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: BOWLER, WI **COOP ID: 470991**

Climate Division: WI 3 **NWS Call Sign:** **Elevation: 1,080 Feet** **Lat: 44˚51N** **Lon: 88˚59W**

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	21.2	-.5	10.4	53	1973	26	19.9	1990	-41	1982	17	-.3	1977	1696	0	.0	.0	.1	25.5	30.9	14.9
Feb	27.6	4.6	16.1	59	2000	28	29.3	1998	-36+	1996	2	5.0	1979	1369	0	.0	.0	.7	17.5	28.1	11.2
Mar	38.6	17.2	27.9	76	2000	8	37.1	1973	-36	1962	1	21.2	1996	1149	0	.0	.0	4.7	8.2	28.5	3.7
Apr	53.4	30.3	41.9	92	1980	22	47.9	1987	1	1979	6	35.6	1975	694	0	.0	.1	18.8	.7	18.4	.0
May	67.0	41.2	54.1	90+	1975	21	61.3	1977	17	1966	10	48.3+	1997	357	18	.0	@	29.8	.0	6.2	.0
Jun	75.1	50.1	62.6	95+	1971	28	67.4	1995	28	1972	10	55.4	1982	131	59	.0	1.2	30.0	.0	.2	.0
Jul	79.5	55.2	67.4	100+	1995	15	71.4	1988	34	1972	4	61.6	1992	45	118	.1	2.4	31.0	.0	.0	.0
Aug	76.8	53.3	65.1	99	1988	3	70.3	1995	31	1965	29	61.1	1977	82	83	.0	1.0	31.0	.0	.0	.0
Sep	67.4	43.8	55.6	92	1976	8	61.3	1998	20	1974	23	50.8	1974	288	6	.0	.1	29.6	.0	2.7	.0
Oct	56.1	32.5	44.3	88	1963	7	52.4	1971	11	1976	27	37.8	1988	641	0	.0	.0	23.1	@	16.1	.0
Nov	40.0	21.4	30.7	74	1978	4	37.9	1999	-12	1976	30	23.3	1995	1028	0	.0	.0	6.2	6.7	25.9	.9
Dec	26.2	8.2	17.2	60+	2001	6	25.1	1997	-26+	1983	20	5.4	1983	1481	0	.0	.0	.5	21.3	30.6	8.5
Ann	52.4	29.8	41.1	100+	Jul 1995	15	71.4	Jul 1988	-41	Jan 1982	17	-.3	Jan 1977	8961	284	.1	4.8	205.5	79.9	187.6	39.2

\+ 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/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	.97	.81	1.30	1999	25	3.22	1996	.09	1981
Feb	.90	.76	1.21	1977	24	2.87	1971	.02	1987
Mar	1.73	1.54	2.25	1973	7	4.67	1977	.20	1999
Apr	2.85	2.77	2.60	1994	25	5.37	1991	.40	1989
May	3.55	3.03	3.02	1965	16	8.07	1973	1.11	1996
Jun	3.75	3.23	3.10	1969	27	7.86	1996	.84	1976
Jul	3.94	3.62	4.52	1982	11	9.98	1982	1.22	1981
Aug	4.17	3.34	4.02	2000	15	9.51	1995	1.08	1999
Sep	3.78	4.04	3.57	1975	11	8.49	1986	.68	1979
Oct	2.47	2.24	2.21	1983	12	6.67	1984	.09	2000
Nov	2.04	1.54	1.80	1984	1	5.23	1985	.00	1976
Dec	1.36	1.24	1.67	1959	28	2.88	1977	.04	1994
Ann	31.51	31.55	4.52	Jul 1982	11	9.98	Jul 1982	.00	Nov 1976

Mean Number of Days (3)

Month	Daily Precipitation >= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	5.3	3.1	.4	.1
Feb	4.0	2.7	.3	.1
Mar	6.1	4.2	1.0	.3
Apr	8.7	6.1	2.1	.5
May	9.3	6.6	2.2	.9
Jun	9.2	6.5	2.2	.9
Jul	9.6	6.9	2.7	1.1
Aug	9.0	7.0	2.5	1.1
Sep	9.4	6.4	2.2	.9
Oct	7.3	4.9	1.5	.6
Nov	6.3	4.2	1.3	.5
Dec	6.0	3.8	.6	.1
Ann	90.2	62.4	19.0	7.1

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	.15	.24	.38	.51	.65	.80	.98	1.19	1.47	1.93	2.37
Feb	.09	.16	.28	.41	.54	.69	.87	1.10	1.41	1.92	2.42
Mar	.28	.43	.68	.91	1.16	1.43	1.74	2.11	2.61	3.43	4.21
Apr	.87	1.14	1.55	1.89	2.23	2.58	2.96	3.41	3.99	4.90	5.74
May	1.23	1.57	2.06	2.47	2.86	3.27	3.71	4.23	4.89	5.91	6.85
Jun	1.14	1.50	2.03	2.49	2.94	3.40	3.90	4.50	5.27	6.47	7.59
Jul	1.18	1.55	2.12	2.60	3.07	3.56	4.10	4.73	5.55	6.83	8.02
Aug	1.27	1.67	2.26	2.77	3.26	3.77	4.33	4.99	5.85	7.18	8.41
Sep	.89	1.24	1.79	2.29	2.78	3.30	3.88	4.58	5.49	6.94	8.30
Oct	.58	.81	1.17	1.49	1.81	2.16	2.54	2.99	3.59	4.54	5.44
Nov	.23	.48	.82	1.12	1.41	1.73	2.09	2.52	3.09	4.01	4.88
Dec	.25	.37	.57	.75	.94	1.14	1.37	1.65	2.03	2.63	3.20
Ann	22.16	23.97	26.28	28.04	29.61	31.12	32.69	34.42	36.53	39.58	42.23

