

# Climatology of the United States

## No. 20

National Climatic Data Center  
Federal Building  
151 Patton Avenue  
Asheville, North Carolina 28801  
www.ncdc.noaa.gov

**Station: GLENWOOD 2 WNW, MN**

**1971-2000**

**COOP ID: 213174**

**Climate Division: MN 4**

**NWS Call Sign:**

**Elevation: 1,198 Feet Lat: 45°40N**

**Lon: 95°27W**

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	20.0	.1	10.1	50+	1981	25	23.3	1990	-41	1951	28	-4.5	1982	1704	0	.0	.0	.1	25.4	31.0	16.3
Feb	27.0	7.4	17.2	58+	1981	17	29.5	1998	-37	1951	1	4.4	1979	1338	0	.0	.0	.9	17.9	27.7	10.1
Mar	39.0	19.8	29.4	78	1986	29	39.3	1973	-31	1962	1	21.6	1975	1103	0	.0	.0	5.0	9.4	27.2	3.3
Apr	57.3	32.8	45.1	98	1980	21	52.6	1987	-3	1975	1	37.0	1975	601	3	.0	.1	21.4	.7	15.2	.1
May	71.1	45.2	58.2	96	1969	27	66.0	1977	14	1966	1	52.4+	1997	253	40	.0	.3	30.4	.0	2.3	.0
Jun	79.0	53.7	66.4	102	1988	24	74.5	1988	32	2000	5	60.9	1982	76	117	.1	2.3	30.0	.0	@	.0
Jul	83.1	58.6	70.9	103+	1988	31	76.7	1976	40	1967	4	63.4	1992	28	210	.1	4.5	31.0	.0	.0	.0
Aug	81.1	56.6	68.9	102	1988	16	75.1	1983	36+	1987	31	64.3	1985	40	160	.1	2.8	31.0	.0	.0	.0
Sep	72.1	46.6	59.4	95	1956	27	65.4	1998	23	1984	26	53.8	1993	201	30	.0	.7	29.7	.0	1.5	.0
Oct	59.2	35.1	47.2	90	1953	2	54.4	1973	3	1951	31	42.2	1976	553	0	.0	.0	25.0	.1	12.6	.0
Nov	39.3	20.6	30.0	77	1999	8	39.0	1999	-22	1996	26	20.0	1985	1051	0	.0	.0	6.1	9.6	26.7	1.8
Dec	25.0	6.6	15.8	60+	1998	2	25.3	1997	-34	1955	19	-.7	1983	1526	0	.0	.0	.5	22.9	30.9	11.1
Ann	54.4	31.9	43.2	103+	Jul 1988	31	76.7	Jul 1976	-41	Jan 1951	28	-4.5	Jan 1982	8474	560	.3	10.7	211.1	86.0	175.1	42.7

+ 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/normal/usnormals.html](http://www.ncdc.noaa.gov/oa/climate/normal/usnormals.html)

Issue Date: February 2004

(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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**Lon: 95°27W**

