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: WADENA 3 S, MN **COOP ID: 218579**

Climate Division: MN 5 **NWS Call Sign:** **Elevation: 1,350 Feet** **Lat: 46˚24N** **Lon: 95˚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	15.8	-5.3	5.3	58	1942	23	18.5	1990	-42+	1936	22	-7.6	1982	1853	0	.0	.0	.1	27.5	31.0	18.9
Feb	23.0	1.3	12.2	60	1961	22	27.4	1998	-43+	1996	2	-.5	1989	1481	0	.0	.0	.2	20.2	27.9	13.4
Mar	34.9	14.6	24.8	79	1946	28	35.0	2000	-33	1948	10	15.6	1996	1248	0	.0	.0	2.7	11.4	29.0	5.1
Apr	52.8	29.2	41.0	96	1980	22	49.1	1987	-7	1975	3	33.1	1975	721	0	.0	@	17.3	1.2	20.0	.2
May	67.2	42.3	54.8	104	1934	31	63.6	1977	17	1946	12	47.2	1979	343	27	.0	.2	29.1	.0	4.5	.0
Jun	74.2	52.3	63.3	97+	1950	6	69.7	1988	30+	1946	1	57.6	1982	120	67	.0	.8	30.0	.0	.0	.0
Jul	78.6	56.4	67.5	112	1936	10	71.9	1989	37	1972	4	60.1	1992	52	130	.1	1.6	31.0	.0	.0	.0
Aug	77.2	54.1	65.7	103	1938	2	71.2	1983	32	1934	28	60.1	1977	77	97	.1	1.4	31.0	.0	.0	.0
Sep	67.3	43.9	55.6	98	1939	14	61.9	1998	17	1974	30	50.4	1993	293	11	.0	.4	28.9	.0	2.7	.0
Oct	54.9	32.2	43.6	94	1963	5	49.2	1973	2	1951	31	37.9	1976	666	0	.0	.0	20.1	.5	16.1	.0
Nov	35.4	17.8	26.6	74+	1999	9	36.9	1999	-22	1964	30	17.4	1985	1153	0	.0	.0	3.9	12.7	27.9	2.3
Dec	21.2	2.5	11.9	65	1939	6	23.3	1997	-42	1983	20	-2.9	1983	1649	0	.0	.0	.3	24.6	31.0	13.9
Ann	50.2	28.4	39.4	112	Jul 1936	10	71.9	Jul 1989	-43+	Feb 1996	2	-7.6	Jan 1982	9656	332	.2	4.4	194.6	98.1	190.1	53.8

\+ 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: 1932-2001

(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	.95	.83	1.86	1997	5	3.39	1997	.08	1981
Feb	.61	.60	1.03	1954	20	1.66	1979	.09	1983
Mar	1.60	1.70	1.95	1957	15	2.83	1975	.47	1974
Apr	1.98	1.81	2.30	1960	24	4.94	1986	.05	1980
May	3.01	2.48	2.92+	1993	24	7.63	1993	.52	1976
Jun	4.24	4.44	3.03	1968	10	7.39	1998	.96	1987
Jul	3.64	3.80	4.33	1959	8	6.63	1999	1.03	1976
Aug	3.15	2.89	5.97	1995	7	9.81	1995	.45	1976
Sep	2.60	2.31	3.23	1980	12	6.54	1986	.24	1974
Oct	2.58	1.51	3.91	1984	15	8.55	1998	.16	1976
Nov	1.48	1.34	1.73	1977	9	3.85	2000	.02	1999
Dec	.60	.62	1.25	1951	3	1.66	1972	.05	1986
Ann	26.44	26.43	5.97	Aug 1995	7	9.81	Aug 1995	.02	Nov 1999

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	7.0	2.9	.4	.1
Feb	5.7	2.1	.1	.0
Mar	7.4	3.9	.9	.2
Apr	7.9	4.6	1.3	.3
May	9.1	6.0	2.0	.6
Jun	11.6	7.8	2.9	1.2
Jul	9.8	6.8	2.4	1.0
Aug	8.8	6.0	1.8	.6
Sep	8.1	5.3	1.7	.4
Oct	7.7	4.1	1.5	.6
Nov	7.2	3.5	.9	.1
Dec	6.5	2.1	.1	.0
Ann	96.8	55.1	16.0	5.1

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	.11	.18	.31	.44	.58	.74	.93	1.15	1.46	1.98	2.48
Feb	.11	.16	.25	.34	.42	.51	.62	.74	.91	1.18	1.44
Mar	.54	.70	.92	1.10	1.28	1.47	1.67	1.91	2.21	2.68	3.11
Apr	.33	.50	.79	1.06	1.34	1.64	1.99	2.41	2.98	3.89	4.77
May	.82	1.10	1.54	1.92	2.29	2.68	3.12	3.63	4.30	5.34	6.32
Jun	1.53	1.93	2.50	2.98	3.44	3.92	4.43	5.02	5.79	6.96	8.04
Jul	1.41	1.75	2.23	2.63	3.01	3.40	3.81	4.30	4.91	5.86	6.72
Aug	.71	1.00	1.47	1.88	2.30	2.74	3.23	3.83	4.61	5.85	7.02
Sep	.67	.92	1.30	1.63	1.96	2.30	2.69	3.14	3.74	4.68	5.56
Oct	.13	.27	.57	.91	1.31	1.78	2.36	3.10	4.16	5.95	7.75
Nov	.16	.27	.48	.68	.91	1.15	1.44	1.81	2.30	3.11	3.91
Dec	.12	.18	.27	.35	.43	.52	.61	.73	.89	1.14	1.38
Ann	17.92	19.54	21.63	23.23	24.66	26.04	27.48	29.07	31.02	33.85	36.31

