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: CALEDONIA, MN **COOP ID: 211198**

Climate Division: MN 9 **NWS Call Sign:** **Elevation: 1,175 Feet** **Lat: 43˚38N** **Lon: 91˚30W**

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	22.4	3.4	12.9	57	1996	18	25.7	1990	-37	1963	15	-.8	1979	1615	0	.0	.0	.1	23.5	30.9	12.5
Feb	28.9	9.7	19.3	58	2000	24	31.3	1998	-35	1996	3	6.7	1979	1280	0	.0	.0	1.0	16.1	27.5	7.2
Mar	40.7	21.5	31.1	82	1986	30	39.6	1973	-32	1962	1	22.4	1975	1051	0	.0	.0	6.6	6.9	26.0	1.7
Apr	55.7	33.9	44.8	93	1980	21	52.0	1977	2	1982	6	38.0	1979	607	2	.0	.1	20.6	.4	12.7	.0
May	68.0	45.9	57.0	90+	1998	29	63.6	1977	19+	1966	10	48.3	1997	284	35	.0	.1	30.3	.0	1.7	.0
Jun	77.7	55.6	66.7	97+	1988	22	71.6	1988	35	1964	1	61.3	1982	61	110	.0	2.0	30.0	.0	.0	.0
Jul	81.5	59.8	70.7	101	1995	14	75.2	1988	42	1965	6	64.6	1992	15	193	.1	3.8	31.0	.0	.0	.0
Aug	78.9	57.8	68.4	102+	1988	2	74.7	1995	35	1964	14	63.8	1992	44	148	.2	1.9	31.0	.0	.0	.0
Sep	70.8	48.0	59.4	92	1960	2	65.1	1998	24	1974	22	53.7	1993	192	24	.0	.4	29.5	.0	1.1	.0
Oct	58.5	36.6	47.6	91+	1997	4	54.5	1971	13+	1988	30	42.3	1988	541	1	.0	.1	24.9	@	10.0	.0
Nov	40.6	23.3	32.0	75	1978	4	41.0	1999	-16	1977	26	25.1	1991	992	0	.0	.0	7.3	7.0	24.4	1.0
Dec	26.9	9.8	18.4	62+	2001	6	26.7	1998	-28+	1983	25	5.6	1983	1447	0	.0	.0	.6	20.0	30.6	7.6
Ann	54.2	33.8	44.0	102+	Aug 1988	2	75.2	Jul 1988	-37	Jan 1963	15	-.8	Jan 1979	8129	513	.3	8.4	212.9	73.9	164.9	30.0

\+ 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

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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	.98	.77	1.32	1971	4	2.27	1979	.13	1981
Feb	.82	.49	1.83	1971	19	3.58	1971	.00+	1997
Mar	1.95	2.00	2.20	1992	4	4.65	1976	.35	1978
Apr	3.67	3.24	2.95	1973	16	7.57	1973	.64	2000
May	3.83	3.72	3.96	2000	18	6.56	1973	1.16	1989
Jun	4.57	3.67	3.97	1950	13	10.31	1984	1.29	1988
Jul	4.71	3.98	6.60	1951	21	10.76	1987	1.43	1996
Aug	4.85	4.54	4.02	1959	3	10.62	1980	1.37	1976
Sep	3.52	3.26	3.88	1983	20	8.43	1972	.27	1979
Oct	2.44	2.24	2.37	1998	18	5.58	1998	.44	1987
Nov	2.38	2.05	2.67	1958	18	6.00	1991	.04	1976
Dec	1.27	1.03	2.51	1984	2	4.53	1984	.00+	1998
Ann	34.99	34.87	6.60	Jul 1951	21	10.76	Jul 1987	.00+	Dec 1998

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	7.8	3.8	.4	.1
Feb	6.2	2.7	.5	.1
Mar	8.4	4.9	1.2	.2
Apr	10.8	7.3	2.6	.5
May	12.1	7.6	2.6	.7
Jun	11.2	7.5	3.0	1.2
Jul	10.2	7.0	3.1	1.4
Aug	11.0	7.6	3.4	1.4
Sep	10.1	6.0	2.4	.8
Oct	8.9	5.0	1.4	.5
Nov	8.7	5.2	1.6	.5
Dec	8.2	4.0	.6	.2
Ann	113.6	68.6	22.8	7.6

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	.21	.30	.45	.58	.71	.85	1.00	1.19	1.44	1.84	2.21
Feb	.00	.00	.00	.16	.32	.51	.74	1.02	1.43	2.12	2.79
Mar	.48	.66	.95	1.20	1.45	1.71	2.01	2.36	2.82	3.55	4.23
Apr	1.02	1.37	1.90	2.36	2.81	3.28	3.80	4.42	5.22	6.48	7.65
May	1.38	1.74	2.26	2.70	3.11	3.54	4.00	4.54	5.23	6.29	7.27
Jun	1.32	1.75	2.41	2.98	3.53	4.11	4.74	5.50	6.47	8.00	9.42
Jul	1.18	1.62	2.31	2.91	3.52	4.15	4.86	5.70	6.79	8.53	10.16
Aug	1.87	2.32	2.97	3.50	4.00	4.52	5.07	5.72	6.54	7.80	8.94
Sep	.57	.87	1.39	1.87	2.37	2.92	3.54	4.30	5.32	6.97	8.55
Oct	.57	.80	1.16	1.48	1.80	2.13	2.51	2.96	3.55	4.49	5.37
Nov	.31	.50	.84	1.17	1.52	1.91	2.36	2.91	3.66	4.89	6.08
Dec	.00	.08	.28	.47	.68	.92	1.21	1.57	2.06	2.90	3.72
Ann	25.02	26.96	29.44	31.32	32.99	34.60	36.27	38.11	40.34	43.57	46.37

