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: ARTICHOKE LAKE, MN **COOP ID: 210287**

Climate Division: MN 4 **NWS Call Sign:** **Elevation: 1,075 Feet** **Lat: 45˚23N** **Lon: 96˚09W**

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	19.6	.0	9.8	63	1981	24	24.9	1990	-34	1951	29	-4.4	1982	1712	0	.0	.0	.1	24.6	31.0	16.2
Feb	26.2	7.6	16.9	60+	1991	2	31.9	1987	-36	1994	9	1.2	1979	1347	0	.0	.0	.8	17.5	27.4	9.7
Mar	37.5	20.4	29.0	76	1963	30	39.3	2000	-30	1962	1	20.7	1975	1118	0	.0	.0	4.5	9.1	26.7	3.2
Apr	54.9	34.5	44.7	97	1980	21	53.7	1987	-1	1975	1	36.2	1975	614	5	.0	.1	19.3	.8	12.9	@
May	69.2	48.2	58.7	95+	2001	14	66.6	1977	22+	1976	6	53.0	1997	241	45	.0	.3	30.0	.0	1.3	.0
Jun	77.3	57.4	67.4	106	1988	24	75.3	1988	35	1969	3	61.7	1982	61	131	.1	1.9	30.0	.0	.0	.0
Jul	81.6	62.0	71.8	108	1988	31	77.4	1988	41	1972	4	63.5	1992	24	236	.4	4.6	31.0	.0	.0	.0
Aug	79.4	59.8	69.6	105	1959	4	75.9	1983	36+	1987	31	64.1	1992	34	177	.3	2.7	31.0	.0	.0	.0
Sep	70.4	49.8	60.1	100	1959	8	65.6	1998	21	1965	26	54.7	1993	180	33	.0	.9	29.5	.0	.7	.0
Oct	57.5	37.6	47.6	92	1963	5	53.7	1973	11+	1991	30	43.2	1987	541	0	.0	.1	23.7	.2	9.8	.0
Nov	37.7	21.6	29.7	78	1978	3	40.2	1999	-18	1964	30	19.9	1985	1061	0	.0	.0	5.4	10.6	26.3	1.7
Dec	24.1	6.9	15.5	60+	1998	1	25.2	1997	-31	1993	28	-.3	1983	1535	0	.0	.0	.4	22.3	30.7	11.0
Ann	53.0	33.8	43.4	108	Jul 1988	31	77.4	Jul 1988	-36	Feb 1994	9	-4.4	Jan 1982	8468	627	.8	10.6	205.7	85.1	166.8	41.8

\+ 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	.89	.69	2.30	1997	4	3.19	1997	.01	1974
Feb	.65	.55	1.46	1977	23	1.66	1977	.16	1999
Mar	1.53	1.56	1.90	1977	12	4.59	1977	.28	1971
Apr	1.97	1.83	2.60	1997	5	4.66	1986	.38	1980
May	2.62	2.42	2.84	1969	16	5.93	1972	.18	1976
Jun	3.67	3.06	3.22	1981	13	7.90	1992	.37	1988
Jul	3.99	3.69	11.15	1949	6	8.14	1993	.47	1975
Aug	3.03	3.31	3.57	1957	13	5.14	1995	.70	2000
Sep	1.93	2.01	3.25	1969	22	3.58+	1995	.00	1979
Oct	2.14	1.57	2.50	1971	16	8.06	1971	.04	1978
Nov	1.16	.90	1.70	1970	8	4.37	2000	.03+	1990
Dec	.50	.43	1.10	1959	28	1.80	1977	.00	1986
Ann	24.08	24.31	11.15	Jul 1949	6	8.14	Jul 1993	.00+	Dec 1986

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	7.2	2.9	.2	.1
Feb	6.2	2.0	.1	@
Mar	7.3	3.8	.9	.1
Apr	8.4	4.9	1.1	.3
May	9.5	6.2	1.6	.4
Jun	9.9	6.5	2.5	.8
Jul	8.9	6.1	2.7	1.3
Aug	7.8	5.4	1.8	.7
Sep	7.5	4.2	1.4	.3
Oct	7.0	3.8	1.4	.6
Nov	6.6	2.9	.6	.1
Dec	5.9	1.7	.1	.0
Ann	92.2	50.4	14.4	4.7

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	.09	.15	.28	.40	.53	.68	.86	1.08	1.38	1.88	2.37
Feb	.19	.25	.35	.43	.50	.58	.67	.78	.91	1.13	1.32
Mar	.41	.55	.78	.97	1.16	1.36	1.58	1.84	2.18	2.72	3.22
Apr	.45	.63	.92	1.18	1.43	1.71	2.02	2.39	2.87	3.64	4.36
May	.76	1.01	1.38	1.71	2.02	2.35	2.71	3.14	3.69	4.56	5.37
Jun	.72	1.05	1.59	2.09	2.59	3.12	3.73	4.47	5.44	7.00	8.48
Jul	1.16	1.54	2.11	2.60	3.09	3.59	4.14	4.80	5.64	6.97	8.20
Aug	1.02	1.31	1.73	2.08	2.42	2.77	3.16	3.61	4.18	5.07	5.89
Sep	.41	.68	1.00	1.26	1.51	1.76	2.04	2.36	2.77	3.42	4.02
Oct	.10	.21	.45	.73	1.06	1.45	1.94	2.56	3.45	4.97	6.50
Nov	.05	.11	.25	.40	.58	.79	1.05	1.39	1.87	2.69	3.52
Dec	.03	.08	.16	.23	.31	.40	.50	.62	.78	1.05	1.31
Ann	15.18	16.82	18.96	20.62	22.11	23.56	25.08	26.78	28.86	31.91	34.59

