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: PEMBINA, ND **COOP ID: 326947**

Climate Division: ND 3 **NWS Call Sign:** **Elevation: 790 Feet** **Lat: 48˚58N** **Lon: 97˚14W**

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	11.5	-9.2	1.2	48	1990	11	13.4	1990	-48	1954	21	-12.3	1982	1982	0	.0	.0	.0	28.6	31.0	22.8
Feb	19.3	-2.1	8.6	61	1958	25	24.3	1998	-42	1955	24	-8.1	1979	1582	0	.0	.0	.1	22.8	28.2	16.9
Mar	31.7	12.1	21.9	75	1963	31	34.1	1973	-39	1962	1	11.7	1996	1337	0	.0	.0	2.2	15.0	29.8	7.7
Apr	51.5	27.5	39.5	99	1952	27	47.2	1987	-12	1979	6	30.2	1979	766	1	.0	.1	16.9	2.5	21.0	.7
May	67.9	41.1	54.5	98+	1980	22	65.3	1977	9	1967	3	46.5	1979	355	29	.0	1.0	28.6	.0	6.3	.0
Jun	75.6	50.4	63.0	100	1995	18	71.0	1988	25	1964	1	55.3	1982	136	76	@	1.9	30.0	.0	.3	.0
Jul	79.7	54.1	66.9	101	1975	30	72.5	1974	34	1983	5	59.2	1992	61	120	@	2.7	31.0	.0	.0	.0
Aug	79.1	51.1	65.1	104	1989	2	71.6	1983	29	1982	27	58.1	1977	104	106	.2	3.3	31.0	.0	.2	.0
Sep	67.9	40.8	54.4	101	1983	3	59.4	1998	18	1984	27	49.3	1984	328	7	.1	.6	28.7	.0	5.0	.0
Oct	53.5	29.7	41.6	93	1992	2	48.4	1973	0+	1988	30	35.1	1991	726	0	.0	.1	19.3	1.0	19.3	.1
Nov	32.5	14.4	23.5	78	1975	6	34.0	1999	-39+	1985	30	11.6	1985	1247	0	.0	.0	3.0	15.3	29.0	4.7
Dec	17.5	-1.7	7.9	53	1982	3	24.4	1997	-40	1967	31	-4.7	1983	1773	0	.0	.0	.1	26.5	31.0	17.0
Ann	49.0	25.7	37.3	104	Aug 1989	2	72.5	Jul 1974	-48	Jan 1954	21	-12.3	Jan 1982	10397	339	.3	9.7	190.9	111.7	201.1	69.9

\+ 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	.44	.40	1.10	1971	13	1.24	1971	.00	1973
Feb	.40	.36	.80	2000	26	1.45	1998	.00+	1982
Mar	.72	.63	1.05	1977	1	2.48	1971	.00	1986
Apr	.99	.82	1.52	1997	8	3.28	1974	.00+	1988
May	2.09	2.00	2.30	1977	30	5.71	1977	.50	1972
Jun	3.41	3.47	3.13	1964	12	6.21	1993	.81	1988
Jul	2.95	2.62	3.71	1955	6	6.68	1993	.46	1989
Aug	2.68	2.00	3.78	1953	1	8.12	2000	.79	1987
Sep	2.12	1.80	3.52	1955	18	6.13	1991	.10	1984
Oct	1.48	1.06	3.03	1949	10	4.97	1997	.04	1990
Nov	.85	.51	1.35	2000	7	3.88	2000	.00	1976
Dec	.45	.46	.60	1972	31	1.20	1977	.05	1981
Ann	18.58	17.75	3.78	Aug 1953	1	8.12	Aug 2000	.00+	Apr 1988

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	5.4	1.6	@	@
Feb	4.5	1.5	.1	.0
Mar	4.7	2.4	.3	@
Apr	4.3	2.4	.7	.1
May	7.4	4.9	1.4	.4
Jun	10.3	6.7	2.3	.8
Jul	8.5	6.3	1.9	.6
Aug	7.1	4.9	1.6	.7
Sep	6.5	4.6	1.3	.5
Oct	5.7	3.7	1.0	.3
Nov	4.6	2.5	.4	@
Dec	4.7	1.7	.1	.0
Ann	73.7	43.2	11.1	3.4

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	.05	.11	.18	.24	.31	.38	.45	.54	.67	.86	1.05
Feb	.00	.04	.11	.17	.24	.31	.39	.49	.63	.86	1.08
Mar	.05	.12	.23	.33	.44	.57	.71	.88	1.12	1.51	1.88
Apr	.00	.00	.14	.30	.47	.66	.91	1.21	1.64	2.36	3.08
May	.50	.70	1.00	1.28	1.55	1.83	2.15	2.53	3.03	3.82	4.56
Jun	1.10	1.42	1.90	2.31	2.70	3.11	3.56	4.08	4.75	5.80	6.77
Jul	.75	1.03	1.46	1.84	2.21	2.61	3.05	3.57	4.25	5.33	6.34
Aug	.55	.80	1.19	1.55	1.91	2.30	2.73	3.26	3.95	5.06	6.11
Sep	.30	.48	.78	1.07	1.38	1.72	2.11	2.59	3.23	4.29	5.30
Oct	.06	.13	.29	.48	.70	.98	1.32	1.76	2.39	3.49	4.60
Nov	.02	.07	.18	.30	.43	.59	.79	1.04	1.39	1.98	2.58
Dec	.08	.12	.19	.25	.31	.38	.45	.55	.67	.87	1.06
Ann	13.07	14.13	15.49	16.53	17.45	18.34	19.26	20.28	21.51	23.31	24.86

