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: GRAND MEADOW, MN **COOP ID: 213290**

Climate Division: MN 9 **NWS Call Sign:** **Elevation: 1,350 Feet** **Lat: 43˚42N** **Lon: 92˚34W**

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	20.6	2.8	11.7	57	1944	26	24.9	1990	-35	1935	23	-.9	1977	1654	0	.0	.0	.1	25.5	30.9	14.1
Feb	26.6	8.8	17.7	63+	1981	19	29.1	1987	-35	1996	2	6.9	1979	1324	0	.0	.0	.6	18.4	27.7	8.7
Mar	38.5	20.1	29.3	79	1938	22	38.1	1973	-31	1962	1	20.2	1975	1108	0	.0	.0	5.4	9.0	26.8	2.4
Apr	54.2	32.3	43.3	91	1980	22	50.7	1977	1	1995	4	36.5	1975	654	1	.0	@	19.1	.9	13.8	.0
May	68.0	44.5	56.3	107	1934	31	64.7	1977	22+	1989	6	48.1	1997	305	35	.0	.3	29.7	.0	1.6	.0
Jun	77.6	55.5	66.6	105	1934	27	72.4	1988	32	1945	4	62.1	1982	62	108	.1	1.8	30.0	.0	.0	.0
Jul	81.1	59.1	70.1	106	1936	14	74.5	1983	40	1971	27	62.7	1992	28	186	@	3.3	31.0	.0	.0	.0
Aug	78.9	56.4	67.7	102	1937	17	73.7	1983	34	1934	24	62.3	1992	53	135	.2	1.9	31.0	.0	.0	.0
Sep	70.9	47.1	59.0	98	1939	8	64.9	1978	22	1939	30	52.8	1993	205	25	.0	.5	29.5	.0	1.2	.0
Oct	58.4	35.7	47.1	92	1997	4	53.9	1971	10	1988	30	42.1	1988	557	0	.0	@	24.7	.1	10.7	.0
Nov	40.2	23.1	31.7	78+	1952	2	39.6	1999	-16	1977	27	22.6	1996	1000	0	.0	.0	7.0	8.3	24.4	1.0
Dec	25.4	9.6	17.5	62	1998	2	25.3	1982	-29+	1990	26	3.3	1983	1473	0	.0	.0	.5	22.4	30.6	8.5
Ann	53.4	32.9	43.2	107	May 1934	31	74.5	Jul 1983	-35+	Feb 1996	2	-.9	Jan 1977	8423	490	.3	7.8	208.6	84.6	167.7	34.7

\+ 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/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

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	1.03	1.01	1.78	1967	25	2.39	1996	.00	1984
Feb	.75	.58	1.65	1939	28	3.46	1971	.01	1987
Mar	1.86	1.69	2.00	1966	23	3.77	1990	.12	1994
Apr	3.37	3.20	4.53	1990	24	8.16	1999	.82	2000
May	4.27	3.94	4.70	2000	18	9.62	1982	1.55	1985
Jun	4.37	4.20	4.83	1942	29	10.40	2000	1.27	1988
Jul	4.82	4.42	5.22	1999	19	13.48	1999	.63	1975
Aug	5.07	4.74	5.15	1962	31	11.43	1980	.26	1971
Sep	3.50	2.77	4.37	1946	6	8.57	1986	.46	1975
Oct	2.43	2.34	2.92	1970	9	4.89	1998	.43	1988
Nov	2.15	1.78	3.14	1991	1	6.02	1991	.09	1976
Dec	1.03	1.02	1.58	1982	28	2.96	1982	.16	1989
Ann	34.65	34.99	5.22	Jul 1999	19	13.48	Jul 1999	.00	Jan 1984

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	7.0	3.4	.5	.1
Feb	5.1	2.1	.4	.0
Mar	7.6	4.4	1.1	.3
Apr	9.7	6.8	2.1	.8
May	11.8	8.0	2.9	.9
Jun	10.7	7.9	3.1	1.0
Jul	9.1	6.5	3.1	1.5
Aug	10.0	7.4	3.3	1.5
Sep	9.2	6.0	2.4	.9
Oct	7.8	5.0	1.6	.6
Nov	7.3	4.4	1.3	.4
Dec	6.8	3.1	.3	.1
Ann	102.1	65.0	22.1	8.1

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	.24	.41	.56	.71	.87	1.05	1.27	1.56	2.03	2.48
Feb	.04	.08	.17	.27	.39	.53	.69	.91	1.21	1.72	2.24
Mar	.40	.57	.84	1.09	1.33	1.60	1.90	2.25	2.73	3.48	4.19
Apr	.99	1.31	1.79	2.21	2.62	3.04	3.50	4.05	4.76	5.87	6.90
May	1.56	1.96	2.54	3.02	3.48	3.95	4.47	5.07	5.83	7.00	8.08
Jun	1.55	1.96	2.55	3.06	3.54	4.03	4.57	5.19	5.99	7.22	8.36
Jul	.97	1.41	2.12	2.77	3.42	4.12	4.91	5.87	7.13	9.15	11.06
Aug	1.19	1.66	2.41	3.07	3.73	4.43	5.22	6.15	7.38	9.32	11.16
Sep	.56	.86	1.37	1.85	2.35	2.89	3.51	4.27	5.28	6.92	8.49
Oct	.63	.86	1.21	1.52	1.83	2.15	2.51	2.94	3.49	4.37	5.20
Nov	.24	.41	.71	1.01	1.33	1.69	2.11	2.63	3.34	4.51	5.66
Dec	.19	.28	.43	.57	.71	.87	1.04	1.25	1.53	1.97	2.40
Ann	23.42	25.56	28.31	30.42	32.30	34.13	36.03	38.13	40.70	44.44	47.69

