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: BEULAH 1 W, ND **COOP ID: 320766**

Climate Division: ND 4 **NWS Call Sign:** **Elevation: 1,785 Feet** **Lat: 47˚16N** **Lon: 101˚47W**

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	21.7	.2	11.0	59	1981	24	24.4	1990	-42+	1968	1	-5.9	1982	1675	0	.0	.0	.2	21.9	31.0	15.1
Feb	29.4	8.4	18.9	68	1958	26	31.5	1998	-42+	1994	9	2.5	1979	1291	0	.0	.0	1.9	15.6	28.1	9.1
Mar	41.2	18.8	30.0	80	1993	24	39.7	1986	-32	1998	11	19.4	1996	1086	0	.0	.0	8.9	9.0	29.0	3.6
Apr	57.5	29.8	43.7	97	1980	21	53.3	1987	-11	1975	1	34.4	1979	642	3	.0	.3	20.8	1.3	20.1	.3
May	70.8	41.3	56.1	99	1980	22	64.3	1977	13	1967	3	49.5	1983	307	30	.0	1.0	29.7	.0	5.7	.0
Jun	78.7	50.3	64.5	105	1988	27	77.5	1988	27	1998	3	58.8	1985	122	107	.4	3.7	30.0	.0	.2	.0
Jul	84.8	54.8	69.8	108	1960	20	75.7	1989	30	1957	28	63.4	1993	37	187	1.3	8.1	31.0	.0	.0	.0
Aug	84.7	53.8	69.3	105+	1978	13	74.1	1991	30	1982	27	64.0	1977	57	188	1.0	8.9	31.0	.0	.1	.0
Sep	72.9	42.6	57.8	108	1978	6	65.2	1998	13	1974	30	51.7	1984	251	34	.3	2.4	28.9	.0	4.4	.0
Oct	59.6	31.9	45.8	96+	1997	2	49.4	1973	-12	1991	30	41.4	1972	597	0	.0	.2	23.6	.9	17.8	.1
Nov	38.7	17.6	28.2	82	1999	7	38.1	1999	-25	1985	29	17.2+	1996	1106	0	.0	.0	6.4	10.3	28.4	2.6
Dec	26.2	5.4	15.8	65	1979	5	26.8	1997	-46+	1983	24	-2.1	1983	1525	0	.0	.0	.8	19.5	30.9	11.0
Ann	55.5	29.6	42.6	108+	Sep 1978	6	77.5	Jun 1988	-46+	Dec 1983	24	-5.9	Jan 1982	8696	549	3.0	24.6	213.2	78.5	195.7	41.8

\+ 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	.31	.24	.82	1949	5	1.02	1976	.00+	1998
Feb	.42	.25	2.36	1998	25	3.68	1998	.05	1997
Mar	.73	.42	1.23	1996	24	4.40	1987	.00	1994
Apr	1.71	1.36	2.10	1997	6	4.67	1975	.00	1988
May	2.21	2.25	4.08	1985	12	5.69	1985	.12	1984
Jun	3.30	2.84	3.26	1957	22	6.88	1990	.43	1974
Jul	2.35	1.76	4.18	1969	18	7.20	1993	.36	1971
Aug	1.53	1.08	3.17	1999	12	5.05	1999	.00	1988
Sep	1.60	1.33	2.35	1994	15	5.41	1977	.15	1997
Oct	1.35	.86	1.75	1994	18	6.41	1994	.00+	1989
Nov	.70	.58	.97	1998	9	1.99	2000	.00+	1999
Dec	.38	.35	.65	1977	17	1.34	1977	.00+	1999
Ann	16.59	16.57	4.18	Jul 1969	18	7.20	Jul 1993	.00+	Dec 1999

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	3.5	1.4	.1	.0
Feb	3.7	1.4	.1	@
Mar	4.2	2.4	.2	.1
Apr	6.2	4.0	1.0	.3
May	7.6	5.1	1.4	.3
Jun	9.2	6.5	2.2	.8
Jul	7.5	5.8	1.4	.4
Aug	6.3	4.0	1.0	.1
Sep	6.1	4.0	.8	.3
Oct	4.5	3.0	.8	.3
Nov	4.6	2.6	.3	.0
Dec	4.3	1.5	.1	.0
Ann	67.7	41.7	9.4	2.6

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	.00	.00	.07	.13	.19	.25	.31	.39	.50	.67	.84
Feb	.03	.05	.11	.16	.23	.30	.39	.51	.67	.95	1.22
Mar	.01	.04	.12	.21	.33	.47	.64	.87	1.19	1.75	2.32
Apr	.12	.29	.56	.81	1.07	1.36	1.70	2.11	2.66	3.57	4.44
May	.34	.53	.85	1.16	1.47	1.82	2.22	2.70	3.35	4.40	5.42
Jun	1.27	1.58	2.01	2.38	2.72	3.07	3.45	3.90	4.46	5.32	6.11
Jul	.40	.61	.95	1.28	1.61	1.96	2.37	2.87	3.53	4.60	5.62
Aug	.09	.23	.47	.69	.93	1.19	1.50	1.89	2.40	3.26	4.09
Sep	.34	.49	.72	.94	1.15	1.38	1.64	1.95	2.35	3.00	3.62
Oct	.00	.06	.24	.43	.66	.92	1.24	1.65	2.22	3.20	4.18
Nov	.00	.10	.24	.35	.46	.58	.72	.87	1.09	1.44	1.77
Dec	.00	.00	.09	.17	.24	.31	.39	.49	.62	.83	1.03
Ann	11.62	12.58	13.81	14.74	15.57	16.37	17.20	18.12	19.24	20.86	22.27

