.01	.06	.16	.28	.41	.57	.76	1.01	1.36	1.96	2.56
Dec	.06	.10	.16	.23	.30	.38	.47	.59	.74	1.00	1.24
Ann	11.26	12.49	14.10	15.34	16.45	17.55	18.69	19.96	21.52	23.81	25.82

\+ 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	6.7	4.8	7	4
Feb	5.1	4.1	5	2
Mar	5.8	4.5	1	0
Apr	1.9	.0	#	0
May	.4	.0	#	0
Jun	.0	.0	0	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	.2	.0	0	0
Oct	1.6	.0	#	0
Nov	5.2	4.3	2	#
Dec	5.4	5.0	3	1
Ann	32.3	22.7	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	16.5	1989	7	22.5	1989	29	1989	17	21	1989
Feb	7.0	1979	23	14.5	1979	22	1971	2	16	1971
Mar	8.0	1985	29	16.5	1971	21	1999	4	7	1971
Apr	9.5	1999	1	13.0	1999	13	1999	5	2	1999
May	9.0	1991	4	9.0	1991	1	1983	16	#+	1998
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	4.5	1972	26	4.5	1972	0	0	0	0	0
Oct	10.0	1985	8	11.0	1985	5	1981	22	#+	2000
Nov	17.3	1986	9	25.5	1985	18	1998	20	10	1986
Dec	9.5	2000	27	11.5	1995	22	2000	31	13	2000
Ann	17.3	Nov 1986	9	25.5	Nov 1985	29	Jan 1989	17	21	Jan 1989

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	3.3	2.3	.9	.3	.1
Feb	2.8	2.3	.5	.2	.0
Mar	2.1	1.9	.9	.5	.0
Apr	.6	.5	.2	.1	.0
May	.1	.1	@	@	.0
Jun	.0	.0	.0	.0	.0
Jul	.0	.0	.0	.0	.0
Aug	.0	.0	.0	.0	.0
Sep	.1	.1	@	.0	.0
Oct	.6	.5	.3	.1	@
Nov	2.6	2.2	.9	.4	@
Dec	2.9	2.4	.8	.2	.0
Ann	15.1	12.3	4.5	1.8	.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	-9.9	-9.9	-9.9	-9.9
Apr	-9.9	-9.9	-9.9	-9.9
May	.1	.0	.0	.0
Jun	.0	.0	.0	.0
Jul	.0	.0	.0	.0
Aug	.0	.0	.0	.0
Sep	.0	.0	.0	.0
Oct	.3	.2	.1	.0
Nov	-9.9	-9.9	-9.9	-9.9
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	6/12	6/07	6/02	5/30	5/26	5/23	5/19	5/15	5/09
32	5/31	5/26	5/23	5/20	5/17	5/14	5/11	5/08	5/03
28	5/18	5/14	5/11	5/08	5/05	5/03	4/30	4/27	4/23
24	5/10	5/04	4/30	4/27	4/23	4/20	4/17	4/13	4/07
20	4/29	4/24	4/21	4/18	4/15	4/12	4/09	4/06	4/01
16	4/18	4/14	4/10	4/07	4/05	4/02	3/30	3/27	3/22

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	8/28	9/02	9/05	9/08	9/11	9/13	9/16	9/19	9/24
32	9/06	9/11	9/15	9/18	9/21	9/24	9/27	10/01	10/06
28	9/17	9/22	9/25	9/28	10/01	10/04	10/07	10/10	10/15
24	9/26	9/30	10/04	10/07	10/10	10/12	10/15	10/19	10/23
20	10/03	10/09	10/13	10/16	10/20	10/23	10/27	10/31	11/05
16	10/10	10/16	10/20	10/24	10/27	10/31	11/03	11/08	11/14

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	130	122	116	111	106	102	97	91	83
32	149	141	135	131	126	122	117	112	104
28	167	160	156	152	148	144	141	136	130
24	190	183	177	173	168	164	159	154	147
20	212	203	197	192	187	182	177	170	162
16	228	220	214	209	205	200	195	189	181

***** 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	1890	1509	1319	788	376	141	58	106	334	712	1222	1706	10161
60	1735	1369	1164	641	251	68	15	44	209	557	1072	1551	8676
57	1642	1285	1071	555	188	38	6	23	145	465	982	1458	7858
55	1580	1229	1009	499	152	24	1	14	109	404	922	1396	7339
50	1425	1089	858	369	80	7	0	3	44	261	772	1241	6149
32	891	622	380	69	1	0	0	0	0	16	314	715	3008

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	24	37	84	271	665	919	1084	1024	666	327	82	31	5214
55	0	0	0	11	103	253	372	326	85	2	0	0	1152
57	0	0	0	7	77	206	315	272	61	0	0	0	938
60	0	0	0	3	47	146	231	200	35	0	0	0	662
65	0	0	0	0	17	70	119	107	10	0	0	0	323
70	0	0	0	0	4	24	45	44	2	0	0	0	119

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	7	124	455	705	863	806	457	165	12	0	0	0	7	131	586	1291	2154	2960	3417	3582	3594	3594
45	0	0	0	66	320	555	708	651	320	87	3	0	0	0	0	66	386	941	1649	2300	2620	2707	2710	2710
50	0	0	0	28	203	405	553	496	197	39	0	0	0	0	0	28	231	636	1189	1685	1882	1921	1921	1921
55	0	0	0	9	107	267	399	351	108	11	0	0	0	0	0	9	116	383	782	1133	1241	1252	1252	1252
60	0	0	0	2	48	149	253	211	47	3	0	0	0	0	0	2	50	199	452	663	710	713	713	713
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	0	4	99	291	428	552	506	285	127	12	0	0	0	4	103	394	822	1374	1880	2165	2292	2304	2304

(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