

Climatology of the United States

No. 20

1971-2000

Station: BUFFALO, MN

COOP ID: 211107

Climate Division: MN 5

NWS Call Sign:

Elevation: 980 Feet

Lat: 45° 11N

Lon: 93° 52W

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	-.3	10.2	56	1981	24	23.6	1990	-38	1977	9	-2.4	1977	1701	0	.0	.0	.1	24.6	31.0	15.0
Feb	27.5	6.1	16.8	60	1998	25	30.0	1998	-36	1996	2	5.6	1979	1350	0	.0	.0	.7	16.8	27.4	9.2
Mar	39.4	19.2	29.3	81	1968	30	38.3	2000	-36	1962	1	20.2	1975	1107	0	.0	.0	5.9	7.5	26.4	2.6
Apr	55.6	32.7	44.2	94	1980	21	51.8	1987	3	1995	4	35.4	1975	627	2	.0	.1	21.2	.4	13.5	.0
May	69.2	46.5	57.9	95	2001	15	64.7	1988	19	1967	3	51.0	1997	266	43	.0	.8	30.4	.0	1.6	.0
Jun	78.2	56.2	67.2	102+	1988	25	74.2	1988	36+	1969	13	62.3	1982	60	126	.1	2.8	30.0	.0	.0	.0
Jul	82.2	60.5	71.4	105	1988	31	76.5	1988	42	1969	1	64.1	1992	19	216	.2	5.8	31.0	.0	.0	.0
Aug	79.8	57.9	68.9	102	1988	1	75.0	1983	39	1986	27	64.4	1992	37	156	.1	3.2	31.0	.0	.0	.0
Sep	71.1	47.3	59.2	96+	1978	7	64.7	1978	25	1965	26	53.6	1993	197	24	.0	.7	29.6	.0	.8	.0
Oct	59.0	36.0	47.5	89	1997	4	53.5	1973	14+	1976	27	41.9	1976	543	0	.0	.0	24.7	.1	9.4	.0
Nov	40.0	22.5	31.3	77	1999	9	40.0	1999	-16+	1977	26	23.5	1996	1012	0	.0	.0	6.1	8.9	24.8	1.2
Dec	25.2	7.4	16.3	64	1998	2	26.2	1997	-33	1983	19	1.7	1983	1510	0	.0	.0	.3	22.0	30.8	9.2
Ann	54.0	32.7	43.4	105	Jul 1988	31	76.5	Jul 1988	-38	Jan 1977	9	-2.4	Jan 1977	8429	567	.4	13.4	211.0	80.3	165.7	37.2

+ 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/normal/usnormals.html

Issue Date: February 2004

(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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No. 20

1971-2000

National Climatic Data Center
Federal Building
151 Patton Avenue
Asheville, North Carolina 28801
www.ncdc.noaa.gov

Station: BUFFALO, MN

COOP ID: 211107

Climate Division: MN 5

NWS Call Sign:

