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: WORTHINGTON 2 NNE, MN **COOP ID: 219170**

Climate Division: MN 7 **NWS Call Sign:** **Elevation: 1,570 Feet** **Lat: 43˚39N** **Lon: 95˚35W**

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	20.8	1.9	11.4	63	1981	25	26.3	1990	-29+	1972	16	-3.3	1979	1663	0	.0	.0	.3	23.7	31.0	14.1
Feb	27.4	8.5	18.0	64+	2000	23	30.7	1987	-30	1996	2	1.6	1979	1317	0	.0	.0	1.6	17.0	27.5	8.4
Mar	38.8	19.9	29.4	79	1978	31	38.7	2000	-13	1995	8	19.6	1975	1106	0	.0	.0	6.6	9.0	27.2	2.4
Apr	54.8	32.2	43.5	91	1980	22	50.4	1987	5+	1982	6	36.6	1975	646	1	.0	.1	19.9	1.3	14.6	.0
May	69.1	45.3	57.2	99	1998	19	64.8	1977	24+	1976	7	51.4	1997	283	40	.0	.6	29.5	.0	2.0	.0
Jun	78.5	55.4	67.0	103	1988	22	72.5	1988	37	1985	3	61.3	1982	59	117	.1	3.0	29.9	.0	.0	.0
Jul	82.3	59.7	71.0	103	1976	10	76.0	1983	42+	1985	22	64.1	1992	18	205	.2	5.3	31.0	.0	.0	.0
Aug	79.7	56.6	68.2	104	1988	1	74.8	1983	39	1985	19	63.2	1977	54	151	@	3.0	31.0	.0	.0	.0
Sep	71.6	46.5	59.1	101	1976	7	65.8	1998	24+	1974	23	54.2	1975	207	28	@	.8	29.4	.0	1.6	.0
Oct	58.9	34.3	46.6	92	1997	3	51.4	1973	10	1972	19	40.1	1976	571	0	.0	@	24.5	.3	12.3	.0
Nov	39.2	20.9	30.1	79	1999	14	42.0	1999	-11+	1985	27	20.5	1985	1049	0	.0	.0	7.3	9.4	26.2	1.2
Dec	25.2	7.8	16.5	64	1998	4	25.4	1998	-28	1983	19	-.3	1983	1504	0	.0	.0	.7	20.8	30.8	8.8
Ann	53.9	32.4	43.2	104	Aug 1988	1	76.0	Jul 1983	-30	Feb 1996	2	-3.3	Jan 1979	8477	542	.3	12.8	211.7	81.5	173.2	34.9

\+ 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: 1971-2001

(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	.70	.53	1.36	1975	11	2.32	1975	.00	1981
Feb	.61	.61	1.06	1984	19	1.67	1971	.02	1987
Mar	1.88	1.50	1.96	1987	23	4.76	1979	.11	1994
Apr	2.72	2.55	3.55	2001	23	5.93	1984	.31	1996
May	3.37	3.35	2.30	1992	11	6.45	1982	1.02	1994
Jun	4.60	4.22	3.54	1993	30	12.29	1993	1.41	1987
Jul	3.56	3.09	3.51	1978	4	11.19	1993	.15	1975
Aug	3.48	3.05	4.80	1994	10	8.22	1979	.62	1999
Sep	2.55	2.17	2.40	1973	29	5.42	1986	.13	1998
Oct	1.96	1.50	3.33	1977	1	6.28	1977	.00	1988
Nov	1.66	1.38	1.95+	1982	10	4.94	1975	.05	1976
Dec	.70	.64	1.39	1982	28	2.43	1982	.03+	1989
Ann	27.79	26.86	4.80	Aug 1994	10	12.29	Jun 1993	.00+	Oct 1988

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	6.5	2.1	.1	.1
Feb	5.4	2.0	.2	@
Mar	7.8	4.5	1.1	.2
Apr	10.2	5.7	1.9	.4
May	11.7	7.0	2.0	.7
Jun	11.0	6.8	3.3	1.4
Jul	9.7	6.1	2.2	1.0
Aug	9.1	5.5	2.2	.9
Sep	8.4	4.8	1.6	.5
Oct	6.9	4.0	1.1	.3
Nov	6.8	3.4	1.1	.3
Dec	5.7	2.1	.2	@
Ann	99.2	54.0	17.0	5.8

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	.08	.18	.29	.40	.52	.67	.86	1.11	1.54	1.95
Feb	.08	.13	.21	.30	.39	.49	.60	.74	.94	1.25	1.56
Mar	.36	.53	.81	1.06	1.32	1.59	1.91	2.28	2.78	3.59	4.35
Apr	.74	1.00	1.39	1.74	2.07	2.43	2.82	3.28	3.88	4.82	5.70
May	1.21	1.52	1.98	2.37	2.73	3.11	3.52	4.00	4.61	5.55	6.41
Jun	1.26	1.70	2.36	2.94	3.51	4.10	4.76	5.54	6.55	8.14	9.63
Jul	.47	.76	1.27	1.76	2.28	2.86	3.53	4.35	5.46	7.28	9.04
Aug	.71	1.03	1.54	2.00	2.47	2.98	3.55	4.23	5.13	6.58	7.95
Sep	.46	.68	1.05	1.40	1.76	2.14	2.58	3.10	3.81	4.94	6.03
Oct	.08	.24	.53	.81	1.12	1.47	1.89	2.41	3.12	4.31	5.47
Nov	.14	.25	.47	.70	.95	1.24	1.59	2.02	2.63	3.64	4.63
Dec	.07	.13	.22	.32	.43	.54	.68	.85	1.09	1.47	1.85
Ann	17.54	19.43	21.90	23.81	25.53	27.21	28.96	30.91	33.31	36.82	39.90