\+ 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	10.3	9.0	6	7	10.0	1997	4	24.5	1975	26	1997	23	21	1997	7.9	3.7	1.1	.3	@	26.1	21.4	16.3	4.5
Feb	6.8	6.0	7	5	6.5	1990	15	12.8	1979	27	1997	5	23	1997	6.1	2.6	.6	.1	.0	21.6	18.4	13.6	6.9
Mar	7.7	7.0	4	3	10.2	1985	3	17.2	1985	27	1997	5	19	1997	4.5	2.1	.9	.4	.1	14.9	11.7	8.6	3.3
Apr	2.2	1.0	#	#	8.0	1994	28	10.0	1995	9	1998	1	3	1975	1.2	.8	.2	.1	.0	1.3	1.0	.6	.0
May	#	.0	#	0	#	1990	1	#+	1990	#+	1994	1	#+	1994	.0	.0	.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	#	1995	21	#+	1995	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Oct	.4	.0	#	0	4.0	1971	28	4.5	1971	4	1971	28	#+	1997	.5	.2	.1	.0	.0	.2	.1	.0	.0
Nov	6.7	5.0	1	1	8.5	1977	9	18.7	1977	14	1985	30	5	2000	4.7	2.5	.6	.3	.0	8.2	4.5	2.9	.4
Dec	6.0	4.8	4	3	5.2	1988	26	14.8	1993	19	1985	6	16	1985	6.8	2.4	.5	@	.0	19.7	14.5	8.8	3.2
Ann	40.1	32.8	N/A	N/A	10.2	Mar 1985	3	24.5	Jan 1975	27+	Mar 1997	5	23	Feb 1997	31.7	14.3	4.0	1.2	.1	92.0	71.6	50.8	18.3

+ 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	5/22	5/18	5/15	5/12	5/10	5/08	5/05	5/02	4/28
32	5/19	5/14	5/10	5/07	5/04	5/01	4/27	4/24	4/18
28	5/04	4/29	4/26	4/23	4/20	4/18	4/15	4/11	4/06
24	4/25	4/20	4/17	4/14	4/11	4/08	4/05	4/02	3/28
20	4/14	4/10	4/07	4/04	4/01	3/30	3/27	3/24	3/19
16	4/10	4/05	4/02	3/29	3/27	3/24	3/21	3/17	3/12

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	9/10	9/14	9/16	9/19	9/21	9/23	9/25	9/28	10/02
32	9/19	9/23	9/26	9/29	10/01	10/04	10/07	10/10	10/14
28	9/28	10/03	10/06	10/09	10/11	10/14	10/16	10/20	10/24
24	10/04	10/10	10/14	10/17	10/20	10/24	10/27	10/31	11/06
20	10/13	10/19	10/24	10/27	10/31	11/03	11/07	11/11	11/17
16	10/26	10/31	11/03	11/05	11/08	11/10	11/13	11/16	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	149	143	139	136	133	130	127	123	118
32	172	165	159	154	150	146	141	135	128
28	196	188	182	178	173	169	164	158	150
24	215	207	201	196	192	187	182	176	168
20	234	226	221	216	212	208	203	198	190
16	245	238	233	229	225	221	217	212	206

***** 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	1712	1347	1118	614	241	61	24	34	180	541	1061	1535	8468
60	1557	1207	963	474	144	19	6	9	86	388	911	1380	7144
57	1464	1123	870	395	99	8	0	2	48	301	821	1287	6418
55	1402	1067	809	346	75	4	0	1	30	248	761	1225	5968
50	1247	933	663	237	32	0	0	0	6	137	617	1070	4942
32	721	485	223	25	0	0	0	0	0	4	200	563	2221

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	32	62	128	406	827	1060	1235	1166	843	486	129	51	6425
55	0	0	1	37	189	373	522	453	183	17	0	0	1775
57	0	0	0	26	151	317	460	392	141	8	0	0	1495
60	0	0	0	14	103	238	373	306	89	2	0	0	1125
65	0	0	0	5	45	131	236	177	33	0	0	0	627
70	0	0	0	0	15	57	131	85	8	0	0	0	296

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	1	23	203	580	818	982	912	603	266	29	0	0	1	24	227	807	1625	2607	3519	4122	4388	4417	4417
45	0	0	6	116	430	668	827	757	459	157	11	0	0	0	6	122	552	1220	2047	2804	3263	3420	3431	3431
50	0	0	0	59	294	518	672	602	317	80	1	0	0	0	0	59	353	871	1543	2145	2462	2542	2543	2543
55	0	0	0	27	173	371	517	447	191	34	0	0	0	0	0	27	200	571	1088	1535	1726	1760	1760	1760
60	0	0	0	11	90	235	362	296	102	10	0	0	0	0	0	11	101	336	698	994	1096	1106	1106	1106
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	1	17	125	344	518	652	595	360	148	23	0	0	1	18	143	487	1005	1657	2252	2612	2760	2783	2783

(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

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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