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: TROTTERS 3 SSE, ND **COOP ID: 328812**

Climate Division: ND 8 **NWS Call Sign:** **Elevation: 2,420 Feet** **Lat: 47˚17N** **Lon: 103˚54W**

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	23.0	4.0	13.5	58	1987	11	27.9	1992	-37	1982	10	-3.1	1982	1597	0	.0	.0	.6	20.2	30.3	13.0
Feb	30.1	11.3	20.7	66+	1992	29	31.9	1998	-37	1962	28	4.4	1989	1241	0	.0	.0	2.6	13.4	27.0	7.4
Mar	41.3	20.1	30.7	79	1999	26	40.2	1986	-25	1998	11	19.8	1996	1064	0	.0	.0	9.6	7.4	27.4	2.5
Apr	55.8	30.8	43.3	92+	2001	28	50.9	1987	-7	1975	1	34.6	1975	651	0	.0	.1	21.1	1.1	17.5	.2
May	67.4	42.0	54.7	101	1980	22	61.7	1988	16	1967	3	49.2	1974	338	18	@	.5	29.4	.0	4.0	.0
Jun	76.2	50.8	63.5	106	1988	20	76.7	1988	29	1998	3	58.0	1998	133	88	.4	2.4	30.0	.0	.1	.0
Jul	83.0	55.6	69.3	110	1981	6	74.3	1989	38	1967	2	61.6	1993	53	187	1.3	7.9	31.0	.0	.0	.0
Aug	82.5	54.4	68.5	105	1988	6	75.3	1983	30	1964	11	61.7	1974	80	187	.9	8.6	31.0	.0	.0	.0
Sep	69.9	43.9	56.9	103+	1998	4	65.3	1998	17+	1995	21	50.9	1984	281	39	.3	2.1	28.5	.0	2.7	.0
Oct	56.5	33.0	44.8	93+	1997	2	48.2	1974	-3	1991	30	40.1	1972	628	0	.0	.1	22.5	.9	13.7	@
Nov	37.4	19.0	28.2	81	1999	7	41.4	1999	-22	1985	29	13.5	1985	1104	0	.0	.0	6.3	9.7	26.5	2.9
Dec	26.5	7.9	17.2	61	1979	4	29.2	1999	-37	1989	21	-2.0	1983	1482	0	.0	.0	1.1	17.9	30.3	9.8
Ann	54.1	31.1	42.6	110	Jul 1981	6	76.7	Jun 1988	-37+	Dec 1989	21	-3.1	Jan 1982	8652	519	2.9	21.7	213.7	70.6	179.5	35.8

+ 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: 1949-2001

(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	.35	.29	.57	1995	16	.83	1971	.07+	1990
Feb	.39	.31	.59	1973	12	1.86	1998	.07	1976
Mar	.58	.52	1.08	1963	25	1.58	1982	.08	1977
Apr	1.23	1.13	1.87	1992	18	3.11	1992	.00	1980
May	2.09	1.84	2.48	1965	25	4.62	1978	.19	1984
Jun	2.90	2.57	2.51	1986	29	5.07	1994	.93	1989
Jul	1.89	1.54	2.00	1986	17	7.51	1993	.22	1971
Aug	1.50	1.41	2.94	1995	12	5.56	1995	.11	1988
Sep	1.61	1.10	2.57	1991	15	5.71	1991	.15	1990
Oct	1.16	.60	1.89	1971	2	4.22	1982	.06	1987
Nov	.61	.43	1.70	2000	1	2.92	2000	.11	1972
Dec	.40	.43	.37	2001	5	.67+	1989	.06	1997
Ann	14.71	14.75	2.94	Aug 1995	12	7.51	Jul 1993	.00	Apr 1980

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	6.5	1.0	@	.0
Feb	6.2	1.1	.1	.0
Mar	7.1	1.9	.1	.0
Apr	7.8	3.5	.5	.1
May	11.1	5.4	1.0	.2
Jun	10.9	6.0	1.6	.7
Jul	8.3	4.2	1.1	.4
Aug	7.7	3.6	.8	.3
Sep	7.1	3.4	.8	.4
Oct	5.9	2.4	.8	.2
Nov	7.0	2.2	.1	@
Dec	7.4	1.2	.0	.0
Ann	93.0	35.9	6.9	2.3

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	.08	.13	.18	.23	.29	.35	.43	.53	.70	.86
Feb	.05	.08	.14	.19	.25	.31	.39	.48	.60	.80	.99
Mar	.11	.16	.25	.33	.41	.49	.59	.71	.87	1.12	1.36
Apr	.07	.19	.38	.56	.75	.97	1.21	1.52	1.93	2.62	3.28
May	.48	.67	.98	1.25	1.53	1.82	2.15	2.54	3.05	3.87	4.64
Jun	1.02	1.30	1.69	2.03	2.34	2.67	3.03	3.44	3.97	4.79	5.55
Jul	.31	.48	.75	1.01	1.28	1.57	1.90	2.31	2.85	3.72	4.56
Aug	.19	.31	.52	.73	.95	1.20	1.48	1.84	2.32	3.10	3.86
Sep	.11	.21	.42	.64	.88	1.17	1.52	1.96	2.57	3.60	4.62
Oct	.06	.12	.25	.41	.58	.80	1.06	1.40	1.87	2.69	3.51
Nov	.09	.14	.22	.31	.40	.49	.61	.74	.93	1.23	1.53
Dec	.10	.14	.20	.25	.30	.35	.41	.48	.57	.72	.85
Ann	8.87	9.93	11.33	12.42	13.40	14.36	15.37	16.51	17.90	19.95	21.76

