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: GULL LAKE DAM, MN **COOP ID: 213411**

Climate Division: MN 3 **NWS Call Sign:** **Elevation: 1,215 Feet** **Lat: 46˚25N** **Lon: 94˚22W**

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	15.4	-4.6	5.4	55+	1981	24	16.5	1990	-41+	1994	19	-6.4	1982	1850	0	.0	.0	.1	27.0	31.0	17.5
Feb	23.2	2.8	13.0	57	1961	22	29.1	1998	-45+	1996	3	.4	1989	1457	0	.0	.0	.4	18.6	27.8	11.7
Mar	34.4	15.2	24.8	74	1968	30	35.2	2000	-34	1962	1	16.4	1996	1246	0	.0	.0	4.0	9.3	28.6	4.1
Apr	50.6	29.4	40.0	95	1980	21	48.2	1987	-4	1979	6	32.5	1975	750	0	.0	.1	18.6	.9	18.8	.1
May	65.2	43.5	54.4	93+	1964	22	62.7	1977	18	1967	3	47.6	1979	352	22	.0	.1	29.7	.0	3.0	.0
Jun	73.5	53.8	63.7	96	1988	20	69.5	1988	34+	1964	4	57.6	1982	109	67	.0	1.2	30.0	.0	.0	.0
Jul	77.7	58.9	68.3	101+	1988	28	73.0	1988	39	1967	4	60.5	1992	48	150	.1	2.7	31.0	.0	.0	.0
Aug	75.6	56.7	66.2	102+	1976	19	72.2	1983	38	1967	31	61.1	1977	76	111	.1	1.8	31.0	.0	.0	.0
Sep	65.6	46.6	56.1	96+	1983	2	62.3	1998	23	1974	22	49.3	1993	279	11	.0	.4	29.0	.0	1.2	.0
Oct	53.1	34.3	43.7	88	1953	2	50.3	1973	7	1976	27	38.8	1988	661	0	.0	.0	21.5	.3	11.7	.0
Nov	34.5	19.9	27.2	73+	1978	2	36.7	1999	-26	1964	30	18.7	1985	1133	0	.0	.0	4.4	11.5	26.7	1.4
Dec	20.1	3.4	11.8	59	1962	1	24.5	1997	-38	1983	19	-2.3	1983	1650	0	.0	.0	.1	24.6	30.9	11.9
Ann	49.1	30.0	39.6	102+	Aug 1976	19	73.0	Jul 1988	-45+	Feb 1996	3	-6.4	Jan 1982	9611	361	.2	6.3	199.8	92.2	179.7	46.7

\+ 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: 1919-2001

(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	.78	.70	1.50	1975	11	3.38	1975	.02	1981
Feb	.57	.45	1.24	1977	24	1.91	1979	.02	1988
Mar	1.41	1.24	2.10	1985	4	3.14	1985	.37	1974
Apr	1.72	1.72	2.02	2001	23	5.04	1986	.07	1987
May	3.25	2.87	3.53	1949	5	7.82	1999	.69	1976
Jun	4.27	4.56	3.58	1968	10	7.60	1998	.72	1987
Jul	3.97	3.84	5.90	1952	17	6.66	1972	1.72	1989
Aug	3.73	3.60	3.58	1989	12	8.27	1989	.49	1976
Sep	2.64	2.20	2.40	1980	12	7.44	1986	.26	1974
Oct	2.54	1.90	3.43	1971	27	8.50	1971	.25	1976
Nov	1.34	1.19	1.86	2000	1	4.13	2000	.18	1999
Dec	.54	.56	.87	1963	8	1.45	1972	.13+	1997
Ann	26.76	27.04	5.90	Jul 1952	17	8.50	Oct 1971	.02+	Feb 1988

Mean Number of Days (3)

Month	Daily Precipitation >= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	6.6	2.5	.2	@
Feb	5.2	1.7	.2	@
Mar	7.0	4.1	.6	@
Apr	7.6	4.6	1.0	.1
May	10.2	6.3	2.3	.8
Jun	11.5	7.5	2.7	1.1
Jul	10.7	7.0	2.5	1.0
Aug	9.9	6.7	2.5	.9
Sep	9.3	5.3	1.7	.6
Oct	7.8	4.2	1.5	.8
Nov	6.3	3.5	.7	.2
Dec	5.9	1.9	.1	.0
Ann	98.0	55.3	16.0	5.5

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	.08	.14	.25	.36	.47	.61	.76	.96	1.22	1.66	2.09
Feb	.04	.08	.15	.23	.32	.42	.54	.70	.91	1.26	1.61
Mar	.44	.57	.77	.94	1.11	1.28	1.47	1.69	1.97	2.42	2.83
Apr	.29	.43	.69	.92	1.17	1.43	1.73	2.10	2.59	3.39	4.15
May	1.05	1.36	1.82	2.21	2.58	2.97	3.39	3.88	4.52	5.51	6.43
Jun	1.46	1.86	2.45	2.95	3.42	3.92	4.45	5.08	5.88	7.12	8.27
Jul	1.87	2.22	2.69	3.07	3.43	3.78	4.16	4.59	5.14	5.96	6.70
Aug	1.01	1.36	1.90	2.37	2.84	3.32	3.86	4.50	5.33	6.63	7.85
Sep	.57	.82	1.20	1.55	1.91	2.28	2.70	3.21	3.87	4.93	5.93
Oct	.24	.42	.77	1.12	1.50	1.94	2.45	3.09	3.97	5.44	6.87
Nov	.21	.33	.52	.71	.90	1.11	1.35	1.64	2.03	2.67	3.28
Dec	.15	.20	.28	.35	.41	.48	.56	.65	.76	.94	1.11
Ann	18.48	20.07	22.10	23.66	25.04	26.39	27.78	29.32	31.19	33.92	36.28

