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: STEWART, MN **COOP ID: 218025**

Climate Division: MN 5 **NWS Call Sign:** **Elevation: 1,040 Feet** **Lat: 44˚44N** **Lon: 94˚21W**

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	21.3	.7	11.0	62	1981	24	25.6	1990	-35	1977	9	-2.0	1977	1675	0	.0	.0	.2	24.2	31.0	14.9
Feb	28.4	8.7	18.6	61	1981	16	32.3	1987	-34	1996	2	4.8	1979	1301	0	.0	.0	1.2	16.7	27.4	8.8
Mar	40.2	21.6	30.9	84	1968	30	38.9	1973	-31	1962	1	19.6	1975	1057	0	.0	.0	6.3	7.6	25.9	2.3
Apr	56.8	34.4	45.6	93	1980	21	54.5	1987	4	1975	1	37.0	1975	586	4	.0	.1	21.8	.5	12.3	.0
May	70.9	46.9	58.9	96	1959	1	66.3	1977	20	1967	3	52.7	1997	239	50	.0	1.1	30.4	.0	1.5	.0
Jun	80.0	56.8	68.4	104	1988	20	75.1	1988	36+	1969	13	63.2	1985	46	149	.2	3.8	30.0	.0	.0	.0
Jul	84.1	61.3	72.7	102+	1995	14	76.8	1974	42+	1971	30	65.5	1992	13	252	.2	6.1	31.0	.0	.0	.0
Aug	81.2	58.9	70.1	106	1988	1	75.2	1983	37	1964	13	64.6	1992	27	183	.1	3.1	31.0	.0	.0	.0
Sep	73.0	48.9	61.0	99	1978	7	66.9	1978	21	1974	22	55.4	1993	158	37	.0	1.1	29.8	.0	1.2	.0
Oct	60.4	37.0	48.7	90	2001	3	54.9	1973	13	1972	19	43.7	1988	507	1	.0	.0	25.6	.1	10.0	.0
Nov	40.4	23.1	31.8	75+	1978	3	41.4	1999	-15+	1996	26	23.4	1985	998	0	.0	.0	7.2	8.7	25.1	1.0
Dec	25.7	7.3	16.5	66	1998	2	25.7	1997	-30+	1983	23	-.4	1983	1503	0	.0	.0	.6	21.5	30.7	9.4
Ann	55.2	33.8	44.5	106	Aug 1988	1	76.8	Jul 1974	-35	Jan 1977	9	-2.0	Jan 1977	8110	676	.5	15.3	215.1	79.3	165.1	36.4

\+ 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: 1957-2001

(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	.87	.68	3.10	1996	18	3.91	1996	.00	1990
Feb	.65	.53	1.04	1971	27	2.66	1971	.00	1999
Mar	1.76	1.46	1.55	1991	23	3.90	1983	.29	1994
Apr	2.56	2.31	2.51	2001	23	8.00	1986	.25	1987
May	3.02	3.25	1.62	1963	28	6.26	1993	.39	1976
Jun	4.31	3.85	4.64	1997	29	9.20	1971	.48	1988
Jul	4.11	3.96	4.03	1997	25	8.60	1987	1.00	1988
Aug	4.39	4.18	6.72	1994	26	9.80	1979	1.24	1998
Sep	2.70	2.60	3.10	1982	10	8.40	1982	.34	2000
Oct	1.96	1.68	2.30	1970	8	4.75	1984	.15	1989
Nov	1.99	1.38	2.36	1973	20	5.42	2000	.05	1980
Dec	.76	.67	1.20	1984	16	2.15	1982	.10	1986
Ann	29.08	28.79	6.72	Aug 1994	26	9.80	Aug 1979	.00+	Feb 1999

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	5.0	2.8	.3	@
Feb	4.4	2.5	.2	@
Mar	6.9	4.3	1.1	.2
Apr	8.9	6.3	1.7	.5
May	9.5	7.5	2.2	.3
Jun	9.9	7.1	2.8	1.2
Jul	9.2	6.7	2.6	1.2
Aug	8.6	6.4	3.0	1.1
Sep	7.7	5.5	1.8	.6
Oct	5.9	4.3	1.3	.5
Nov	6.2	4.2	1.2	.5
Dec	4.7	2.5	.3	@
Ann	86.9	60.1	18.5	6.1

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	.02	.08	.20	.32	.46	.62	.81	1.06	1.40	1.97	2.54
Feb	.02	.08	.17	.27	.37	.49	.63	.80	1.04	1.45	1.84
Mar	.46	.63	.89	1.11	1.33	1.56	1.82	2.13	2.53	3.15	3.74
Apr	.40	.61	.98	1.34	1.70	2.10	2.56	3.12	3.88	5.10	6.27
May	.82	1.11	1.55	1.93	2.30	2.69	3.13	3.64	4.31	5.36	6.34
Jun	1.18	1.59	2.22	2.76	3.29	3.85	4.47	5.20	6.15	7.64	9.03
Jul	1.15	1.54	2.13	2.64	3.15	3.67	4.26	4.94	5.84	7.24	8.55
Aug	1.53	1.94	2.55	3.05	3.54	4.04	4.58	5.22	6.03	7.29	8.44
Sep	.57	.81	1.21	1.57	1.94	2.32	2.76	3.29	3.98	5.09	6.14
Oct	.20	.34	.61	.88	1.18	1.51	1.90	2.39	3.06	4.17	5.26
Nov	.14	.27	.52	.80	1.10	1.45	1.88	2.41	3.15	4.41	5.64
Dec	.10	.16	.27	.38	.49	.61	.75	.93	1.16	1.54	1.91
Ann	18.29	20.28	22.89	24.90	26.71	28.48	30.33	32.39	34.92	38.64	41.90

