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: CROOKSTON NW EXP STN, MN **COOP ID: 211891**

Climate Division: MN 1 **NWS Call Sign:** **Elevation: 888 Feet** **Lat: 47˚48N** **Lon: 96˚36W**

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	14.1	-6.5	3.8	57	1902	5	17.6	1990	-44	1892	18	-9.8	1982	1900	0	.0	.0	.0	28.2	31.0	20.1
Feb	21.3	1.0	11.2	63	1958	25	26.2	1998	-51	1936	15	-2.5	1979	1508	0	.0	.0	.1	21.6	28.0	13.7
Mar	33.4	15.6	24.5	78+	1963	31	35.3	1973	-39	1948	10	14.2	1996	1255	0	.0	.0	2.9	12.9	28.2	5.1
Apr	52.4	31.0	41.7	96+	1980	22	49.7	1987	-10	1979	6	33.2	1979	701	1	.0	.1	18.1	1.4	17.6	.2
May	68.6	44.1	56.4	101	1939	30	65.6	1977	6	1967	3	48.1	1979	306	38	.0	.7	29.5	.0	4.0	.0
Jun	77.0	53.5	65.3	102	1893	12	72.6	1988	27	1964	1	58.6	1982	93	101	.0	1.6	30.0	.0	.0	.0
Jul	81.5	57.5	69.5	105+	1936	12	74.0	1974	38+	1967	4	61.8	1992	39	178	.2	3.2	31.0	.0	.0	.0
Aug	80.6	55.3	68.0	104	1983	8	73.4	1983	31	1964	13	62.0	1977	58	149	.2	3.5	31.0	.0	.0	.0
Sep	69.4	44.6	57.0	99	1931	11	62.6	1978	11	1893	26	52.2	1984	257	17	.0	.9	29.1	.0	2.7	.0
Oct	55.3	32.7	44.0	88+	1992	2	49.9	1973	-2	1919	26	39.6	1976	652	0	.0	.0	21.3	.5	14.0	.0
Nov	34.1	16.8	25.5	73	1999	1	35.7	1999	-30+	1985	27	13.7	1985	1186	0	.0	.0	3.7	14.5	27.7	2.8
Dec	19.9	1.2	10.6	56+	1990	10	24.0	1997	-38	1933	28	-1.2	1983	1687	0	.0	.0	.1	25.9	31.0	14.7
Ann	50.6	28.9	39.8	105+	Jul 1936	12	74.0	Jul 1974	-51	Feb 1936	15	-9.8	Jan 1982	9642	484	.4	10.0	196.8	105.0	184.2	56.6

\+ 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

Issue Date: February 2004

(1) From the 1971-2000 Monthly Normals

(2) Derived from station's available digital record: 1890-2001

(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	.54	.41	1.00	1896	30	1.38	1997	.10	2000
Feb	.54	.42	1.28	1946	6	1.77	1979	.07	1978
Mar	.74	.61	1.42	1941	16	2.04	1983	.00	1986
Apr	1.32	.96	2.08	1924	26	5.01	1986	.00+	1988
May	2.44	1.98	4.60	1922	11	6.04	1998	.33	1980
Jun	3.51	3.37	4.20	1960	27	7.11+	1994	1.04	1987
Jul	3.12	3.19	5.40	1919	2	7.56	1995	.43	1975
Aug	2.94	3.04	5.85	1908	31	6.03	1999	.33	1996
Sep	2.24	1.87	3.12	1953	2	6.69	1973	.07	1974
Oct	1.84	1.59	2.70	1997	9	5.32	1998	.06	1992
Nov	.99	.75	1.90	2000	1	4.42	2000	.00	1999
Dec	.50	.45	1.10	1945	8	1.72	1996	.05	1979
Ann	20.72	20.63	5.85	Aug 1908	31	7.56	Jul 1995	.00+	Nov 1999

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	6.9	1.8	.1	.0
Feb	5.4	1.5	.2	@
Mar	6.3	2.4	.2	.0
Apr	6.6	3.3	.7	.3
May	9.2	5.0	1.6	.4
Jun	11.2	6.4	2.3	.7
Jul	10.1	5.6	1.8	.8
Aug	9.5	6.0	1.9	.7
Sep	8.2	4.6	1.4	.5
Oct	7.2	4.0	1.1	.4
Nov	5.9	2.5	.5	.1
Dec	6.8	1.5	.1	@
Ann	93.3	44.6	11.9	3.9

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	.13	.18	.26	.33	.39	.47	.55	.65	.78	.98	1.17
Feb	.06	.10	.18	.25	.33	.42	.53	.65	.83	1.12	1.40
Mar	.09	.18	.31	.42	.52	.64	.76	.92	1.12	1.44	1.74
Apr	.00	.13	.36	.57	.78	1.03	1.31	1.65	2.11	2.89	3.64
May	.49	.71	1.07	1.40	1.73	2.08	2.48	2.97	3.61	4.63	5.60
Jun	1.09	1.42	1.92	2.35	2.76	3.18	3.65	4.21	4.92	6.03	7.05
Jul	.65	.94	1.39	1.81	2.23	2.68	3.18	3.79	4.59	5.88	7.09
Aug	.84	1.11	1.54	1.90	2.26	2.63	3.04	3.53	4.16	5.15	6.07
Sep	.29	.47	.79	1.10	1.43	1.79	2.21	2.74	3.44	4.60	5.72
Oct	.11	.21	.44	.69	.97	1.30	1.71	2.23	2.95	4.18	5.41
Nov	.03	.09	.22	.36	.52	.70	.92	1.20	1.60	2.26	2.92
Dec	.07	.12	.19	.26	.33	.41	.50	.61	.76	1.01	1.24
Ann	14.12	15.38	17.00	18.23	19.34	20.41	21.52	22.75	24.25	26.44	28.33

