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: OTTERTAIL, MN **COOP ID: 216276**

Climate Division: MN 4 **NWS Call Sign:** **Elevation: 980 Feet** **Lat: 46˚25N** **Lon: 95˚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	19.9	-2.2	8.9	56	1981	24	23.3	1990	-40+	1972	15	-3.9	1982	1743	0	.0	.0	.1	26.0	31.0	17.6
Feb	27.3	4.9	16.1	59	1981	17	29.3	1998	-45	1996	1	3.3	1989	1369	0	.0	.0	.3	17.9	27.7	11.8
Mar	39.2	18.0	28.6	71+	1987	7	38.1	1973	-33	1962	1	19.2	1996	1128	0	.0	.0	4.3	8.9	28.0	4.3
Apr	56.3	32.5	44.4	94	1980	21	53.8	1987	-7	1975	1	37.1	1979	621	3	.0	@	20.5	.7	15.9	.2
May	70.6	46.5	58.6	94	1964	22	67.5	1977	18	1967	2	51.1	1979	250	49	.0	.2	30.1	.0	2.4	.0
Jun	78.0	56.2	67.1	98+	1988	19	74.1	1988	33	1969	3	61.7	1982	64	126	.0	1.5	30.0	.0	.0	.0
Jul	82.4	61.1	71.8	102	1988	27	76.9	1988	37	1969	1	64.5	1992	22	232	.2	3.7	31.0	.0	.0	.0
Aug	80.7	59.1	69.9	101+	1976	19	76.1	1983	35	1965	28	65.0	1977	34	186	.1	2.8	31.0	.0	.0	.0
Sep	70.8	49.0	59.9	97	1983	2	66.2	1998	19	1965	26	55.2	1993	190	38	.0	.6	29.5	.0	1.0	.0
Oct	58.0	37.0	47.5	91	1963	5	53.1	1973	10	1996	31	43.8	1976	542	0	.0	.0	22.9	.3	9.8	.0
Nov	38.1	21.0	29.6	71+	1999	8	39.4	1999	-21	1985	29	19.4	1985	1063	0	.0	.0	4.8	10.9	26.3	1.8
Dec	24.5	5.1	14.8	57	1962	1	24.9	1997	-38+	1983	19	-.2	1983	1556	0	.0	.0	.3	23.7	30.9	12.1
Ann	53.8	32.4	43.1	102	Jul 1988	27	76.9	Jul 1988	-45	Feb 1996	1	-3.9	Jan 1982	8582	634	.3	8.8	204.8	88.4	173.0	47.8

\+ 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

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	.88	.66	1.00	1989	7	2.50	1975	.15+	1978
Feb	.61	.57	.64	1977	24	2.55	1979	.00+	1993
Mar	1.39	1.20	1.87	1982	20	3.27	1982	.44	1984
Apr	1.98	2.00	2.27	1957	19	5.16	1991	.00	1980
May	3.15	3.00	2.42	1985	31	7.00	1985	.84	1980
Jun	4.64	4.81	4.40	1979	19	7.64	1979	.83	1987
Jul	3.99	3.98	3.82	1998	14	8.94	1985	.87	1975
Aug	3.38	2.87	3.80	1972	6	7.24	1988	.38	1976
Sep	2.48	2.25	2.19	1999	4	5.12	1999	.42	1974
Oct	2.45	1.93	3.64	1982	6	6.42	1982	.22	1976
Nov	1.17	1.00	1.69	2000	1	3.86	1977	.00	1999
Dec	.55	.56	2.10	1951	3	1.90	1972	.00	1997
Ann	26.67	25.59	4.40	Jun 1979	19	8.94	Jul 1985	.00+	Nov 1999

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	4.8	3.3	.4	@
Feb	3.8	2.9	.1	.0
Mar	5.5	4.5	.8	.2
Apr	6.8	5.3	1.2	.3
May	9.3	7.0	2.3	.5
Jun	10.5	7.9	3.2	1.1
Jul	9.8	7.1	2.7	1.2
Aug	8.5	6.5	2.0	.8
Sep	8.1	5.2	1.6	.5
Oct	7.6	5.0	1.4	.5
Nov	5.0	3.9	.6	.1
Dec	3.8	2.7	.1	.0
Ann	83.5	61.3	16.4	5.2

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	.20	.32	.44	.57	.71	.88	1.08	1.34	1.78	2.21
Feb	.00	.06	.16	.26	.36	.47	.60	.76	.98	1.33	1.68
Mar	.45	.58	.77	.94	1.10	1.26	1.44	1.66	1.93	2.35	2.75
Apr	.30	.56	.90	1.17	1.44	1.73	2.05	2.43	2.92	3.71	4.45
May	.94	1.24	1.69	2.08	2.45	2.84	3.27	3.78	4.44	5.46	6.41
Jun	1.82	2.25	2.86	3.37	3.85	4.33	4.86	5.47	6.24	7.42	8.50
Jul	1.32	1.69	2.25	2.72	3.17	3.64	4.15	4.75	5.52	6.72	7.82
Aug	.84	1.15	1.65	2.08	2.51	2.97	3.48	4.08	4.87	6.13	7.30
Sep	.70	.94	1.29	1.60	1.90	2.22	2.57	2.98	3.51	4.34	5.12
Oct	.22	.39	.72	1.06	1.43	1.85	2.35	2.98	3.84	5.28	6.70
Nov	.10	.23	.42	.59	.77	.96	1.18	1.44	1.79	2.37	2.91
Dec	.03	.08	.16	.24	.33	.43	.54	.68	.87	1.18	1.48
Ann	17.64	19.33	21.53	23.22	24.72	26.19	27.72	29.42	31.49	34.52	37.16