\+ 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	3.7	2.0	9	6
Feb	5.4	5.0	7	3
Mar	4.0	3.2	4	2
Apr	2.7	.0	1	0
May	.2	.0	#	0
Jun	.0	.0	0	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	.1	.0	#	0
Oct	1.7	.0	#	0
Nov	6.3	6.0	2	1
Dec	5.7	6.0	5	3
Ann	29.8	22.2	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	10.0	1976	1	13.0	1989	33	1982	31	26+	1994
Feb	7.0	1979	23	19.5	1979	34	1982	2	28	1982
Mar	6.5	1982	20	11.0	1988	35	1979	3	26	1979
Apr	12.0	1999	1	16.0	1999	23	1975	10	11	1975
May	3.0	1991	3	3.0	1991	3	1991	3	#+	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	3.0	1972	27	3.0	1972	6	1984	24	#+	1995
Oct	15.0	1991	28	20.0	1991	16	1991	31	2	1991
Nov	11.0	1986	8	19.6	1993	23	1993	29	12	1986
Dec	7.0	1988	26	15.3	1977	25	1977	31	20	1977
Ann	15.0	Oct 1991	28	20.0	Oct 1991	35	Mar 1979	3	28	Feb 1982

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	3.1	2.1	.7	.2	@
Feb	2.6	2.2	.4	.1	.0
Mar	1.8	1.6	.8	.4	.0
Apr	.9	.7	.4	.2	.1
May	.1	.1	@	.0	.0
Jun	.0	.0	.0	.0	.0
Jul	.0	.0	.0	.0	.0
Aug	.0	.0	.0	.0	.0
Sep	@	@	@	.0	.0
Oct	.7	.6	.2	@	@
Nov	3.0	2.6	.6	.3	@
Dec	3.0	2.1	.4	.1	.0
Ann	15.2	12.0	3.5	1.3	.1

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	24.2	19.0	12.4	4.1
Feb	18.5	14.2	8.6	2.0
Mar	8.7	6.2	4.4	2.2
Apr	1.8	1.3	1.2	.8
May	.1	@	.0	.0
Jun	.0	.0	.0	.0
Jul	.0	.0	.0	.0
Aug	.0	.0	.0	.0
Sep	@	.0	.0	.0
Oct	.8	.3	.2	.2
Nov	10.3	6.2	4.3	1.7
Dec	21.8	15.8	10.6	4.3
Ann	86.2	63.0	41.7	15.3

+ 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

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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	6/21	6/15	6/11	6/07	6/03	5/31	5/27	5/22	5/16
32	6/01	5/27	5/24	5/21	5/18	5/16	5/13	5/10	5/05
28	5/25	5/21	5/17	5/14	5/12	5/09	5/06	5/03	4/28
24	5/12	5/08	5/04	5/02	4/29	4/26	4/23	4/20	4/15
20	5/06	4/30	4/25	4/22	4/18	4/15	4/11	4/07	4/01
16	4/20	4/16	4/12	4/10	4/07	4/04	4/02	3/29	3/25

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	8/17	8/23	8/27	8/30	9/03	9/06	9/09	9/13	9/19
32	9/03	9/07	9/09	9/12	9/14	9/17	9/19	9/22	9/26
28	9/15	9/19	9/22	9/24	9/27	9/29	10/01	10/04	10/08
24	9/17	9/23	9/27	10/01	10/04	10/07	10/11	10/15	10/21
20	9/24	10/01	10/06	10/10	10/14	10/17	10/22	10/26	11/02
16	10/05	10/11	10/15	10/19	10/22	10/26	10/29	11/03	11/09

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	113	105	100	95	91	86	81	76	68
32	137	130	126	122	118	115	111	106	100
28	155	149	144	141	137	134	130	125	119
24	181	173	167	162	157	153	148	142	134
20	203	194	188	183	177	172	167	160	151
16	219	212	206	202	198	193	189	184	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	1675	1291	1086	642	307	122	37	57	251	597	1106	1525	8696
60	1520	1151	931	500	195	57	10	21	146	443	956	1370	7300
57	1427	1067	838	420	142	32	3	10	97	352	866	1277	6531
55	1365	1011	777	369	111	21	1	5	70	294	806	1215	6045
50	1213	884	634	256	53	6	0	1	25	168	661	1060	4961
32	705	449	213	30	0	0	0	0	0	5	229	551	2182

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	53	82	150	380	746	975	1173	1154	773	431	113	48	6078
55	0	0	2	29	144	306	460	446	153	7	0	0	1547
57	0	0	0	20	113	257	400	388	120	3	0	0	1301
60	0	0	0	11	74	192	315	306	79	1	0	0	978
65	0	0	0	3	30	107	187	188	34	0	0	0	549
70	0	0	0	0	10	46	95	101	11	0	0	0	263

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	1	29	178	495	735	919	890	529	222	18	0	0	1	30	208	703	1438	2357	3247	3776	3998	4016	4016
45	0	0	7	100	351	586	764	735	387	123	7	0	0	0	7	107	458	1044	1808	2543	2930	3053	3060	3060
50	0	0	0	49	228	437	609	581	256	55	0	0	0	0	0	49	277	714	1323	1904	2160	2215	2215	2215
55	0	0	0	20	130	295	455	429	149	21	0	0	0	0	0	20	150	445	900	1329	1478	1499	1499	1499
60	0	0	0	6	63	172	304	284	75	6	0	0	0	0	0	6	69	241	545	829	904	910	910	910
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	4	37	149	329	464	585	565	351	175	26	0	0	4	41	190	519	983	1568	2133	2484	2659	2685	2685

(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