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: WILLARD 4 SW, NC **COOP ID: 319423**

Climate Division: NC 6 **NWS Call Sign:** **Elevation: 55 Feet** **Lat: 34˚39N** **Lon: 78˚03W**

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	56.7	34.8	45.8	80+	1974	28	57.4	1974	-2	1985	21	35.8	1977	604	0	.0	.0	22.9	.4	15.0	@
Feb	60.7	36.6	48.7	84	1997	27	56.4	1976	2	1973	13	39.2	1978	458	1	.0	.0	22.7	.3	12.3	.0
Mar	68.7	42.6	55.7	92	1985	30	60.6	1976	2	1980	4	50.4	1996	301	10	.0	.1	30.0	@	6.9	.0
Apr	76.8	49.3	63.1	97	1981	28	67.1	1977	24	1982	7	59.6	1997	104	47	.0	1.3	30.0	.0	1.2	.0
May	82.8	58.3	70.6	98	1962	19	74.7	1991	32	1963	2	67.3	1972	11	183	.0	4.0	31.0	.0	.0	.0
Jun	88.1	65.8	77.0	104	1952	26	80.1	1981	44+	1972	12	72.3	1972	0	358	.1	11.7	30.0	.0	.0	.0
Jul	91.3	70.2	80.8	103	1985	10	84.8	1993	52	1988	2	78.1	1984	0	487	.4	18.5	31.0	.0	.0	.0
Aug	89.9	69.1	79.5	103+	1999	1	82.1	1983	50	1965	30	76.1	1996	0	450	.3	13.0	31.0	.0	.0	.0
Sep	85.4	63.9	74.7	101	1983	11	79.0	1980	38	1950	25	71.4	1984	3	292	.1	4.8	30.0	.0	.0	.0
Oct	76.6	52.4	64.5	98	1954	5	70.2	1985	21	1962	27	58.1	1988	109	93	.0	.2	31.0	.0	.7	.0
Nov	68.5	44.1	56.3	85+	1979	11	65.7	1985	15	1970	25	48.9	1976	284	23	.0	.0	29.2	.0	6.1	.0
Dec	59.9	37.0	48.5	82+	1991	3	57.0	1971	-8	1989	25	37.4	1989	522	8	.0	.0	25.6	.1	13.1	@
Ann	75.5	52.0	63.8	104	Jun 1952	26	84.8	Jul 1993	-8	Dec 1989	25	35.8	Jan 1977	2396	1952	.9	53.6	344.4	.8	55.3	.0

\+ 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	4.49	4.53	3.30	1999	24	7.39	1987	1.52	1981
Feb	3.53	3.07	4.30	1998	17	11.18	1998	.79	1976
Mar	4.43	3.98	3.50	1983	18	10.89	1983	1.83	1985
Apr	3.06	3.04	2.32	1962	11	6.20	1998	.48	1976
May	4.10	3.87	6.19	1969	19	8.07	1975	1.51	1982
Jun	5.14	4.27	5.10	1995	19	16.46	1995	1.42	1990
Jul	7.12	6.55	5.00	1990	8	12.65	1985	2.01	1992
Aug	6.54	5.45	6.22	1971	17	17.35	1992	2.01	1997
Sep	6.22	5.46	9.00	1996	6	21.01	1999	.63	1990
Oct	3.16	2.56	7.60	1996	8	8.12	1996	.11	2000
Nov	2.99	2.64	6.34	1977	6	8.29	1977	.54	1981
Dec	3.42	3.47	3.20	1986	24	5.99	1973	.46	1988
Ann	54.20	54.90	9.00	Sep 1996	6	21.01	Sep 1999	.11	Oct 2000

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	10.7	8.1	3.2	1.0
Feb	8.3	6.1	2.4	1.1
Mar	9.5	7.7	3.3	1.2
Apr	7.2	5.3	2.3	.9
May	9.3	7.1	3.1	1.0
Jun	9.8	7.4	3.3	1.5
Jul	11.8	9.4	4.8	2.2
Aug	11.0	8.3	4.0	2.1
Sep	9.0	7.4	3.8	1.9
Oct	6.0	4.8	2.1	.8
Nov	6.9	5.1	1.8	.9
Dec	8.4	6.3	2.3	.8
Ann	107.9	83.0	36.4	15.4

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	2.10	2.49	3.03	3.46	3.87	4.27	4.71	5.20	5.83	6.77	7.61
Feb	.80	1.13	1.65	2.11	2.58	3.07	3.62	4.28	5.15	6.54	7.84
Mar	1.96	2.36	2.91	3.35	3.77	4.19	4.64	5.16	5.81	6.80	7.69
Apr	.73	1.02	1.46	1.86	2.26	2.68	3.14	3.70	4.43	5.59	6.67
May	1.65	2.03	2.56	3.00	3.42	3.84	4.29	4.81	5.48	6.50	7.42
Jun	1.63	2.12	2.84	3.46	4.06	4.67	5.35	6.15	7.17	8.77	10.24
Jul	3.11	3.74	4.64	5.36	6.04	6.73	7.46	8.31	9.37	10.99	12.45
Aug	1.79	2.41	3.36	4.18	4.99	5.84	6.77	7.88	9.33	11.59	13.71
Sep	1.12	1.67	2.58	3.42	4.29	5.23	6.29	7.59	9.31	12.08	14.72
Oct	.35	.59	1.03	1.47	1.94	2.47	3.09	3.86	4.91	6.64	8.33
Nov	.67	.95	1.39	1.78	2.18	2.60	3.07	3.63	4.37	5.55	6.67
Dec	1.01	1.34	1.82	2.25	2.66	3.08	3.55	4.11	4.83	5.95	6.99
Ann	42.02	44.46	47.54	49.84	51.87	53.82	55.81	58.00	60.63	64.41	67.65

