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: WALKER AH GWAH CHING, MN **COOP ID: 218618**

Climate Division: MN 2 **NWS Call Sign:** **Elevation: 1,410 Feet** **Lat: 47˚04N** **Lon: 94˚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	16.0	-3.0	6.5	51+	1973	25	18.9	1990	-39+	1972	15	-5.3	1982	1816	0	.0	.0	.1	27.6	31.0	17.7
Feb	24.5	4.6	14.6	59+	1976	24	29.1	1998	-44	1996	2	2.3	1989	1413	0	.0	.0	.5	19.4	27.9	10.9
Mar	35.6	17.2	26.4	73	1963	31	34.5	1973	-32	1962	1	17.2	1996	1197	0	.0	.0	3.9	10.7	28.0	4.2
Apr	51.8	31.0	41.4	94	1980	21	49.9	1987	-6+	1995	4	34.3	1975	708	0	.0	@	17.6	.8	17.7	.2
May	66.3	44.3	55.3	93+	1964	22	64.7	1977	16	1966	1	49.1	1979	326	26	.0	.1	29.2	.0	2.9	.0
Jun	74.3	53.6	64.0	95+	1988	18	69.8	1988	32+	1998	3	58.6	1982	105	73	.0	.7	30.0	.0	@	.0
Jul	78.4	58.4	68.4	100+	1988	5	72.5	1988	40+	1969	1	61.3	1992	41	146	.1	1.9	31.0	.0	.0	.0
Aug	76.0	56.5	66.3	103	1976	19	72.2	1983	35	1986	28	61.1	1977	76	114	.1	1.3	31.0	.0	.0	.0
Sep	65.7	46.4	56.1	97	1983	2	61.2	1998	22	1965	26	50.5	1993	280	12	.0	.2	29.0	.0	1.5	.0
Oct	53.1	35.3	44.2	89	1963	5	50.1	1973	7	1951	31	39.1	1980	645	0	.0	.0	20.3	.6	11.7	.0
Nov	34.1	19.9	27.0	72+	1978	3	36.5	1999	-22+	1976	28	18.8	1985	1140	0	.0	.0	3.3	13.1	26.8	1.8
Dec	20.2	3.7	12.0	58	1962	1	23.6	1997	-37+	1967	31	-1.2	1983	1645	0	.0	.0	.1	25.6	30.9	12.3
Ann	49.7	30.7	40.2	103	Aug 1976	19	72.5	Jul 1988	-44	Feb 1996	2	-5.3	Jan 1982	9392	371	.2	4.2	196.0	97.8	178.4	47.1

\+ 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

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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	.80	.63	1.37	1997	4	2.35	1975	.06	1981
Feb	.60	.52	1.03	1954	20	1.49	1979	.03	1988
Mar	1.36	1.34	1.20	1985	4	3.06	1988	.29	1986
Apr	1.96	1.73	2.37	1970	19	5.13	1985	.39	1988
May	3.01	2.60	2.28	1985	31	6.88	1985	.28	1976
Jun	4.05	4.01	3.10	1983	14	6.87	1992	1.40	1996
Jul	4.24	4.18	4.70	1959	8	7.94	1995	.62	1989
Aug	3.69	3.43	5.35	1953	28	9.12	1978	.86	1982
Sep	2.91	2.63	4.19	1961	10	5.73	1991	.61	1974
Oct	2.70	2.33	3.62	1969	5	7.21	1984	.16	1976
Nov	1.40	1.22	1.95	1977	9	3.86	2000	.02	1999
Dec	.78	.77	1.20	1995	1	2.34	1995	.17	1986
Ann	27.50	27.93	5.35	Aug 1953	28	9.12	Aug 1978	.02	Nov 1999

Mean Number of Days (3)

Month	Daily Precipitation >= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	7.5	3.0	.2	@
Feb	6.0	2.1	.1	.0
Mar	7.1	3.8	.7	@
Apr	7.7	5.1	1.1	.2
May	10.7	6.9	1.8	.4
Jun	11.8	7.9	2.6	.9
Jul	10.0	7.0	2.8	1.0
Aug	10.0	6.5	2.4	.9
Sep	9.9	5.5	1.9	.5
Oct	9.3	4.8	1.6	.6
Nov	7.1	3.7	.6	.2
Dec	6.9	2.5	.3	@
Ann	104.0	58.8	16.1	4.7

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	.17	.29	.40	.51	.64	.79	.98	1.22	1.63	2.02
Feb	.08	.13	.22	.30	.39	.48	.59	.73	.91	1.21	1.50
Mar	.43	.56	.75	.92	1.07	1.24	1.42	1.63	1.90	2.33	2.72
Apr	.46	.64	.93	1.18	1.44	1.71	2.02	2.38	2.86	3.62	4.33
May	.75	1.04	1.47	1.86	2.25	2.65	3.10	3.64	4.34	5.46	6.50
Jun	1.47	1.85	2.40	2.86	3.30	3.75	4.23	4.80	5.53	6.64	7.67
Jul	1.33	1.73	2.33	2.84	3.34	3.85	4.42	5.08	5.93	7.26	8.50
Aug	.83	1.17	1.71	2.20	2.68	3.20	3.78	4.47	5.38	6.83	8.20
Sep	.99	1.26	1.67	2.01	2.33	2.67	3.04	3.47	4.02	4.88	5.67
Oct	.23	.41	.77	1.15	1.56	2.03	2.58	3.28	4.25	5.87	7.46
Nov	.14	.24	.43	.63	.84	1.07	1.35	1.70	2.18	2.97	3.74
Dec	.16	.23	.35	.45	.56	.67	.80	.95	1.16	1.48	1.79
Ann	20.43	21.82	23.59	24.92	26.11	27.24	28.41	29.70	31.26	33.50	35.43