Elevation: 980 Feet Lat: 45°11N

Lon: 93°52W

Precipitation (inches)																								
	Precipitation Totals									Mean Number of Days (3)				Precipitation Probabilities (1) Probability that the monthly/annual precipitation will be equal to or less than the indicated amount										
	Means/ Medians(1)		Extremes							Daily Precipitation				Monthly/Annual Precipitation vs Probability Levels These values were determined from the incomplete gamma distribution										
Month	Mean	Med- ian	Highest Daily(2)	Year	Day	Highest Monthly(1)	Year	Lowest Monthly(1)	Year	>= 0.01	>= 0.10	>= 0.50	>= 1.00	.05	.10	.20	.30	.40	.50	.60	.70	.80	.90	.95
Jan	.78	.60	1.12	1996	18	2.81	1975	.02+	1990	7.0	2.6	.2	@	.07	.13	.24	.35	.46	.60	.76	.95	1.22	1.68	2.12
Feb	.64	.47	.92	1977	23	2.02	1971	.04	1987	5.0	2.1	.2	.0	.07	.11	.20	.29	.38	.49	.62	.77	.99	1.34	1.69
Mar	1.56	1.32	1.40	1965	17	3.38	1998	.44	1994	7.8	3.9	1.0	@	.48	.63	.85	1.04	1.22	1.41	1.62	1.87	2.19	2.69	3.15
Apr	2.30	1.98	2.88	2001	23	6.19	1986	.55	1979	8.8	5.2	1.5	.5	.50	.71	1.05	1.36	1.66	1.99	2.35	2.79	3.37	4.30	5.17
May	3.26	3.29	2.16	1973	24	6.27	1999	.69	1981	10.6	6.9	2.1	.7	1.25	1.56	1.99	2.35	2.69	3.04	3.41	3.85	4.40	5.25	6.03
Jun	4.39	4.07	4.05	1983	21	9.05	1990	.08	1988	10.3	7.1	2.9	1.3	1.06	1.47	2.11	2.68	3.25	3.85	4.51	5.31	6.35	8.00	9.55
Jul	3.91	3.28	5.45	1961	12	9.40	1997	1.36	1979	9.9	6.7	2.8	1.1	1.29	1.67	2.21	2.67	3.12	3.58	4.08	4.67	5.42	6.59	7.67
Aug	4.24	3.77	4.58	1999	22	9.46	1993	1.77	1996	9.7	6.4	3.0	1.2	1.79	2.17	2.71	3.15	3.57	3.99	4.44	4.96	5.62	6.62	7.53
Sep	2.96	2.71	2.90	1991	8	6.80	1986	.39	2000	8.6	5.5	1.9	.7	.78	1.06	1.49	1.87	2.24	2.63	3.06	3.57	4.23	5.28	6.26
Oct	2.19	2.03	3.73	1973	10	5.92	1984	.16+	1978	7.2	4.4	1.3	.5	.27	.45	.76	1.06	1.38	1.74	2.16	2.67	3.37	4.51	5.62
Nov	1.81	1.39	2.70	1975	20	5.05	1975	.12	1980	7.1	4.1	1.1	.3	.18	.31	.56	.81	1.08	1.39	1.75	2.20	2.82	3.85	4.85
Dec	.78	.67	1.12	1984	16	2.05	1982	.06	1980	6.6	2.7	.3	.1	.12	.19	.31	.41	.52	.65	.78	.95	1.18	1.55	1.90
Ann	28.82	29.38	5.45	Jul 1961	12	9.46	Aug 1993	.02+	Jan 1990	98.6	57.6	18.3	6.4	18.99	20.84	23.23	25.07	26.71	28.31	29.98	31.83	34.09	37.40	40.28

+ 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: 1948-2001

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Station: BUFFALO, MN

COOP ID: 211107

Climate Division: MN 5

NWS Call Sign:

Elevation: 980 Feet

Lat: 45° 11N

Lon: 93° 52W

Snow (inches)																							
Snow Totals															Mean Number of Days (1)								
Means/Medians (1)					Extremes (2)										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	9.6	8.5	8	6	7.8	1982	22	28.4	1975	32	1982	26	20+	1997	7.3	3.6	1.0	.1	.0	27.6	24.9	19.3	6.3
Feb	6.2	4.7	9	6	7.1	1991	24	15.5	1974	30	1979	13	27	1979	4.9	2.4	.7	.1	.0	24.9	21.4	15.7	4.7
Mar	8.1	8.0	5	3	10.8	1999	9	24.1	1985	24	1979	4	15	1979	4.6	2.6	1.2	.4	@	14.6	9.5	7.0	2.9
Apr	2.5	2.0	#	#	6.9	1984	30	8.2	1983	13	1975	1	5	1975	1.4	.8	.4	.1	.0	2.3	1.2	.5	.2
May	.1	.0	#	0	3.0	1971	19	3.0	1971	#	1989	29	#	1989	@	@	@	.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	#	1979	2	#	1979	.0	.0	.0	.0	.0	.0	.0	.0	.0
Sep	#	.0	0	0	#	1985	30	#	1985	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Oct	.1	.0	#	0	1.5	1981	24	1.5	1981	2	1981	24	#+	1987	.2	.1	.0	.0	.0	@	.0	.0	.0
Nov	7.8	6.9	2	1	11.8	1991	1	29.8	1991	20	1991	8	9	1991	4.1	2.5	.9	.3	@	9.2	5.1	2.3	.6
Dec	8.0	6.1	5	3	11.5	1982	28	18.7	1981	25	1983	16	21	1983	6.5	3.1	.7	.2	.1	22.9	14.7	10.1	3.6
Ann	42.4	36.2	N/A	N/A	11.8	Nov 1991	1	29.8	Nov 1991	32	Jan 1982	26	27	Feb 1979	29.0	15.1	4.9	1.2	.1	101.5	76.8	54.9	18.3

+ 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

Complete documentation available from:

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Lat: 45° 11N

Lon: 93° 52W

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	5/24	5/20	5/17	5/14	5/12	5/09	5/07	5/04	4/30
32	5/16	5/11	5/08	5/04	5/01	4/29	4/25	4/22	4/17
28	5/06	5/01	4/27	4/24	4/21	4/18	4/15	4/11	4/06
24	4/25	4/20	4/17	4/14	4/11	4/09	4/06	4/02	3/29
20	4/13	4/09	4/06	4/04	4/01	3/30	3/27	3/24	3/20
16	4/11	4/06	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	9/22	9/24	9/26	9/28	10/01	10/05
32	9/19	9/24	9/27	9/30	10/02	10/05	10/08	10/11	10/16
28	9/29	10/03	10/07	10/09	10/12	10/15	10/17	10/21	10/25
24	10/10	10/15	10/19	10/22	10/26	10/29	11/01	11/05	11/10
20	10/19	10/24	10/28	10/31	11/03	11/06	11/09	11/12	11/17
16	10/27	11/01	11/06	11/09	11/12	11/16	11/19	11/23	11/29
Freeze Free Period									
Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	150	145	141	138	135	131	128	124	119
32	173	166	161	157	153	149	145	140	134
28	195	188	182	178	173	169	164	159	151
24	219	212	206	201	197	192	187	181	174
20	235	228	223	219	215	210	206	201	194
16	254	245	239	234	230	225	220	214	205

* 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

Complete documentation available from:

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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	1701	1350	1107	627	266	60	19	37	197	543	1012	1510	8429
60	1546	1210	952	484	165	19	4	9	97	393	862	1355	7096
57	1453	1126	859	402	116	8	0	2	55	308	772	1262	6363
55	1391	1070	797	350	90	4	0	1	35	256	712	1200	5906
50	1236	930	648	235	41	0	0	0	8	146	567	1045	4856
32	700	470	212	20	0	0	0	0	0	4	159	528	2093

Base	Cooling Degree Days (1)												
Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	22	44	128	384	800	1056	1220	1142	816	484	137	42	6275
55	0	0	0	25	177	370	507	430	162	22	0	0	1693
57	0	0	0	16	142	313	445	369	122	12	0	0	1419
60	0	0	0	8	97	235	356	283	73	4	0	0	1056
65	0	0	0	2	43	126	216	156	24	0	0	0	567
70	0	0	0	0	15	52	111	69	4	0	0	0	251

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	33	223	595	839	1007	927	615	287	36	1	0	2	35	258	853	1692	2699	3626	4241	4528	4564	4565
45	0	0	14	133	443	689	852	772	467	173	15	0	0	0	14	147	590	1279	2131	2903	3370	3543	3558	3558
50	0	0	4	70	302	539	697	617	326	91	3	0	0	0	4	74	376	915	1612	2229	2555	2646	2649	2649
55	0	0	0	30	183	390	542	463	205	41	0	0	0	0	0	30	213	603	1145	1608	1813	1854	1854	1854
60	0	0	0	11	98	255	388	312	114	14	0	0	0	0	0	11	109	364	752	1064	1178	1192	1192	1192
Base	Growing Degree Units for Corn (Monthly)												Growing Degree Units for Corn (Accumulated Monthly)											
50/86	0	0	24	148	364	539	673	609	375	172	22	0	0	0	24	172	536	1075	1748	2357	2732	2904	2926	2926

(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.
Complete documentation for the 1971-2000 Normals is available on the internet from:
www.ncdc.noaa.gov/oa/climate/normal/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 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.

- | | |
|---|---|
| <ol style="list-style-type: none">a. Temperature/ Precipitation Tables<ol style="list-style-type: none">1. 1971-2000 Monthly Normals2. Cooperative Summary of the Day3. National Weather Service station records4. 1971-2000 serially complete daily datab. Degree Day Table<ol style="list-style-type: none">1. Monthly and Annual Heating and Cooling Degree Days Normals to Selected Bases derived from 1971-2000 Monthly Normals2. Daily Normal Growing Degree Units to Selected Base Temperatures derived from 1971-2000 serially complete daily data | <ol style="list-style-type: none">c. Snow Tables<ol style="list-style-type: none">1. Snow Climatology2. Cooperative Summary of the Dayd. Freeze Data Table
1971-2000 serially complete daily data |
|---|---|

References

U.S. Climate Normals 1971-2000, www.ncdc.noaa.gov/normal.html
U.S. Climate Normals 1971-2000-Products Clim20, www.ncdc.noaa.gov/oa/climate/normal/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