\+ 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	14.4	15.0	9	9
Feb	8.9	8.0	9	9
Mar	7.2	7.5	2	#
Apr	1.9	.0	#	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	.4	.0	#	0
Nov	5.0	3.6	#	0
Dec	10.8	8.4	2	#
Ann	48.6	42.5	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	1971	4	24.4	1999	24	1971	31	20	1971
Feb	8.0	1974	22	20.5	1974	30	1971	16	23	1971
Mar	10.5	1995	7	15.0+	1985	18	1975	16	12	1975
Apr	13.0	1973	10	22.0	1973	17	1973	10	2	1973
May	.0	0	0	.0	0	0	0	0	0	0
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	5.0	1979	23	5.0	1979	2	1999	2	#+	1999
Nov	6.5	1986	20	16.7	1985	7	1996	23	1	1996
Dec	9.0	2000	29	30.1	2000	20	2000	31	8+	2000
Ann	13.0	Apr 1973	10	30.1	Dec 2000	30	Feb 1971	16	23	Feb 1971

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	5.3	4.3	1.6	.6	.1
Feb	2.9	2.5	1.1	.4	.0
Mar	2.4	2.2	.9	.3	.1
Apr	.9	.7	.4	.1	@
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
Nov	2.5	2.0	.7	.1	.0
Dec	4.8	3.8	1.4	.4	.0
Ann	19.0	15.7	6.1	1.9	.2

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	-9.9	-9.9	-9.9	-9.9
Feb	-9.9	-9.9	-9.9	-9.9
Mar	-9.9	-9.9	-9.9	-9.9
Apr	-9.9	-9.9	-9.9	-9.9
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	.1	.0	.0	.0
Nov	-9.9	-9.9	-9.9	-9.9
Dec	-9.9	-9.9	-9.9	-9.9
Ann	-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

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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	5/25	5/20	5/17	5/14	5/11	5/08	5/06	5/02	4/27
32	5/15	5/11	5/08	5/05	5/03	5/01	4/28	4/26	4/22
28	5/05	4/30	4/26	4/22	4/19	4/16	4/12	4/08	4/03
24	4/21	4/17	4/13	4/11	4/08	4/05	4/03	3/30	3/26
20	4/14	4/10	4/07	4/04	4/02	3/31	3/28	3/25	3/21
16	4/10	4/05	4/02	3/30	3/27	3/24	3/21	3/17	3/12

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	9/13	9/17	9/20	9/23	9/25	9/27	9/30	10/03	10/07
32	9/20	9/24	9/27	9/30	10/03	10/05	10/08	10/11	10/16
28	9/25	9/30	10/04	10/07	10/11	10/14	10/17	10/21	10/26
24	10/10	10/15	10/19	10/22	10/25	10/28	10/31	11/04	11/09
20	10/21	10/26	10/29	11/01	11/04	11/07	11/10	11/14	11/19
16	10/30	11/04	11/07	11/10	11/13	11/15	11/18	11/22	11/26

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	154	148	144	140	136	133	129	124	118
32	168	162	158	155	152	149	146	142	136
28	196	188	183	178	174	170	165	159	152
24	221	213	208	203	199	195	190	185	177
20	232	226	222	219	215	212	208	204	198
16	253	245	239	235	230	226	221	216	208

***** 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)

Base	Heating Degree Days (1)												
Below	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
65	1654	1324	1108	654	305	62	28	53	205	557	1000	1473	8423
60	1499	1184	953	508	197	19	7	14	104	406	850	1318	7059
57	1406	1100	860	424	145	8	0	5	62	321	760	1225	6316
55	1344	1044	798	371	115	4	0	2	41	268	701	1163	5851
50	1189	904	648	251	58	1	0	0	10	156	558	1008	4783
32	654	439	210	21	0	0	0	0	0	5	158	492	1979

Base	Cooling Degree Days (1)												
Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	23	39	125	359	753	1036	1181	1105	810	471	147	42	6091
55	0	0	0	19	155	350	468	394	160	21	1	0	1568
57	0	0	0	12	123	294	406	335	121	12	0	0	1303
60	0	0	0	5	82	216	319	251	74	4	0	0	951
65	0	0	0	1	35	108	186	135	25	0	0	0	490
70	0	0	0	0	12	39	91	57	5	0	0	0	204

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	36	194	539	816	957	886	597	278	41	2	0	0	36	230	769	1585	2542	3428	4025	4303	4344	4346
45	0	0	14	110	388	666	802	731	453	166	19	0	0	0	14	124	512	1178	1980	2711	3164	3330	3349	3349
50	0	0	3	56	259	517	647	576	316	88	5	0	0	0	3	59	318	835	1482	2058	2374	2462	2467	2467
55	0	0	0	28	152	371	493	423	196	41	0	0	0	0	0	28	180	551	1044	1467	1663	1704	1704	1704
60	0	0	0	10	79	236	340	272	109	10	0	0	0	0	0	10	89	325	665	937	1046	1056	1056	1056
Base	Growing Degree Units for Corn (Monthly)												Growing Degree Units for Corn (Accumulated Monthly)											
50/86	0	0	22	125	317	519	633	570	365	165	26	0	0	0	22	147	464	983	1616	2186	2551	2716	2742	2742

(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:
www.ncdc.noaa.gov/oa/climate/normals/usnormals.html

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