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: WINNEBAGO, MN **COOP ID: 219046**

Climate Division: MN 8 **NWS Call Sign:** **Elevation: 1,110 Feet** **Lat: 43˚46N** **Lon: 94˚11W**

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	21.2	3.1	12.2	63	1944	26	25.9	1990	-32	1936	22	-.7	1979	1639	0	.0	.0	.2	24.1	31.0	14.0
Feb	27.6	10.0	18.8	63+	1981	18	32.2	1987	-32+	1996	3	4.3	1979	1294	0	.0	.0	1.2	17.2	27.7	8.1
Mar	39.7	22.2	31.0	83	1968	31	40.3	2000	-25	1962	1	21.9	1975	1056	0	.0	.0	6.4	8.3	26.2	2.4
Apr	55.7	34.7	45.2	92	1980	22	54.5	1977	6	1936	7	38.4	1975	598	3	.0	.1	19.7	.8	12.2	.0
May	69.5	47.6	58.6	106	1934	31	68.4	1977	20	1967	3	51.4	1997	257	57	.0	.7	29.8	.0	1.3	.0
Jun	78.7	57.8	68.3	104	1934	27	74.7	1988	32	1945	3	62.4	1982	45	143	.1	3.1	30.0	.0	.0	.0
Jul	82.1	61.8	72.0	107	1936	14	76.6	1983	44+	1971	31	64.7	1992	17	234	.1	4.8	31.0	.0	.0	.0
Aug	79.5	59.4	69.5	103+	1988	1	74.6	1983	37	1934	24	64.7	1992	28	166	@	2.4	31.0	.0	.0	.0
Sep	71.7	49.4	60.6	99+	1939	15	67.1	1978	22	1942	28	54.7	1993	171	38	.0	.8	29.4	.0	.6	.0
Oct	59.2	37.2	48.2	92	1997	4	53.4	1973	13	1936	23	43.4	1987	522	0	.0	@	24.9	.2	10.0	.0
Nov	40.1	23.7	31.9	80+	1999	14	42.0	1999	-13	1977	26	22.9	1991	993	0	.0	.0	7.0	9.0	24.8	1.1
Dec	25.6	9.3	17.5	67	1998	2	25.6	1998	-33	1985	23	.3	1983	1474	0	.0	.0	.5	21.3	30.6	8.8
Ann	54.2	34.7	44.5	107	Jul 1936	14	76.6	Jul 1983	-33	Dec 1985	23	-.7	Jan 1979	8094	641	.2	11.9	211.1	80.9	164.4	34.4

\+ 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	.88	.82	1.01+	2001	30	2.91	1975	.05	1995
Feb	.69	.63	1.64	1948	28	2.95	1971	.00	1987
Mar	1.84	1.62	1.40	1961	28	4.21	1977	.22	1994
Apr	2.98	2.83	3.05	1981	28	7.66	1999	.76	1996
May	3.95	3.69	3.56	2000	18	7.33	2000	1.57	1988
Jun	4.58	4.18	3.79	1956	18	10.43	1993	.72	1988
Jul	4.15	4.04	4.55	1963	19	8.00	1990	.42	1975
Aug	4.21	3.64	6.22	1948	10	9.07	1985	.87	1971
Sep	2.65	2.19	4.10	1964	8	7.36	1973	.88	2000
Oct	2.39	1.92	2.15	1998	15	7.30	1998	.11	1988
Nov	1.86	1.58	1.85	1975	10	4.92	1991	.03	1980
Dec	1.01	.86	1.26	1959	28	3.12	1982	.13	1989
Ann	31.19	31.59	6.22	Aug 1948	10	10.43	Jun 1993	.00	Feb 1987

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	6.9	3.0	.3	@
Feb	5.2	1.9	.2	.1
Mar	8.2	4.9	1.1	.2
Apr	10.4	6.5	2.0	.5
May	11.5	8.0	2.7	.8
Jun	10.7	7.4	3.0	1.2
Jul	9.2	6.5	2.7	1.1
Aug	9.6	6.7	2.8	1.2
Sep	8.4	5.3	1.6	.5
Oct	6.7	4.6	1.6	.6
Nov	7.0	4.4	1.0	.3
Dec	7.0	2.9	.4	.1
Ann	100.8	62.1	19.4	6.6

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	.12	.19	.32	.44	.57	.71	.87	1.07	1.35	1.79	2.21
Feb	.04	.10	.21	.31	.41	.53	.68	.85	1.09	1.48	1.86
Mar	.48	.66	.92	1.16	1.39	1.63	1.90	2.22	2.63	3.28	3.90
Apr	.80	1.08	1.51	1.89	2.26	2.65	3.08	3.59	4.26	5.30	6.27
May	1.72	2.07	2.57	2.97	3.35	3.73	4.14	4.61	5.20	6.10	6.92
Jun	1.49	1.93	2.57	3.11	3.64	4.18	4.77	5.47	6.37	7.76	9.04
Jul	1.09	1.49	2.09	2.62	3.14	3.68	4.29	5.01	5.95	7.42	8.81
Aug	1.36	1.76	2.35	2.85	3.33	3.84	4.39	5.03	5.86	7.15	8.34
Sep	.88	1.14	1.50	1.82	2.12	2.43	2.77	3.16	3.67	4.46	5.19
Oct	.23	.40	.72	1.06	1.42	1.83	2.31	2.92	3.75	5.13	6.48
Nov	.20	.34	.60	.86	1.14	1.45	1.82	2.27	2.90	3.92	4.93
Dec	.20	.29	.44	.57	.71	.86	1.02	1.23	1.49	1.92	2.32
Ann	20.83	22.79	25.32	27.26	29.00	30.69	32.44	34.39	36.76	40.23	43.25