Precipitation (inches)																								
	Precipitation Totals									Mean Number of Days (3)				Precipitation Probabilities (1) Probability that the monthly/annual precipitation will be equal to or less than the indicated amount										
	Means/ Medians(1)		Extremes							Daily Precipitation				Monthly/Annual Precipitation vs Probability Levels These values were determined from the incomplete gamma distribution										
Month	Mean	Med-ian	Highest Daily(2)	Year	Day	Highest Monthly(1)	Year	Lowest Monthly(1)	Year	>= 0.01	>= 0.10	>= 0.50	>= 1.00	.05	.10	.20	.30	.40	.50	.60	.70	.80	.90	.95
Jan	.61	.55	1.70	1986	31	1.84	1986	.04+	1990	7.0	2.0	.1	.1	.06	.10	.19	.27	.36	.47	.59	.74	.95	1.30	1.64
Feb	.51	.43	1.08	1954	20	1.72	1971	.00	1982	5.2	1.6	.2	@	.03	.08	.16	.24	.31	.40	.50	.63	.79	1.07	1.34
Mar	1.33	1.25	2.18	1985	4	3.04	1985	.37	1986	6.3	3.5	.7	.2	.35	.48	.67	.84	1.01	1.18	1.37	1.60	1.90	2.36	2.80
Apr	1.73	1.45	3.90	1954	26	6.07	1986	.10	1980	8.5	4.8	1.1	.2	.23	.37	.62	.86	1.11	1.39	1.71	2.11	2.65	3.53	4.39
May	3.33	3.03	2.37	1987	21	6.26	1972	.86	1976	11.2	6.8	2.3	.6	1.36	1.66	2.10	2.45	2.79	3.13	3.49	3.91	4.45	5.27	6.01
Jun	4.06	4.13	3.00	1957	22	7.73	1979	.62	1988	11.4	7.5	3.2	1.0	1.30	1.69	2.26	2.74	3.21	3.69	4.23	4.85	5.65	6.90	8.05
Jul	3.42	3.20	3.07	1962	4	7.38	1972	1.14	1984	10.3	6.1	2.3	.8	1.29	1.60	2.06	2.44	2.81	3.18	3.58	4.04	4.64	5.55	6.39
Aug	3.42	3.27	2.57	1971	31	6.58	1988	.92	1996	9.3	5.7	2.4	.9	1.11	1.44	1.91	2.32	2.72	3.12	3.57	4.09	4.76	5.80	6.76
Sep	2.32	2.05	3.54	1995	30	5.65	1986	.00	1979	7.5	4.5	1.5	.5	.44	.77	1.16	1.47	1.78	2.09	2.44	2.85	3.37	4.20	4.96
Oct	2.36	1.77	3.18	1990	3	8.61	1971	.20	1987	7.0	4.5	1.4	.5	.16	.31	.61	.94	1.30	1.72	2.22	2.86	3.75	5.25	6.74
Nov	1.20	1.01	2.10	1970	9	4.46	2000	.00	1984	6.4	2.8	.7	.3	.03	.11	.28	.45	.64	.86	1.12	1.46	1.93	2.72	3.50
Dec	.42	.37	1.16	1968	23	1.56	1972	.00	1986	5.8	1.7	@	.0	.04	.09	.16	.22	.29	.35	.42	.51	.63	.82	1.00
Ann	24.71	24.44	3.90	Apr 1954	26	8.61	Oct 1971	.00+	Dec 1986	95.9	51.5	15.9	5.1	16.52	18.07	20.07	21.60	22.97	24.30	25.68	27.21	29.09	31.82	34.20

+ 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

Complete documentation available from:  
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**Climate Division: MN 4**

**NWS Call Sign:**

**Elevation: 1,198 Feet**

**Lat: 45°40N**

**Lon: 95°27W**

Snow (inches)																							
Snow Totals															Mean Number of Days (1)								
Means/Medians (1)					Extremes (2)										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	7.0	5.0	9	6	21.0	1997	4	23.0	1996	42	1997	29	35	1997	5.3	3.1	1.1	.2	.1	30.5	26.6	20.4	5.4
Feb	5.7	4.7	9	8	6.0	1971	27	16.0	1971	30+	1997	1	24+	1997	3.4	2.2	.6	.2	.0	-9.9	-9.9	-9.9	-9.9
Mar	7.3	6.5	4	2	10.0	1982	19	18.0	1985	23	1997	14	15	1997	3.0	2.3	.9	.4	.1	13.8	11.2	8.9	4.5
Apr	2.5	2.0	#	#	7.0	1995	12	8.0	1994	10	1975	10	1	1975	1.0	.7	.3	.2	.0	.7	.3	.1	.0
May	#	.0	0	0	#	1979	9	#+	1979	0	0	0	0	0	.0	.0	.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	.3	.0	#	0	1.5	1971	29	2.5	1971	2+	1984	30	#+	1984	.3	.2	.0	.0	.0	.1	.0	.0	.0
Nov	5.3	5.1	1	1	6.0	1994	27	13.5	1996	12	1985	30	3	1992	3.3	2.1	.6	.1	.0	8.1	4.1	1.5	.2
Dec	5.8	5.3	4	3	5.0	1995	8	12.5	1995	17	2000	31	13	1985	5.2	2.8	.4	.1	.0	22.6	17.7	9.4	2.9
Ann	33.9	28.6	N/A	N/A	21.0	Jan 1997	4	23.0	Jan 1996	42	Jan 1997	29	35	Jan 1997	21.5	13.4	3.9	1.2	.2	-9.9	-9.9	-9.9	-9.9

