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: WINONA DAM 5 A, MN **COOP ID: 219072**

Climate Division: MN 9 **NWS Call Sign:** **Elevation: 663 Feet** **Lat: 44˚05N** **Lon: 91˚40W**

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	.0	.0	.0	53	1996	14	.0	0	-31	1996	31	.0	0	0	0	.0	.0	.2	23.6	30.8	12.6
Feb	.0	.0	.0	60	2000	26	.0	0	-38+	1996	4	.0	0	0	0	.0	.0	1.4	15.1	27.6	3.9
Mar	.0	.0	.0	81	2000	8	.0	0	-9	1993	17	.0	0	0	0	.0	.0	7.4	6.3	25.3	1.8
Apr	.0	.0	.0	93	1980	21	.0	0	8	1980	25	.0	0	0	0	.0	@	23.1	.3	12.4	.0
May	.0	.0	.0	93	1970	21	.0	0	30+	1997	13	.0	0	0	0	.0	.6	30.6	.0	.9	.0
Jun	.0	.0	.0	98	1996	30	.0	0	40+	1992	22	.0	0	0	0	.1	3.3	30.0	.0	.0	.0
Jul	.0	.0	.0	108	1995	14	.0	0	48	2001	2	.0	0	0	0	.2	5.9	31.0	.0	.0	.0
Aug	.0	.0	.0	98	2000	10	.0	0	45	1997	15	.0	0	0	0	.1	3.2	31.0	.0	.0	.0
Sep	.0	.0	.0	96	1998	14	.0	0	34	1991	28	.0	0	0	0	.0	.7	29.8	.0	1.4	.0
Oct	.0	.0	.0	88	1997	4	.0	0	21+	1997	28	.0	0	0	0	.0	@	26.6	.0	10.6	.0
Nov	.0	.0	.0	78+	1999	10	.0	0	-2	1996	27	.0	0	0	0	.0	.0	8.6	5.5	22.1	.7
Dec	.0	.0	.0	66	1998	6	.0	0	-31	2000	25	.0	0	0	0	.0	.0	.8	18.0	30.1	7.0
Ann	.0	.0	.0	108	Jul 1995	14	-99.9	0	-38+	Feb 1996	4	99.9	0	0	0	.4	13.7	220.5	68.8	161.2	26.0

\+ 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	.94	.78	1.50	1971	4	2.56	1996	.14	1981
Feb	.84	.69	1.46	1998	27	2.60	1998	.00	1987
Mar	1.87	1.67	1.89	1966	23	3.52	1990	.31	1994
Apr	3.31	2.76	5.44	1990	24	8.20	1990	.90	1997
May	3.74	3.69	3.10	1980	31	7.32	1973	1.35	1985
Jun	3.88	3.12	2.71	1968	21	8.67	2000	1.27	1982
Jul	4.20	3.54	4.41	1978	1	10.70	1978	1.40	1975
Aug	4.14	3.50	3.04	1973	23	9.97	1998	.61	1971
Sep	3.44	3.35	3.41	1965	19	8.03	1972	.31	1979
Oct	2.20	1.99	2.20	1986	12	4.68	1979	.33	1976
Nov	2.18	1.94	2.60	1991	2	7.83	1991	.01	1976
Dec	1.03	.93	1.23	1982	28	2.82	1982	.15	1998
Ann	31.77	31.36	5.44	Apr 1990	24	10.70	Jul 1978	.00	Feb 1987

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	7.5	3.1	.4	@
Feb	6.0	2.4	.3	.1
Mar	8.4	4.5	1.1	.3
Apr	11.4	6.6	2.1	.6
May	11.6	7.4	2.4	.9
Jun	11.0	7.0	2.8	.8
Jul	10.6	6.8	3.2	1.2
Aug	10.2	7.3	2.7	1.0
Sep	10.1	6.5	2.3	.8
Oct	8.5	4.7	1.3	.5
Nov	8.5	4.3	1.3	.3
Dec	7.6	3.3	.3	@
Ann	111.4	63.9	20.2	6.5

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	.29	.43	.55	.68	.81	.96	1.14	1.37	1.74	2.09
Feb	.07	.16	.30	.42	.55	.68	.84	1.03	1.29	1.71	2.11
Mar	.51	.69	.96	1.19	1.43	1.67	1.94	2.25	2.67	3.31	3.92
Apr	.84	1.15	1.63	2.06	2.48	2.92	3.42	4.01	4.77	5.99	7.13
May	1.46	1.80	2.30	2.71	3.10	3.49	3.92	4.42	5.05	6.01	6.89
Jun	1.26	1.63	2.17	2.63	3.08	3.54	4.04	4.63	5.39	6.56	7.65
Jul	1.32	1.72	2.31	2.82	3.31	3.81	4.37	5.03	5.87	7.19	8.41
Aug	1.06	1.45	2.05	2.58	3.10	3.66	4.27	5.00	5.95	7.45	8.86
Sep	.70	1.01	1.52	1.98	2.45	2.95	3.51	4.19	5.09	6.53	7.89
Oct	.38	.57	.90	1.20	1.51	1.84	2.22	2.69	3.31	4.31	5.26
Nov	.22	.38	.67	.98	1.31	1.68	2.11	2.66	3.40	4.64	5.85
Dec	.18	.27	.42	.56	.70	.86	1.04	1.26	1.55	2.01	2.46
Ann	22.71	24.47	26.72	28.43	29.94	31.41	32.92	34.59	36.61	39.54	42.08