\+ 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	10.7	10.0	8	7
Feb	6.0	5.2	8	6
Mar	8.1	8.4	3	2
Apr	3.1	1.9	#	#
May	#	.0	#	0
Jun	.0	.0	0	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	.0	.0	0	0
Oct	.4	.0	#	0
Nov	6.8	5.5	1	1
Dec	10.0	9.5	5	3
Ann	45.1	40.5	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	12.0	1982	23	29.0	1975	36	1984	3	29	1984
Feb	7.0	1971	27	16.5	1971	35	1982	6	27	1979
Mar	10.0	1983	27	21.0	1983	28	1979	5	15	1979
Apr	8.0	1984	30	13.0	1983	10	1985	1	2	1983
May	#	1992	26	#+	1992	4	1984	1	#	1984
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	4.0	1976	24	4.5	1976	4	1976	24	#+	1999
Nov	13.0	1991	1	24.5	1983	17	1983	30	6	1991
Dec	11.0	1982	28	30.3	2000	36	1983	31	28	1983
Ann	13.0	Nov 1991	1	30.3	Dec 2000	36+	Jan 1984	3	29	Jan 1984

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	6.2	3.9	1.1	.6	.1
Feb	4.2	2.0	.8	.3	.0
Mar	3.8	2.5	1.0	.4	@
Apr	1.6	1.1	.3	.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	.2	.2	@	.0	.0
Nov	3.7	2.4	.8	.2	.1
Dec	5.7	3.3	1.3	.4	.1
Ann	25.4	15.4	5.3	2.0	.3

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	26.8	19.9	16.0	8.6
Feb	19.8	17.4	15.0	8.4
Mar	12.9	10.1	7.3	3.4
Apr	2.1	1.1	.3	@
May	@	@	.0	.0
Jun	.0	.0	.0	.0
Jul	.0	.0	.0	.0
Aug	.0	.0	.0	.0
Sep	.0	.0	.0	.0
Oct	.2	@	.0	.0
Nov	8.2	4.7	2.8	.6
Dec	21.9	13.9	8.9	3.6
Ann	91.9	67.1	50.3	24.6

+ 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	5/21	5/17	5/13	5/11	5/08	5/06	5/03	4/30	4/25
32	5/14	5/09	5/05	5/02	4/29	4/26	4/23	4/19	4/14
28	5/06	4/30	4/26	4/22	4/19	4/15	4/12	4/07	4/01
24	4/16	4/12	4/10	4/07	4/05	4/03	4/01	3/29	3/25
20	4/13	4/08	4/04	4/01	3/29	3/26	3/23	3/19	3/14
16	4/07	4/03	3/30	3/27	3/24	3/21	3/18	3/15	3/10

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

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	157	151	147	143	140	137	133	129	123
32	177	170	166	162	158	155	151	146	140
28	200	192	186	181	177	172	167	161	153
24	222	216	211	207	204	200	197	192	186
20	244	236	230	226	221	217	212	207	199
16	257	249	243	238	233	229	224	218	210

***** 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	1639	1294	1056	598	257	45	17	28	171	522	993	1474	8094
60	1484	1154	901	456	162	13	4	5	81	372	843	1319	6794
57	1391	1070	808	376	116	5	0	1	46	289	753	1226	6081
55	1329	1014	747	326	90	2	0	0	29	238	694	1164	5633
50	1174	879	603	215	43	0	0	0	6	132	554	1009	4615
32	645	432	186	15	0	0	0	0	0	3	160	505	1946

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	30	62	153	410	823	1088	1239	1161	857	505	157	55	6540
55	0	0	1	31	201	400	526	448	196	27	1	0	1831
57	0	0	0	21	164	343	464	387	153	15	0	0	1547
60	0	0	0	11	117	261	375	298	98	5	0	0	1165
65	0	0	0	3	57	143	234	166	38	0	0	0	641
70	0	0	0	0	23	61	124	73	9	0	0	0	290

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	43	216	574	848	993	915	623	289	46	2	0	2	45	261	835	1683	2676	3591	4214	4503	4549	4551
45	0	1	18	124	426	698	838	760	479	174	19	0	0	1	19	143	569	1267	2105	2865	3344	3518	3537	3537
50	0	0	6	67	290	548	683	605	336	94	6	0	0	0	6	73	363	911	1594	2199	2535	2629	2635	2635
55	0	0	0	33	180	401	528	450	212	43	0	0	0	0	0	33	213	614	1142	1592	1804	1847	1847	1847
60	0	0	0	13	95	263	374	299	118	11	0	0	0	0	0	13	108	371	745	1044	1162	1173	1173	1173
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	1	31	137	346	544	663	601	380	175	29	0	0	1	32	169	515	1059	1722	2323	2703	2878	2907	2907

(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