\+ 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	6.3	5.3	12	9
Feb	4.8	4.0	11	8
Mar	3.0	2.0	7	3
Apr	1.9	.0	1	#
May	.1	.0	#	0
Jun	.0	.0	0	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	#	.0	0	0
Oct	1.0	.0	#	0
Nov	5.9	3.0	2	1
Dec	5.4	5.3	7	5
Ann	28.4	19.6	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	8.0	1989	7	28.0	1989	41	1989	27	33+	1997
Feb	5.0	1995	10	16.0	1987	37	1989	10	34	1989
Mar	7.0	1976	2	9.0	1988	30	1987	4	23	1997
Apr	10.0	1997	8	10.0+	1999	24	1996	5	11	1996
May	1.0	1979	11	1.0+	1991	1+	1991	1	#+	1991
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	#	1984	26	#	1984	0	0	0	0	0
Oct	6.0	1985	8	7.0+	1987	7	1985	10	1	1985
Nov	10.0	1988	15	22.0	1995	19	1996	30	13	1986
Dec	6.0	1972	31	12.0	1991	32	1996	31	24	1996
Ann	10.0+	Apr 1997	8	28.0	Jan 1989	41	Jan 1989	27	34	Feb 1989

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	3.8	3.6	.5	.1	.0
Feb	2.7	2.4	.5	@	.0
Mar	2.0	1.9	.5	.2	.0
Apr	.7	.6	.3	.1	@
May	.1	.1	.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	.3	.3	.1	@	.0
Nov	2.7	2.5	.9	.3	@
Dec	3.3	2.9	.7	.2	.0
Ann	15.6	14.3	3.5	.9	@

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	30.3	27.8	20.1	9.0
Feb	25.8	21.7	18.5	12.4
Mar	14.7	8.3	4.9	2.8
Apr	2.2	1.5	1.1	.3
May	.1	.0	.0	.0
Jun	.0	.0	.0	.0
Jul	.0	.0	.0	.0
Aug	.0	.0	.0	.0
Sep	.0	.0	.0	.0
Oct	.5	.3	.2	.0
Nov	10.9	6.4	4.5	1.3
Dec	21.1	17.6	12.0	8.1
Ann	105.6	83.6	61.3	33.9

+ 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	6/26	6/18	6/13	6/08	6/04	5/31	5/27	5/21	5/14
32	6/05	5/31	5/28	5/25	5/22	5/19	5/17	5/13	5/09
28	5/23	5/18	5/15	5/11	5/08	5/06	5/02	4/29	4/24
24	5/16	5/10	5/06	5/02	4/29	4/25	4/21	4/17	4/11
20	5/08	5/02	4/27	4/23	4/20	4/16	4/12	4/08	4/01
16	4/23	4/17	4/14	4/10	4/07	4/04	4/01	3/29	3/23

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	8/18	8/23	8/27	8/30	9/03	9/06	9/09	9/13	9/18
32	9/01	9/06	9/10	9/13	9/15	9/18	9/21	9/25	9/29
28	9/14	9/19	9/22	9/25	9/27	9/30	10/02	10/05	10/10
24	9/22	9/27	10/01	10/04	10/07	10/10	10/13	10/17	10/22
20	10/02	10/07	10/11	10/14	10/17	10/20	10/23	10/27	11/01
16	10/11	10/17	10/21	10/24	10/27	10/30	11/03	11/06	11/12

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	116	107	100	95	90	84	79	72	63
32	135	128	124	119	116	112	107	103	96
28	160	154	149	145	141	137	133	128	121
24	184	176	170	165	160	156	151	145	137
20	206	197	191	185	179	174	168	162	152
16	228	219	213	207	202	197	191	185	176

***** 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	1982	1582	1337	766	355	136	61	104	328	726	1247	1773	10397
60	1827	1442	1182	622	240	65	16	42	199	571	1097	1618	8921
57	1734	1358	1089	538	183	36	7	21	135	479	1007	1525	8112
55	1672	1302	1027	485	149	23	2	13	99	419	947	1463	7601
50	1517	1162	876	360	82	7	0	2	37	281	799	1308	6431
32	965	681	395	72	2	0	0	0	0	25	335	775	3250

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	6	24	81	297	699	930	1082	1026	670	322	78	25	5240
55	0	0	0	20	134	263	371	325	79	3	0	0	1195
57	0	0	0	13	105	216	314	271	55	1	0	0	975
60	0	0	0	7	69	155	230	199	29	0	0	0	689
65	0	0	0	1	29	76	120	106	7	0	0	0	339
70	0	0	0	0	10	27	46	43	1	0	0	0	127

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	4	123	467	700	842	784	441	144	11	0	0	0	4	127	594	1294	2136	2920	3361	3505	3516	3516
45	0	0	0	65	331	550	687	629	306	73	3	0	0	0	0	65	396	946	1633	2262	2568	2641	2644	2644
50	0	0	0	28	218	402	532	474	186	30	0	0	0	0	0	28	246	648	1180	1654	1840	1870	1870	1870
55	0	0	0	12	125	265	377	326	100	8	0	0	0	0	0	12	137	402	779	1105	1205	1213	1213	1213
60	0	0	0	1	62	152	233	194	44	0	0	0	0	0	0	1	63	215	448	642	686	686	686	686
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	0	3	100	302	432	534	496	284	106	9	0	0	0	3	103	405	837	1371	1867	2151	2257	2266	2266

(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