\+ 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)

Extremes (2)

Mean Number of Days (1)

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	.3	.0	#	0	6.0	1973	8	6.0	1973	6	1973	8	1	1973	.2	.2	@	@	.0	.5	.2	.1	.0
Feb	1.2	.0	#	0	12.0	1973	10	13.0	1973	12	1973	10	2	1973	.4	.3	.1	.1	@	.4	.2	.2	.1
Mar	.7	.0	#	0	7.5	1980	3	13.0	1980	10	1980	3	1	1980	.2	.2	.1	@	.0	.2	.1	.1	@
Apr	#	.0	0	0	#	1989	11	#	1989	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
May	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.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	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Sep	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Oct	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Nov	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Dec	.2	.0	#	0	2.0	1988	16	2.0+	1993	15	1989	24	2	1989	.1	.1	.0	.0	.0	@	.0	.0	.0
Ann	2.4	.0	N/A	N/A	12.0	Feb 1973	10	13.0+	Mar 1980	15	Dec 1989	24	2+	Dec 1989	.9	.8	.2	.1	@	1.1	.5	.4	.1

+ Also occurred on an earlier date(s) #Denotes trace amounts

(1) Derived from Snow Climatology and 1971-2000 daily data

@ Denotes mean number of days greater than 0 but less than .05

(2) Derived from 1971-2000 daily data

-9/-9.9 represents missing values

Annual statistics for Mean/Median snow depths are not appropriate

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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	4/30	4/24	4/20	4/16	4/13	4/10	4/06	4/02	3/27
32	4/18	4/12	4/08	4/05	4/02	3/29	3/26	3/22	3/16
28	4/07	3/31	3/27	3/22	3/18	3/15	3/10	3/05	2/27
24	3/21	3/13	3/08	3/03	2/27	2/22	2/18	2/12	2/05
20	3/07	2/27	2/22	2/17	2/12	2/08	2/03	1/29	1/21
16	2/18	2/10	2/04	1/29	1/23	1/16	1/03	0/00	0/00

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	10/07	10/13	10/17	10/20	10/24	10/27	10/30	11/04	11/09
32	10/19	10/25	10/29	11/02	11/05	11/08	11/12	11/16	11/22
28	10/26	11/03	11/08	11/12	11/16	11/20	11/25	11/30	12/07
24	11/15	11/22	11/27	12/01	12/05	12/08	12/12	12/17	12/24
20	11/17	11/29	12/09	12/17	12/24	12/31	1/08	1/17	1/30
16	12/17	12/26	1/02	1/09	1/16	1/25	0/00	0/00	0/00

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	221	211	204	198	193	187	181	174	165
32	245	235	228	222	217	211	205	198	189
28	273	262	255	248	242	236	229	222	211
24	304	296	290	285	280	275	270	264	256
20	356	336	326	318	311	303	296	287	275
16	>365	>365	>365	>365	365	346	335	325	313

***** 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	604	458	301	104	11	0	0	0	3	109	284	522	2396
60	460	330	176	36	1	0	0	0	0	47	175	381	1606
57	379	257	118	15	0	0	0	0	0	25	124	304	1222
55	329	214	87	7	0	0	0	0	0	15	95	258	1005
50	223	127	32	1	0	0	0	0	0	4	40	164	591
32	20	3	0	0	0	0	0	0	0	0	0	9	32

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	447	470	732	932	1195	1348	1510	1473	1279	1007	729	518	11640
55	43	36	106	249	482	658	797	760	589	309	134	54	4217
57	31	24	75	197	420	598	735	698	529	256	103	38	3704
60	18	12	40	128	328	508	642	605	439	186	64	22	2992
65	0	1	10	47	183	358	487	450	292	93	23	8	1952
70	0	0	0	9	74	214	332	295	156	34	7	0	1121

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	219	278	478	682	935	1095	1241	1194	1005	729	467	280	219	497	975	1657	2592	3687	4928	6122	7127	7856	8323	8603
45	127	175	337	536	780	945	1086	1039	855	574	331	169	127	302	639	1175	1955	2900	3986	5025	5880	6454	6785	6954
50	64	95	215	388	625	795	931	884	705	424	215	93	64	159	374	762	1387	2182	3113	3997	4702	5126	5341	5434
55	28	47	119	252	471	645	776	729	555	280	123	44	28	75	194	446	917	1562	2338	3067	3622	3902	4025	4069
60	3	17	53	140	320	495	621	574	406	162	57	14	3	20	73	213	533	1028	1649	2223	2629	2791	2848	2862
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	142	190	316	447	627	749	853	830	688	472	299	178	142	332	648	1095	1722	2471	3324	4154	4842	5314	5613	5791

(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