+ 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

Complete documentation available from:

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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	5/29	5/26	5/22	5/20	5/17	5/13	5/10	5/04
32	5/23	5/17	5/14	5/10	5/07	5/04	5/01	4/27	4/22
28	5/09	5/04	5/01	4/28	4/26	4/23	4/20	4/17	4/12
24	4/24	4/20	4/17	4/14	4/12	4/09	4/06	4/03	3/30
20	4/18	4/13	4/10	4/07	4/04	4/02	3/30	3/26	3/22
16	4/13	4/08	4/04	4/01	3/29	3/26	3/23	3/19	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	9/07	9/10	9/13	9/15	9/18	9/20	9/22	9/25	9/29
32	9/18	9/21	9/24	9/26	9/28	9/30	10/03	10/05	10/09
28	9/21	9/26	9/30	10/03	10/06	10/09	10/13	10/16	10/22
24	10/02	10/08	10/12	10/15	10/19	10/22	10/25	10/29	11/04
20	10/08	10/14	10/18	10/22	10/25	10/29	11/01	11/05	11/11
16	10/25	10/29	11/01	11/04	11/06	11/09	11/12	11/15	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	142	134	129	125	120	116	112	107	99
32	162	156	151	147	143	140	136	131	124
28	186	178	172	168	163	159	154	148	140
24	211	203	198	193	189	185	181	175	168
20	223	216	211	207	203	199	195	190	183
16	243	236	231	226	222	218	213	208	200

\* 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

Complete documentation available from:  
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Degree Days to Selected Base Temperatures (°F)													
Base	Heating Degree Days (1)												
Below	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
65	1704	1338	1103	601	253	76	28	40	201	553	1051	1526	8474
60	1549	1198	948	460	152	26	8	10	102	401	901	1371	7126
57	1456	1114	855	380	105	12	1	3	61	314	811	1278	6390
55	1394	1058	794	330	79	6	0	1	40	261	751	1216	5930
50	1239	918	645	221	34	1	0	0	10	148	606	1061	4883
32	707	467	210	19	0	0	0	0	0	4	186	548	2141

Base	Cooling Degree Days (1)												
Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	26	54	129	410	810	1031	1204	1142	819	474	125	45	6269
55	0	0	0	32	176	348	491	430	169	18	0	0	1664
57	0	0	0	21	140	293	431	370	130	9	0	0	1394
60	0	0	0	11	94	217	344	285	81	3	0	0	1035
65	0	0	0	3	40	117	210	160	30	0	0	0	560
70	0	0	0	0	13	49	112	73	7	0	0	0	254

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	24	200	561	789	957	897	581	253	32	0	0	0	24	224	785	1574	2531	3428	4009	4262	4294	4294
45	0	0	7	114	412	639	802	742	435	144	12	0	0	0	7	121	533	1172	1974	2716	3151	3295	3307	3307
50	0	0	0	55	275	489	647	587	295	70	1	0	0	0	0	55	330	819	1466	2053	2348	2418	2419	2419
55	0	0	0	23	160	342	492	433	177	31	0	0	0	0	0	23	183	525	1017	1450	1627	1658	1658	1658
60	0	0	0	10	77	211	342	282	92	8	0	0	0	0	0	10	87	298	640	922	1014	1022	1022	1022
Base	Growing Degree Units for Corn (Monthly)												Growing Degree Units for Corn (Accumulated Monthly)											
50/86	0	0	14	140	352	501	633	584	361	162	21	0	0	0	14	154	506	1007	1640	2224	2585	2747	2768	2768

(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.  
Complete documentation for the 1971-2000 Normals is available on the internet from:  
[www.ncdc.noaa.gov/oa/climate/normal/usnormals.html](http://www.ncdc.noaa.gov/oa/climate/normal/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 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/normal.html](http://www.ncdc.noaa.gov/normal.html)  
U.S. Climate Normals 1971-2000-Products Clim20, [www.ncdc.noaa.gov/oa/climate/normal/usnormalsprods.html](http://www.ncdc.noaa.gov/oa/climate/normal/usnormalsprods.html)  
Snow Climatology Project Description, [www.ncdc.noaa.gov/oa/climate/monitoring/snowclim/mainpage.html](http://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](http://www1.ncdc.noaa.gov/pub/data/special/serialcomplete_jam_0900.pdf)