\+ 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

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	8.5	6.4	6	7
Feb	6.4	7.0	7	5
Mar	7.3	5.1	2	0
Apr	1.5	.0	#	0
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	.2	.0	#	0
Nov	4.1	4.0	#	0
Dec	7.8	4.4	3	#
Ann	35.8	26.9	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	1988	20	17.0	1988	13+	1984	29	13	1984
Feb	8.0	1997	5	13.2	1971	20	1971	27	20	1971
Mar	24.0	1997	14	28.3	1972	27	1972	7	16	1972
Apr	6.0	1985	1	7.0	1988	11	1972	1	3	1972
May	#	1990	10	#+	1990	0	0	0	0	0
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	1.5	1976	19	1.5+	1982	1+	1989	20	#+	1989
Nov	5.6	1977	28	11.7	1971	10	1971	30	2	1971
Dec	18.0	1985	2	20.0	1972	16+	1983	28	14	1983
Ann	24.0	Mar 1997	14	28.3	Mar 1972	27	Mar 1972	7	20	Feb 1971

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	4.0	3.2	1.2	.4	.1
Feb	2.6	2.1	.8	.3	.0
Mar	2.2	1.9	.9	.5	.1
Apr	.6	.6	.3	.1	.0
May	.0	.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	.0	.0	.0
Nov	1.6	1.5	.4	.2	.0
Dec	3.5	3.2	1.2	.5	.1
Ann	14.7	12.6	4.8	2.0	.3

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	-9.9	-9.9	-9.9	-9.9
Feb	-9.9	-9.9	-9.9	-9.9
Mar	-9.9	-9.9	-9.9	-9.9
Apr	.2	.2	.1	.0
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	.2	.1	.1	.0
Dec	-9.9	-9.9	-9.9	-9.9
Ann	-9.9	-9.9	-9.9	-9.9

+ 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	6/20	6/15	6/11	6/08	6/05	6/02	5/30	5/26	5/21
32	6/07	6/02	5/30	5/27	5/24	5/21	5/18	5/14	5/09
28	5/22	5/17	5/13	5/10	5/08	5/05	5/02	4/29	4/24
24	5/05	5/01	4/27	4/24	4/22	4/19	4/16	4/13	4/08
20	4/25	4/21	4/18	4/16	4/13	4/11	4/09	4/06	4/02
16	4/15	4/11	4/08	4/05	4/03	3/31	3/29	3/26	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	8/25	8/30	9/03	9/07	9/10	9/13	9/17	9/21	9/26
32	9/12	9/15	9/18	9/20	9/23	9/25	9/27	9/30	10/03
28	9/20	9/25	9/28	10/01	10/03	10/06	10/09	10/12	10/16
24	9/27	10/03	10/07	10/11	10/14	10/18	10/22	10/26	11/01
20	10/09	10/15	10/19	10/23	10/27	10/31	11/03	11/08	11/14
16	10/25	10/29	11/02	11/05	11/08	11/11	11/14	11/17	11/22

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	119	111	106	101	96	92	87	81	73
32	138	132	128	124	121	118	114	110	104
28	168	161	156	152	148	144	140	135	128
24	198	190	185	180	175	170	165	160	152
20	218	210	205	200	196	191	187	181	174
16	240	232	227	222	218	214	209	204	197

***** 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	1696	1369	1149	694	357	131	45	82	288	641	1028	1481	8961
60	1541	1229	994	546	234	58	10	25	164	489	878	1326	7494
57	1448	1145	901	460	174	30	2	10	105	401	788	1233	6697
55	1386	1089	839	405	139	18	0	4	75	344	728	1171	6198
50	1231	949	686	277	70	4	0	0	25	219	579	1016	5056
32	685	474	224	24	0	0	0	0	0	10	144	493	2054

Base	Cooling Degree Days (1)												
Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	13	28	98	321	685	918	1096	1024	708	392	106	35	5424
55	0	0	0	11	110	246	383	315	93	13	0	0	1171
57	0	0	0	6	83	198	323	259	63	7	0	0	939
60	0	0	0	2	50	135	238	181	32	2	0	0	640
65	0	0	0	0	18	59	118	83	6	0	0	0	284
70	0	0	0	0	5	17	42	25	0	0	0	0	89

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	162	458	706	864	790	501	198	30	1	0	0	20	182	640	1346	2210	3000	3501	3699	3729	3730
45	0	0	8	86	318	556	709	635	357	106	10	0	0	0	8	94	412	968	1677	2312	2669	2775	2785	2785
50	0	0	1	45	197	407	554	480	227	45	0	0	0	0	1	46	243	650	1204	1684	1911	1956	1956	1956
55	0	0	0	19	105	266	399	329	125	14	0	0	0	0	0	19	124	390	789	1118	1243	1257	1257	1257
60	0	0	0	8	49	149	252	190	56	3	0	0	0	0	0	8	57	206	458	648	704	707	707	707
Base	Growing Degree Units for Corn (Monthly)												Growing Degree Units for Corn (Accumulated Monthly)											
50/86	0	0	20	116	299	442	559	499	308	134	18	0	0	0	20	136	435	877	1436	1935	2243	2377	2395	2395

(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