+ 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: 1957-2001
(3) Derived from 1971-2000 serially complete daily data

Complete documentation available from:
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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	11.2	8.5	8	6
Feb	8.0	8.0	8	6
Mar	9.1	9.0	4	3
Apr	3.1	2.5	#	#
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	.3	.0	#	0
Nov	7.4	7.4	1	1
Dec	9.0	8.0	5	3
Ann	48.1	43.4	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	1975	11	37.5	1975	39	1982	26	22+	1997
Feb	12.0	1971	27	20.0	1971	35	1982	6	28	1982
Mar	11.0	1984	5	28.5	1985	26	1979	4	17	1975
Apr	6.0	1972	21	14.5	1983	11	1975	2	4	1975
May	.2	1979	4	.2	1979	#	1991	6	#	1991
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	3.0	1976	24	5.5	1976	2	1981	24	#+	1995
Nov	10.0	1983	28	24.0	1983	15	1996	30	5	1996
Dec	13.0	1996	15	26.5	1996	39	1996	31	26	1996
Ann	13.0	Dec 1996	15	37.5	Jan 1975	39+	Dec 1996	31	28	Feb 1982

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	5.0	4.1	1.5	.3	@
Feb	3.7	2.9	.8	.2	@
Mar	3.9	3.1	1.4	.5	.1
Apr	1.5	1.2	.3	.1	.0
May	@	.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	.1	.1	.0	.0
Nov	3.6	2.8	1.1	.4	@
Dec	4.8	3.1	1.1	.4	@
Ann	22.7	17.3	6.3	1.9	.1

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	24.4	20.1	18.2	7.2
Feb	18.6	15.9	13.2	7.3
Mar	13.9	9.6	7.7	3.7
Apr	1.8	.9	.6	.2
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	7.1	4.4	2.3	.6
Dec	21.1	14.3	11.0	5.4
Ann	87.0	65.2	53.0	24.4

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

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	9/12	9/15	9/18	9/20	9/22	9/24	9/27	9/29	10/03
32	9/16	9/20	9/23	9/26	9/28	10/01	10/04	10/07	10/11
28	9/28	10/02	10/06	10/09	10/11	10/14	10/17	10/20	10/25
24	10/05	10/11	10/15	10/18	10/22	10/25	10/29	11/02	11/08
20	10/20	10/25	10/28	10/31	11/03	11/06	11/09	11/13	11/18
16	10/27	11/01	11/04	11/07	11/10	11/12	11/15	11/19	11/23

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	153	146	141	137	133	130	126	121	114
32	167	161	157	153	149	145	142	137	131
28	190	184	179	175	171	168	164	159	153
24	213	208	204	200	197	194	190	186	180
20	237	230	224	220	215	211	206	201	193
16	252	245	240	235	231	227	222	217	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)

Base	Heating Degree Days (1)												
Below	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
65	1675	1301	1057	586	239	46	13	27	158	507	998	1503	8110
60	1520	1161	902	446	143	13	0	5	71	359	848	1348	6816
57	1427	1077	810	368	99	5	0	1	38	279	758	1255	6117
55	1365	1021	749	319	75	2	0	0	23	230	699	1193	5676
50	1210	884	604	211	32	0	0	0	4	129	557	1038	4669
32	683	437	188	17	0	0	0	0	0	4	160	531	2020

Base	Cooling Degree Days (1)												
Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	31	60	154	424	834	1093	1262	1179	869	521	152	51	6630
55	0	0	1	36	196	406	549	466	202	34	1	0	1891
57	0	0	0	25	158	348	487	405	157	21	0	0	1601
60	0	0	0	13	109	266	394	316	100	8	0	0	1206
65	0	0	0	4	50	149	252	183	37	1	0	0	676
70	0	0	0	0	18	67	134	86	8	0	0	0	313

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	42	236	607	869	1016	936	639	306	41	2	0	2	44	280	887	1756	2772	3708	4347	4653	4694	4696
45	0	0	14	139	455	719	861	781	492	189	16	0	0	0	14	153	608	1327	2188	2969	3461	3650	3666	3666
50	0	0	3	72	316	569	706	626	351	103	6	0	0	0	3	75	391	960	1666	2292	2643	2746	2752	2752
55	0	0	0	35	194	423	551	471	228	48	0	0	0	0	0	35	229	652	1203	1674	1902	1950	1950	1950
60	0	0	0	12	104	282	397	319	124	17	0	0	0	0	0	12	116	398	795	1114	1238	1255	1255	1255
Base	Growing Degree Units for Corn (Monthly)												Growing Degree Units for Corn (Accumulated Monthly)											
50/86	0	0	24	154	372	561	681	617	400	191	27	0	0	0	24	178	550	1111	1792	2409	2809	3000	3027	3027

(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