\+ 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: 1919-2001
(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	12.3	9.3	12	10
Feb	7.6	6.8	14	13
Mar	9.5	7.8	11	10
Apr	2.9	2.3	2	#
May	.2	.0	#	0
Jun	.0	.0	0	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	.0	.0	0	0
Oct	.7	.0	#	0
Nov	8.9	8.2	2	2
Dec	8.8	9.0	6	6
Ann	50.9	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	15.0	1996	18	30.5	1975	32	1997	7	27	1997
Feb	10.0	1990	16	21.5	1971	28	1971	4	25	1997
Mar	14.0	1985	4	21.0	1985	34	1975	28	28	1997
Apr	9.0	1974	1	9.0	1974	28	1975	3	14	1975
May	4.0	1971	19	4.0	1971	#	1971	19	#	1971
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	3.5	1972	31	5.6	1992	4	1972	31	#+	1996
Nov	10.0	1988	27	24.5	1988	16	1988	27	6	1993
Dec	8.5	1990	20	16.6	1972	17+	1996	30	12	1988
Ann	15.0	Jan 1996	18	30.5	Jan 1975	34	Mar 1975	28	28	Mar 1997

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	7.3	4.0	1.5	.6	.1
Feb	4.8	2.5	.7	.2	.1
Mar	3.8	2.5	1.1	.5	.1
Apr	1.5	1.1	.3	.1	.0
May	@	@	@	.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	.4	.3	.1	.0	.0
Nov	3.6	2.2	.7	.4	.1
Dec	6.4	3.0	.7	.2	.0
Ann	27.8	15.6	5.1	2.0	.4

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	30.6	30.2	28.5	17.4
Feb	27.2	27.2	25.6	19.0
Mar	23.5	20.8	18.7	13.9
Apr	5.8	4.3	3.2	1.5
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	.3	.1	.0	.0
Nov	12.0	7.9	5.9	1.6
Dec	25.6	22.6	15.9	4.5
Ann	125.0	113.1	97.8	57.9

+ 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	5/30	5/26	5/23	5/20	5/18	5/15	5/12	5/09	5/05
32	5/19	5/16	5/13	5/10	5/08	5/06	5/04	5/01	4/27
28	5/11	5/07	5/04	5/02	4/29	4/27	4/24	4/21	4/17
24	4/30	4/25	4/22	4/20	4/17	4/15	4/12	4/09	4/05
20	4/20	4/16	4/13	4/10	4/08	4/06	4/03	3/31	3/27
16	4/13	4/09	4/06	4/04	4/02	3/31	3/28	3/26	3/22

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	9/14	9/17	9/19	9/21	9/23	9/24	9/26	9/28	10/01
32	9/21	9/24	9/26	9/28	9/30	10/01	10/03	10/05	10/08
28	9/25	9/30	10/04	10/07	10/09	10/12	10/15	10/19	10/23
24	10/08	10/13	10/16	10/19	10/22	10/25	10/28	11/01	11/05
20	10/19	10/24	10/27	10/30	11/02	11/04	11/07	11/10	11/15
16	10/26	10/31	11/03	11/06	11/09	11/12	11/15	11/19	11/24

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	143	138	134	131	127	124	121	117	111
32	158	153	149	146	144	141	138	134	129
28	183	176	171	167	163	159	154	149	142
24	209	202	196	191	187	183	178	173	165
20	227	220	215	211	207	203	198	193	186
16	239	233	228	224	221	217	213	208	202

***** 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)

Heating Degree Days (1)

Base Below	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
65	1850	1457	1246	750	352	109	48	76	279	661	1133	1650	9611
60	1695	1317	1091	603	233	42	13	25	161	507	983	1495	8165
57	1602	1233	998	518	174	20	6	11	105	417	893	1402	7379
55	1540	1177	936	462	141	12	0	5	75	359	833	1340	6880
50	1385	1037	781	334	74	2	0	0	26	230	684	1185	5738
32	839	569	297	48	1	0	0	0	0	12	233	655	2654

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	12	36	74	288	695	948	1124	1058	722	374	90	28	5449
55	0	0	0	13	121	270	411	349	107	8	0	0	1279
57	0	0	0	8	93	218	355	293	77	4	0	0	1048
60	0	0	0	4	59	151	269	214	43	1	0	0	741
65	0	0	0	0	22	67	150	111	11	0	0	0	361
70	0	0	0	0	7	19	68	43	2	0	0	0	139

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	12	153	508	750	930	851	528	218	19	0	0	0	12	165	673	1423	2353	3204	3732	3950	3969	3969
45	0	0	2	81	361	600	775	696	385	121	7	0	0	0	2	83	444	1044	1819	2515	2900	3021	3028	3028
50	0	0	0	40	232	452	620	541	251	57	0	0	0	0	0	40	272	724	1344	1885	2136	2193	2193	2193
55	0	0	0	15	130	308	465	386	143	22	0	0	0	0	0	15	145	453	918	1304	1447	1469	1469	1469
60	0	0	0	3	63	181	310	241	66	2	0	0	0	0	0	3	66	247	557	798	864	866	866	866
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	0	12	117	313	466	602	541	307	127	13	0	0	0	12	129	442	908	1510	2051	2358	2485	2498	2498

(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