\+ 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)

Extremes (2)

Mean Number of Days (1)

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	13.0	11.5	9	8	10.0	1971	25	27.0	1972	32	1997	5	25	1997	5.9	5.1	1.7	.6	.1	29.7	25.4	21.9	8.7
Feb	8.9	8.4	9	6	8.0	1996	27	25.0	1979	34	1979	25	27	1979	3.9	3.7	1.0	.3	.0	26.1	20.8	15.8	9.2
Mar	10.3	9.0	6	5	12.0	1975	24	27.5	1975	34	1997	13	26	1997	3.8	3.4	1.2	.6	.1	17.9	13.7	9.9	6.0
Apr	3.2	2.0	1	#	8.5	1994	29	12.5	1994	20	1975	2	8	1975	1.4	1.3	.5	.1	.0	2.9	1.5	1.1	.6
May	.1	.0	#	0	1.0	1979	5	1.0+	1983	#+	2000	13	#+	2000	.1	.1	.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	#	1995	21	#+	1995	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Oct	1.1	.0	#	0	6.0	1995	24	7.0	1995	4	1972	30	#+	1997	.6	.5	.1	@	.0	.3	.1	.0	.0
Nov	8.4	5.0	1	1	12.0	1993	25	24.5	1993	14	1993	27	4	1993	3.9	3.7	1.4	.4	@	11.2	4.9	2.1	.2
Dec	8.4	7.3	4	3	8.0	1972	30	22.0	1972	21	1985	4	19	1985	4.4	3.8	.9	.2	.0	23.7	14.0	8.0	2.8
Ann	53.4	43.2	N/A	N/A	12.0+	Nov 1993	25	27.5	Mar 1975	34+	Mar 1997	13	27	Feb 1979	24.0	21.6	6.8	2.2	.2	111.8	80.4	58.8	27.5

+ 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	5/27	5/24	5/21	5/19	5/17	5/15	5/13	5/10	5/07
32	5/18	5/15	5/12	5/09	5/07	5/05	5/03	4/30	4/26
28	5/09	5/05	5/01	4/29	4/26	4/24	4/21	4/18	4/13
24	4/28	4/23	4/19	4/17	4/14	4/11	4/08	4/05	3/31
20	4/18	4/14	4/11	4/09	4/07	4/04	4/02	3/30	3/26
16	4/12	4/08	4/05	4/02	3/31	3/28	3/26	3/23	3/18

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	9/10	9/14	9/17	9/19	9/21	9/24	9/26	9/29	10/03
32	9/18	9/22	9/25	9/27	9/30	10/02	10/05	10/08	10/12
28	9/26	9/30	10/04	10/07	10/10	10/12	10/15	10/19	10/24
24	10/12	10/16	10/20	10/22	10/25	10/28	10/31	11/03	11/08
20	10/21	10/25	10/28	10/31	11/03	11/05	11/08	11/11	11/16
16	10/25	10/30	11/02	11/05	11/08	11/11	11/14	11/18	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	144	138	134	130	127	123	119	115	109
32	161	155	151	148	145	142	138	134	129
28	187	180	174	170	166	162	157	152	144
24	213	206	202	197	194	190	186	181	174
20	227	221	217	213	209	206	202	198	192
16	243	236	230	226	222	217	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

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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	1743	1369	1128	621	250	64	22	34	190	542	1063	1556	8582
60	1588	1229	973	480	153	20	6	9	96	390	913	1401	7258
57	1495	1145	880	400	108	9	0	3	57	302	823	1308	6530
55	1433	1089	819	350	82	4	0	1	37	248	763	1246	6072
50	1278	949	669	239	37	0	0	0	9	135	618	1091	5025
32	745	495	229	24	0	0	0	0	0	3	197	580	2273

Base	Cooling Degree Days (1)												
Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	25	50	123	396	822	1052	1233	1175	838	484	124	47	6369
55	0	0	0	33	192	367	520	463	185	16	0	0	1776
57	0	0	0	22	155	311	458	403	145	8	0	0	1502
60	0	0	0	12	108	233	371	316	94	2	0	0	1136
65	0	0	0	3	49	126	232	186	38	0	0	0	634
70	0	0	0	0	18	53	126	92	11	0	0	0	300

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	20	186	562	800	972	912	584	252	26	0	0	0	20	206	768	1568	2540	3452	4036	4288	4314	4314
45	0	0	5	102	415	650	817	757	437	141	10	0	0	0	5	107	522	1172	1989	2746	3183	3324	3334	3334
50	0	0	0	51	279	500	662	602	298	67	1	0	0	0	0	51	330	830	1492	2094	2392	2459	2460	2460
55	0	0	0	19	165	354	507	447	179	27	0	0	0	0	0	19	184	538	1045	1492	1671	1698	1698	1698
60	0	0	0	6	81	220	353	297	94	7	0	0	0	0	0	6	87	307	660	957	1051	1058	1058	1058
Base	Growing Degree Units for Corn (Monthly)												Growing Degree Units for Corn (Accumulated Monthly)											
50/86	0	0	12	121	342	506	647	595	349	145	16	0	0	0	12	133	475	981	1628	2223	2572	2717	2733	2733

(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

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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