\+ 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: 1971-2001
(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	6.7	4.5	6	4	12.0	1988	20	22.0	1979	27+	1994	31	18	1994	4.5	2.3	.9	.3	@	24.8	19.6	16.0	7.2
Feb	5.8	5.9	5	3	10.5	1984	19	14.5	1984	27+	1994	7	19	1988	3.9	2.5	.6	.1	@	20.0	14.1	10.0	5.1
Mar	7.1	7.5	2	2	9.0	1992	9	17.3	1983	20+	1984	13	13	1984	3.9	2.3	1.1	.3	.0	12.7	7.3	4.7	1.4
Apr	3.6	2.5	#	1	10.0	2000	7	12.5+	2000	10	2000	7	1+	2000	1.6	1.3	.5	.1	@	3.1	.9	.3	@
May	.0	.0	#	0	.3	1984	1	.3	1984	#	1984	1	#	2000	.0	.0	.0	.0	.0	.0	.0	.0	.0
Jun	.0	.0	#	0	.0	0	0	.0	0	0	0	0	#	1988	.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	#	1991	18	#+	1991	#	1991	18	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Oct	.9	.0	#	0	4.0	1976	24	6.0	1976	4+	1982	21	#	1999	.5	.4	.1	.0	.0	.7	.1	.0	.0
Nov	6.6	6.4	1	1	12.0	1983	28	19.5	1983	13+	1983	30	6	1985	3.6	2.2	.8	.3	@	10.1	5.3	3.2	.9
Dec	6.3	5.4	4	2	13.0	1982	28	16.3	1982	23+	1983	28	19	1983	4.2	2.4	.8	.3	@	20.7	13.7	8.6	3.7
Ann	37.0	32.2	N/A	N/A	13.0	Dec 1982	28	22.0	Jan 1979	27+	Feb 1994	7	19+	Feb 1988	22.2	13.4	4.8	1.4	@	92.1	61.0	42.8	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	5/27	5/22	5/19	5/16	5/13	5/11	5/08	5/05	4/30
32	5/15	5/11	5/08	5/05	5/03	4/30	4/28	4/25	4/20
28	5/09	5/04	4/30	4/27	4/23	4/20	4/17	4/13	4/08
24	4/23	4/18	4/15	4/12	4/10	4/07	4/05	4/02	3/28
20	4/16	4/11	4/08	4/05	4/03	3/31	3/28	3/25	3/20
16	4/10	4/05	4/02	3/30	3/27	3/25	3/22	3/18	3/14

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	9/18	9/20	9/22	9/25	9/27	10/01
32	9/15	9/20	9/23	9/26	9/28	10/01	10/04	10/07	10/12
28	9/25	9/30	10/03	10/06	10/09	10/11	10/14	10/18	10/22
24	10/06	10/11	10/15	10/19	10/22	10/25	10/28	11/01	11/07
20	10/13	10/19	10/23	10/26	10/29	11/01	11/05	11/09	11/14
16	10/24	10/29	11/02	11/05	11/07	11/10	11/13	11/17	11/22

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	142	137	133	129	125	121	116	110
32	166	159	155	151	148	144	140	136	130
28	187	180	176	171	167	164	159	154	148
24	216	208	203	198	194	190	186	180	173
20	231	223	218	213	209	204	200	194	187
16	246	239	233	229	224	220	215	210	202

***** 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	1663	1317	1106	646	283	59	18	54	207	571	1049	1504	8477
60	1508	1177	951	500	179	18	3	16	106	419	899	1349	7125
57	1415	1093	858	416	128	7	0	6	63	334	809	1256	6385
55	1353	1037	796	362	100	4	0	3	42	281	749	1194	5921
50	1198	903	649	242	48	0	0	0	11	168	604	1039	4862
32	675	457	209	17	0	0	0	0	0	7	185	525	2075

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	35	64	125	362	780	1048	1210	1120	811	459	127	43	6184
55	0	0	0	17	167	362	497	410	163	21	0	0	1637
57	0	0	0	11	134	306	435	351	124	12	0	0	1373
60	0	0	0	5	91	227	345	268	77	4	0	0	1017
65	0	0	0	1	40	117	205	151	28	0	0	0	542
70	0	0	0	0	14	45	101	70	6	0	0	0	236

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	3	40	197	551	821	973	887	594	272	40	1	0	3	43	240	791	1612	2585	3472	4066	4338	4378	4379
45	0	1	14	116	405	672	818	732	449	163	15	0	0	1	15	131	536	1208	2026	2758	3207	3370	3385	3385
50	0	0	4	59	271	522	663	577	311	83	3	0	0	0	4	63	334	856	1519	2096	2407	2490	2493	2493
55	0	0	0	30	161	374	508	422	193	37	0	0	0	0	0	30	191	565	1073	1495	1688	1725	1725	1725
60	0	0	0	11	81	242	356	276	105	11	0	0	0	0	0	11	92	334	690	966	1071	1082	1082	1082
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	2	30	133	333	523	645	574	372	176	31	0	0	2	32	165	498	1021	1666	2240	2612	2788	2819	2819

(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