\+ 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: 1890-2001
(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	9.1	7.2	8	6	12.0	1996	18	18.4	1982	38	1997	30	36	1997	6.8	3.8	1.0	.3	@	29.1	24.5	18.2	4.0
Feb	6.5	5.9	7	5	11.0	1977	24	17.0	1979	36	1997	1	25	1997	4.8	2.6	.6	.2	@	22.6	18.4	13.2	2.3
Mar	5.2	6.0	4	3	10.0	1997	4	13.7	1975	31	1997	16	27	1997	3.8	2.2	.7	.2	@	13.8	10.0	6.4	1.5
Apr	1.6	.9	1	#	7.0	1997	6	10.3	1997	22	1997	1	8	1997	1.3	.8	.1	.1	.0	1.7	.5	.1	.0
May	.1	.0	0	0	2.0	1979	5	2.0	1979	0	0	0	0	0	.1	.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	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Oct	.5	.0	#	0	4.0	1972	30	4.0+	1979	3	1979	31	#+	1997	.3	.1	.1	.0	.0	.2	.1	.0	.0
Nov	6.0	3.3	2	1	15.0	1998	18	30.8	1977	20	1998	22	7	1977	3.5	2.4	.6	.3	.1	10.8	4.2	2.7	1.9
Dec	6.0	6.0	4	3	6.0	1996	17	12.0	1993	38	1996	31	27	1996	5.9	2.9	.6	.1	.0	21.3	10.5	3.0	1.5
Ann	35.0	29.3	N/A	N/A	15.0	Nov 1998	18	30.8	Nov 1977	38+	Jan 1997	30	36	Jan 1997	26.5	14.9	3.7	1.2	.1	99.5	68.2	43.6	11.2

+ 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	6/02	5/29	5/26	5/24	5/21	5/19	5/16	5/13	5/09
32	5/23	5/19	5/16	5/13	5/11	5/08	5/06	5/03	4/28
28	5/16	5/11	5/07	5/04	5/01	4/28	4/24	4/21	4/15
24	5/05	4/30	4/26	4/22	4/19	4/16	4/13	4/09	4/03
20	4/23	4/18	4/14	4/11	4/09	4/06	4/03	3/30	3/25
16	4/14	4/10	4/07	4/04	4/02	3/31	3/28	3/25	3/21

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	9/03	9/06	9/09	9/11	9/13	9/15	9/17	9/20	9/24
32	9/13	9/16	9/19	9/21	9/23	9/25	9/27	9/29	10/03
28	9/19	9/24	9/27	9/30	10/02	10/05	10/08	10/11	10/16
24	9/28	10/04	10/08	10/11	10/15	10/18	10/21	10/26	10/31
20	10/06	10/11	10/16	10/19	10/23	10/26	10/30	11/03	11/09
16	10/16	10/22	10/26	10/30	11/03	11/06	11/10	11/14	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	133	126	122	118	114	111	107	102	96
32	153	146	142	138	134	131	127	122	116
28	172	166	161	158	154	151	147	142	136
24	200	193	187	182	178	173	168	162	155
20	220	212	206	201	196	192	187	181	173
16	236	229	223	218	214	209	204	199	191

***** 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	1900	1508	1255	701	306	93	39	58	257	652	1186	1687	9642
60	1745	1368	1100	556	199	36	11	18	144	497	1036	1532	8242
57	1652	1284	1007	473	146	18	4	8	91	407	946	1439	7475
55	1590	1228	945	420	116	10	0	3	64	349	886	1377	6988
50	1435	1088	795	299	59	2	0	0	20	219	738	1222	5877
32	895	619	330	43	0	0	0	0	0	13	284	693	2877

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	18	36	98	334	756	998	1162	1114	750	384	88	29	5767
55	0	0	0	21	158	318	449	404	123	7	0	0	1480
57	0	0	0	14	126	265	391	347	91	3	0	0	1237
60	0	0	0	7	86	193	305	264	54	1	0	0	910
65	0	0	0	1	38	101	178	149	17	0	0	0	484
70	0	0	0	0	14	38	89	69	4	0	0	0	214

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	10	159	525	760	919	871	525	203	21	0	0	0	10	169	694	1454	2373	3244	3769	3972	3993	3993
45	0	0	0	83	382	610	764	716	382	108	8	0	0	0	0	83	465	1075	1839	2555	2937	3045	3053	3053
50	0	0	0	45	253	460	609	561	251	53	0	0	0	0	0	45	298	758	1367	1928	2179	2232	2232	2232
55	0	0	0	18	151	317	455	406	149	18	0	0	0	0	0	18	169	486	941	1347	1496	1514	1514	1514
60	0	0	0	4	79	190	307	261	73	5	0	0	0	0	0	4	83	273	580	841	914	919	919	919
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	0	5	110	331	477	600	564	322	126	13	0	0	0	5	115	446	923	1523	2087	2409	2535	2548	2548

(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