\+ 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: 1932-2001
(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	11.3	10.8	10	9
Feb	6.9	6.4	11	8
Mar	9.8	8.0	7	4
Apr	2.8	2.0	1	#
May	.1	.0	#	0
Jun	.0	.0	0	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	#	.0	#	0
Oct	.9	.0	#	#
Nov	8.2	5.6	2	1
Dec	6.7	7.0	5	4
Ann	46.7	39.8	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	18.5	1997	5	36.0	1997	38	1997	30	33	1997
Feb	10.0	1990	16	23.7	1979	30	1979	25	26	1997
Mar	16.0	1985	4	25.7	1995	38	1997	15	30	1997
Apr	8.0	2000	11	10.0	1991	17	1975	2	6	1975
May	1.3	1971	20	1.3	1971	#	1990	1	#	1990
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	#	1995	23	#+	1995	#	1995	23	#	1995
Oct	6.0	1995	24	6.0	1995	6	1995	24	1	1995
Nov	12.5	1993	25	25.5	1993	18	1993	28	8	1993
Dec	7.0	1985	1	14.4	1972	17+	1996	31	16	1985
Ann	18.5	Jan 1997	5	36.0	Jan 1997	38+	Mar 1997	15	33	Jan 1997

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	7.0	3.9	1.2	.5	@
Feb	4.7	2.4	.7	.3	@
Mar	4.4	2.9	1.3	.6	.1
Apr	1.4	1.0	.3	.2	.0
May	.1	.1	.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	.6	.4	.1	@	.0
Nov	4.2	3.0	1.0	.3	@
Dec	5.8	2.9	.5	.1	.0
Ann	28.2	16.6	5.1	2.0	.1

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	29.8	26.0	22.1	12.6
Feb	27.0	24.7	20.3	9.9
Mar	17.2	13.8	10.2	4.7
Apr	2.9	1.2	.5	.0
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	.6	.2	@	.0
Nov	9.4	6.0	3.3	.3
Dec	25.2	18.0	11.1	4.8
Ann	112.1	89.9	67.5	32.3

+ 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	6/04	5/30	5/27	5/24	5/21	5/19	5/16	5/13	5/08
32	5/22	5/18	5/14	5/12	5/09	5/07	5/04	5/01	4/27
28	5/13	5/09	5/06	5/04	5/02	4/29	4/27	4/24	4/20
24	5/05	4/30	4/25	4/22	4/19	4/15	4/12	4/08	4/02
20	4/21	4/16	4/13	4/11	4/09	4/06	4/04	4/01	3/27
16	4/14	4/10	4/07	4/04	4/01	3/30	3/27	3/24	3/19

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	9/07	9/10	9/13	9/15	9/18	9/20	9/24	9/28
32	9/16	9/19	9/21	9/23	9/25	9/27	9/29	10/02	10/05
28	9/21	9/26	9/30	10/03	10/06	10/09	10/12	10/15	10/20
24	10/03	10/08	10/11	10/14	10/17	10/20	10/23	10/26	10/31
20	10/13	10/17	10/21	10/24	10/27	10/29	11/01	11/05	11/10
16	10/22	10/27	10/30	11/02	11/05	11/08	11/11	11/14	11/19

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	135	129	124	120	116	112	108	104	97
32	155	149	145	142	138	135	132	128	122
28	175	168	164	160	156	152	149	144	138
24	205	197	191	185	181	176	170	164	156
20	218	212	208	204	200	197	193	189	183
16	239	232	226	221	217	213	208	203	195

***** 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	1853	1481	1248	721	343	120	52	77	293	666	1153	1649	9656
60	1698	1341	1093	574	228	51	13	24	173	511	1003	1494	8203
57	1605	1257	1000	489	171	26	5	10	115	420	913	1401	7412
55	1543	1201	938	434	137	16	1	5	84	361	853	1339	6912
50	1388	1061	786	308	72	3	0	0	30	227	704	1184	5763
32	846	592	316	41	1	0	0	0	0	11	256	655	2718

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	16	35	91	310	707	937	1102	1043	708	369	93	29	5440
55	0	0	0	14	131	263	389	334	102	5	0	0	1238
57	0	0	0	9	102	213	332	278	73	2	0	0	1009
60	0	0	0	4	66	148	247	199	41	0	0	0	705
65	0	0	0	0	27	67	130	97	11	0	0	0	332
70	0	0	0	0	9	20	53	33	2	0	0	0	117

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	11	138	474	708	865	809	482	183	17	0	0	0	11	149	623	1331	2196	3005	3487	3670	3687	3687
45	0	0	3	68	335	558	710	654	341	100	7	0	0	0	3	71	406	964	1674	2328	2669	2769	2776	2776
50	0	0	0	34	208	411	555	499	217	46	0	0	0	0	0	34	242	653	1208	1707	1924	1970	1970	1970
55	0	0	0	12	116	270	401	347	124	16	0	0	0	0	0	12	128	398	799	1146	1270	1286	1286	1286
60	0	0	0	2	55	151	254	204	56	3	0	0	0	0	0	2	57	208	462	666	722	725	725	725
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	0	9	104	293	430	553	506	285	121	14	0	0	0	9	113	406	836	1389	1895	2180	2301	2315	2315

(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