\+ 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)

Month	Snow Fall Mean	Snow Fall Median	Snow Depth Mean	Snow Depth Median
Jan	13.5	13.0	12	11
Feb	7.3	6.3	12	11
Mar	9.6	9.0	8	6
Apr	1.9	.7	2	#
May	.0	.0	#	0
Jun	.0	.0	0	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	.0	.0	#	0
Oct	.3	.0	#	0
Nov	6.9	3.6	2	1
Dec	8.6	7.4	6	5
Ann	48.1	40.0	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	15.0	1997	4	28.8	1975	31	1971	31	26	1997
Feb	9.0	1971	27	20.0	1971	35	1971	4	27	1975
Mar	16.0	1985	4	20.0	1975	31	1972	6	23	1997
Apr	8.0	1974	1	8.0	1974	25	1975	1	9	1996
May	1.0	1971	19	1.0	1971	1	1971	19	#+	2000
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	.5	1974	21	.5	1974	#	1995	21	#	1995
Oct	2.0	1972	31	3.0	1972	2	1987	24	#+	1997
Nov	8.0	1977	9	24.5	1977	13	1996	30	7	1993
Dec	7.0	1995	8	16.8	1972	19	1983	30	16	1983
Ann	16.0	Mar 1985	4	28.8	Jan 1975	35	Feb 1971	4	27	Feb 1975

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	5.8	3.8	1.1	.4	.0
Feb	4.7	2.7	.6	.2	.0
Mar	3.5	2.7	1.2	.4	@
Apr	.7	.6	.2	.1	.0
May	@	@	.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
Oct	.3	.2	.0	.0	.0
Nov	3.7	2.6	1.1	.4	.0
Dec	5.5	3.0	.9	.3	.0
Ann	24.2	15.6	5.1	1.8	@

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	30.8	29.1	28.7	20.4
Feb	27.1	26.8	24.5	17.3
Mar	19.1	15.9	13.4	8.9
Apr	3.7	2.6	2.2	1.2
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	.1	.0	.0	.0
Nov	8.2	5.2	2.5	.3
Dec	24.3	15.6	11.4	3.9
Ann	113.3	95.2	82.7	52.0

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

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	9/08	9/13	9/16	9/18	9/21	9/23	9/25	9/28	10/03
32	9/15	9/19	9/22	9/25	9/28	9/30	10/03	10/06	10/11
28	9/22	9/27	10/01	10/04	10/07	10/10	10/14	10/17	10/23
24	10/08	10/14	10/18	10/21	10/24	10/27	10/31	11/04	11/09
20	10/18	10/23	10/27	10/30	11/02	11/05	11/08	11/12	11/17
16	10/23	10/28	10/31	11/03	11/06	11/09	11/12	11/15	11/20

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	136	132	128	125	121	118	114	108
32	157	152	148	144	141	137	134	130	124
28	184	177	171	167	162	158	153	148	140
24	213	206	200	195	191	187	182	176	169
20	228	220	215	211	206	202	198	193	185
16	237	230	225	221	218	214	210	205	198

***** 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	1816	1413	1197	708	326	105	41	76	280	645	1140	1645	9392
60	1661	1273	1042	562	211	40	10	25	162	491	990	1490	7957
57	1568	1189	949	476	155	19	3	11	105	401	900	1397	7173
55	1506	1133	887	421	123	11	0	5	75	343	840	1335	6679
50	1351	993	733	296	62	2	0	0	26	214	690	1180	5547
32	806	524	256	33	0	0	0	0	0	10	236	651	2516

Base — Cooling Degree Days (1)

Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	13	35	82	315	723	959	1129	1061	722	388	87	29	5543
55	0	0	0	14	132	280	416	353	107	8	0	0	1310
57	0	0	0	9	103	228	356	297	77	4	0	0	1074
60	0	0	0	4	66	159	270	218	44	1	0	0	762
65	0	0	0	0	26	73	146	114	12	0	0	0	371
70	0	0	0	0	8	22	63	45	2	0	0	0	140

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	14	151	499	725	889	823	493	202	20	0	0	0	14	165	664	1389	2278	3101	3594	3796	3816	3816
45	0	0	2	81	353	575	734	668	349	112	7	0	0	0	2	83	436	1011	1745	2413	2762	2874	2881	2881
50	0	0	0	41	228	426	579	513	220	47	1	0	0	0	0	41	269	695	1274	1787	2007	2054	2055	2055
55	0	0	0	16	125	281	424	360	119	15	0	0	0	0	0	16	141	422	846	1206	1325	1340	1340	1340
60	0	0	0	2	61	160	274	219	55	1	0	0	0	0	0	2	63	223	497	716	771	772	772	772
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	0	9	104	302	447	573	518	273	107	10	0	0	0	9	113	415	862	1435	1953	2226	2333	2343	2343

(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