\+ 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	11.4	10.4	9	7
Feb	9.3	6.5	9	7
Mar	7.4	6.3	4	1
Apr	2.8	1.1	#	#
May	.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	.0	#	0
Nov	4.6	2.0	1	#
Dec	10.4	10.4	4	3
Ann	46.2	36.7	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	15.0	1971	4	21.0	1971	24	1971	20	21	1979
Feb	12.0	1983	3	27.3	1983	25	1983	11	21	1979
Mar	6.0	1971	19	17.0	1975	27	1975	12	20	1975
Apr	10.0	1973	9	17.0	1973	15	1973	10	2	1975
May	1.0	1997	1	1.0	1997	#	1989	6	#	1989
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	.0	0	0	.0	0	0	0	0	0	0
Oct	2.0	1982	20	2.0+	1999	2	1982	21	#+	1992
Nov	8.0	1991	2	16.6	1985	9	1985	10	3	1985
Dec	7.0	1980	2	20.5	1985	24	2000	31	17	1985
Ann	15.0	Jan 1971	4	27.3	Feb 1983	27	Mar 1975	12	21+	Feb 1979

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	4.8	3.2	.9	.2	@
Feb	3.6	2.3	.5	.3	@
Mar	2.7	2.0	.7	.3	.0
Apr	1.4	1.0	.4	.2	@
May	@	@	.0	.0	.0
Jun	.0	.0	.0	.0	.0
Jul	.0	.0	.0	.0	.0
Aug	.0	.0	.0	.0	.0
Sep	.0	.0	.0	.0	.0
Oct	.2	.1	.0	.0	.0
Nov	2.5	1.5	.4	.1	.0
Dec	4.4	3.2	.8	.2	.0
Ann	19.6	13.3	3.7	1.3	@

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	-9.9	-9.9	-9.9	-9.9
Feb	16.9	11.9	10.2	7.0
Mar	8.0	4.6	2.6	.6
Apr	1.1	.5	.4	.2
May	.0	.0	.0	.0
Jun	.0	.0	.0	.0
Jul	.0	.0	.0	.0
Aug	.0	.0	.0	.0
Sep	.0	.0	.0	.0
Oct	.2	.0	.0	.0
Nov	4.2	2.1	1.1	.0
Dec	24.8	17.9	9.9	2.8
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	5/24	5/20	5/17	5/14	5/11	5/09	5/06	5/03	4/29
32	5/18	5/13	5/09	5/05	5/02	4/29	4/26	4/22	4/16
28	5/04	4/29	4/26	4/23	4/20	4/17	4/14	4/10	4/05
24	4/25	4/21	4/18	4/15	4/13	4/10	4/08	4/04	3/31
20	4/17	4/13	4/10	4/07	4/05	4/02	3/30	3/27	3/23
16	4/08	4/03	3/31	3/28	3/25	3/22	3/19	3/16	3/11

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	9/14	9/18	9/20	9/23	9/25	9/27	9/29	10/02	10/06
32	9/20	9/24	9/26	9/29	10/01	10/03	10/06	10/08	10/12
28	9/28	10/03	10/07	10/11	10/14	10/17	10/21	10/25	10/31
24	10/11	10/16	10/20	10/24	10/27	10/30	11/03	11/07	11/13
20	10/17	10/23	10/27	10/30	11/02	11/06	11/09	11/13	11/19
16	10/27	11/02	11/07	11/10	11/14	11/17	11/21	11/25	12/01

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	154	147	143	139	136	132	128	124	118
32	171	164	159	155	151	147	143	138	131
28	200	192	186	181	177	172	167	162	154
24	220	212	206	201	197	192	187	181	173
20	232	225	220	215	211	207	202	197	190
16	258	250	243	238	233	228	222	216	207

***** 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	1615	1280	1051	607	284	61	15	44	192	541	992	1447	8129
60	1460	1140	896	463	178	19	1	11	93	393	842	1292	6788
57	1367	1056	803	381	127	7	0	3	53	311	752	1199	6059
55	1305	1000	741	330	99	4	0	1	34	261	693	1137	5605
50	1150	860	590	216	46	0	0	0	8	154	549	982	4555
32	623	406	164	14	0	0	0	0	0	6	148	468	1829

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	31	49	136	398	773	1039	1199	1127	822	488	146	44	6252
55	0	0	0	25	159	352	486	415	165	30	1	0	1633
57	0	0	0	16	125	296	424	356	124	18	0	0	1359
60	0	0	0	8	83	217	333	270	75	7	0	0	993
65	0	0	0	2	35	110	193	148	24	1	0	0	513
70	0	0	0	0	11	40	90	65	4	0	0	0	210

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	47	221	554	810	967	892	600	279	46	3	0	0	47	268	822	1632	2599	3491	4091	4370	4416	4419
45	0	0	20	128	403	660	812	737	453	169	18	0	0	0	20	148	551	1211	2023	2760	3213	3382	3400	3400
50	0	0	7	63	265	511	657	582	313	89	4	0	0	0	7	70	335	846	1503	2085	2398	2487	2491	2491
55	0	0	2	30	155	366	502	427	196	42	0	0	0	0	2	32	187	553	1055	1482	1678	1720	1720	1720
60	0	0	0	11	77	231	349	276	105	10	0	0	0	0	0	11	88	319	668	944	1049	1059	1059	1059
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	0	31	142	329	521	641	581	369	169	25	0	0	0	31	173	502	1023	1664	2245	2614	2783	2808	2808

(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