\+ 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: 1949-2001
(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	4.9	3.8	5	6	8.7	1995	16	13.3	1971	18	1986	8	13	1979	6.7	1.8	.1	.1	.0	25.2	18.9	14.8	4.2
Feb	5.1	3.6	5	4	9.0	1998	25	24.6	1998	22	1998	28	16	1979	6.1	1.7	.4	.2	.0	17.0	11.8	8.5	4.4
Mar	5.2	4.4	3	2	7.0	1983	6	16.3	1987	25	1998	5	16	1998	5.4	1.9	.4	.1	.0	11.3	7.1	5.4	2.4
Apr	3.7	2.3	1	#	8.0	1989	3	11.7	1991	12	1975	2	3	1979	2.7	1.3	.4	.2	.0	2.9	1.6	1.1	.1
May	1.2	.0	#	0	9.0	1983	12	11.3	1983	10	1983	12	1	1983	.5	.4	.2	.1	.0	.2	.1	@	@
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	.4	.0	#	0	6.7	1972	25	6.9	1972	7	1972	26	1	1972	.3	.1	@	@	.0	.3	.2	.1	.0
Oct	1.9	.7	#	#	7.5	1985	7	9.0	1985	9	1985	9	1	1996	1.5	.6	.2	@	.0	1.4	.7	.2	.0
Nov	5.7	3.9	2	1	6.0	1996	23	17.1	2000	12	2000	30	9	2000	5.4	2.1	.5	.1	.0	10.6	6.1	3.7	1.1
Dec	5.1	5.4	4	3	5.0	1988	26	9.4	1988	16	1985	21	13	1985	7.1	2.0	.2	@	.0	22.3	13.8	7.8	2.7
Ann	33.2	24.1	N/A	N/A	9.0+	Feb 1998	25	24.6	Feb 1998	25	Mar 1998	5	16+	Mar 1998	35.7	11.9	2.4	.8	.0	91.2	60.3	41.6	14.9

+ 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	6/10	6/04	5/31	5/27	5/24	5/20	5/16	5/12	5/06
32	5/29	5/24	5/20	5/17	5/14	5/11	5/08	5/04	4/29
28	5/20	5/15	5/11	5/08	5/05	5/02	4/29	4/26	4/21
24	5/13	5/07	5/02	4/29	4/26	4/22	4/19	4/14	4/09
20	4/26	4/21	4/17	4/14	4/11	4/08	4/05	4/01	3/27
16	4/15	4/11	4/07	4/04	4/02	3/30	3/27	3/24	3/19

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	9/04	9/07	9/09	9/11	9/13	9/15	9/17	9/19	9/22
32	9/12	9/15	9/18	9/20	9/22	9/24	9/26	9/28	10/02
28	9/16	9/21	9/25	9/28	9/30	10/03	10/06	10/09	10/14
24	9/23	9/29	10/03	10/06	10/09	10/12	10/16	10/20	10/25
20	10/02	10/07	10/11	10/15	10/18	10/21	10/25	10/29	11/03
16	10/13	10/19	10/23	10/27	10/30	11/03	11/06	11/10	11/16

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	132	125	120	116	112	108	104	99	92
32	151	143	138	134	130	126	122	116	109
28	169	162	156	152	147	143	139	133	126
24	190	182	176	171	166	161	156	150	142
20	212	204	199	194	189	185	180	174	166
16	232	225	219	215	211	206	202	196	189

***** 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	1597	1241	1064	651	338	133	53	80	281	628	1104	1482	8652
60	1442	1101	909	505	216	63	17	34	175	474	954	1327	7217
57	1349	1019	816	421	157	35	9	19	123	382	864	1234	6428
55	1288	970	754	367	123	23	3	13	94	322	804	1172	5933
50	1140	839	610	246	58	6	0	3	40	187	665	1022	4816
32	642	420	190	20	0	0	0	0	0	6	243	529	2050

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	68	102	150	359	703	945	1157	1130	748	400	129	70	5961
55	1	9	1	17	113	278	447	430	152	4	0	0	1452
57	0	2	0	10	85	230	391	374	121	2	0	0	1215
60	0	0	0	4	51	168	306	296	83	0	0	0	908
65	0	0	0	0	18	88	187	187	39	0	0	0	519
70	0	0	0	0	4	35	100	105	15	0	0	0	259

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	4	39	185	473	723	930	907	536	227	33	0	0	4	43	228	701	1424	2354	3261	3797	4024	4057	4057
45	0	1	11	101	335	573	775	752	397	128	11	0	0	1	12	113	448	1021	1796	2548	2945	3073	3084	3084
50	0	0	1	50	208	424	620	597	264	58	2	0	0	0	1	51	259	683	1303	1900	2164	2222	2224	2224
55	0	0	0	16	113	283	466	445	161	19	0	0	0	0	0	16	129	412	878	1323	1484	1503	1503	1503
60	0	0	0	5	48	160	315	296	84	4	0	0	0	0	0	5	53	213	528	824	908	912	912	912
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	3	38	140	297	444	590	572	332	158	24	1	0	3	41	181	478	922	1512	2084	2416	2574	2598	2599

(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

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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