\+ 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	10.5	8.5	7	7
Feb	5.0	4.1	8	7
Mar	6.4	4.9	4	2
Apr	1.3	.0	#	0
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	.0	.0	0	0
Nov	3.0	2.0	1	#
Dec	7.5	6.3	3	2
Ann	33.7	25.8	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	15.5	1971	4	24.0	1982	31	1979	27	21	1971
Feb	9.0	1983	3	15.0	1971	29	1982	1	20	1971
Mar	12.0	1995	7	20.0	1989	19	1975	15	12	1975
Apr	6.0	1973	9	14.6	1973	12	1973	10	1	1973
May	.0	0	0	.0	0	#	1987	1	#	1987
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	.0	0	0	.0	0	0	0	0	0	0
Nov	9.0	1991	23	14.2	1985	9	1986	20	3	1985
Dec	7.0	1973	5	22.7	2000	18+	2000	30	13	1985
Ann	15.5	Jan 1971	4	24.0	Jan 1982	31	Jan 1979	27	21	Jan 1971

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	5.4	4.2	1.2	.4	.1
Feb	3.1	1.9	.5	.2	.0
Mar	1.8	1.6	.8	.3	@
Apr	.5	.4	.2	.1	.0
May	.0	.0	.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	.0	.0	.0	.0	.0
Nov	1.7	1.2	.3	.1	.0
Dec	4.0	2.8	.8	.3	.0
Ann	16.5	12.1	3.8	1.4	.1

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	27.4	20.7	14.1	7.1
Feb	23.3	19.4	14.7	7.1
Mar	11.9	9.2	7.1	3.8
Apr	.8	.3	.1	@
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	.0	.0	.0	.0
Nov	4.0	2.0	1.0	.0
Dec	18.4	12.8	7.8	3.0
Ann	85.8	64.4	44.8	21.0

+ 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	5/26	5/21	5/17	5/13	5/10	5/06	5/03	4/29	4/23
32	5/14	5/09	5/06	5/03	4/30	4/28	4/25	4/21	4/17
28	5/02	4/27	4/23	4/20	4/17	4/14	4/11	4/07	4/02
24	4/27	4/22	4/18	4/15	4/12	4/08	4/05	4/01	3/27
20	4/17	4/12	4/08	4/05	4/02	3/30	3/27	3/24	3/18
16	4/13	4/07	4/02	3/29	3/26	3/22	3/18	3/13	3/07

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	9/09	9/14	9/18	9/21	9/24	9/27	9/30	10/04	10/09
32	9/16	9/22	9/26	9/30	10/03	10/06	10/10	10/14	10/20
28	9/26	10/03	10/07	10/12	10/16	10/20	10/24	10/29	11/05
24	10/04	10/12	10/17	10/21	10/25	10/30	11/03	11/08	11/16
20	10/21	10/26	10/30	11/03	11/06	11/09	11/13	11/17	11/22
16	10/26	11/02	11/07	11/11	11/16	11/20	11/24	11/29	12/06

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	159	151	146	141	137	132	128	122	115
32	177	170	164	159	155	150	146	140	133
28	207	198	192	186	181	176	170	163	154
24	227	216	209	202	196	190	184	176	166
20	242	233	227	222	217	212	207	201	192
16	267	256	248	241	234	228	221	213	201

***** 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	0	0	0	0	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0	0	0	0	0
57	0	0	0	0	0	0	0	0	0	0	0	0	0
55	0	0	0	0	0	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0	0	0	0	0	0

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	0	0	0	0	0	0	0	0	0	0	0	0	0
55	0	0	0	0	0	0	0	0	0	0	0	0	0
57	0	0	0	0	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0	0	0	0	0
65	0	0	0	0	0	0	0	0	0	0	0	0	0
70	0	0	0	0	0	0	0	0	0	0	0	0	0

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	2	46	242	599	838	1010	936	624	301	57	2	0	2	48	290	889	1727	2737	3673	4297	4598	4655	4657
45	0	0	20	147	445	688	855	781	476	183	23	1	0	0	20	167	612	1300	2155	2936	3412	3595	3618	3619
50	0	0	9	74	305	538	700	626	334	103	6	0	0	0	9	83	388	926	1626	2252	2586	2689	2695	2695
55	0	0	3	36	178	390	545	472	208	47	1	0	0	0	3	39	217	607	1152	1624	1832	1879	1880	1880
60	0	0	0	13	94	253	391	319	111	15	0	0	0	0	0	13	107	360	751	1070	1181	1196	1196	1196
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	0	29	159	363	542	677	616	387	186	30	2	0	0	29	188	551	1093	1770	2386	2773	2959	2989	2991

(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