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: TIOGA 1 E, ND **COOP ID: 328737**

Climate Division: ND 3 **NWS Call Sign:** **Elevation: 2,245 Feet** **Lat: 48˚24N** **Lon: 102˚55W**

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	16.7	-2.9	6.9	51	1981	24	22.4	1990	-41	1996	19	-9.2	1982	1802	0	.0	.0	@	25.3	31.0	18.5
Feb	24.4	5.7	15.1	63	1992	28	27.7	1998	-41	1962	28	-1.2	1979	1400	0	.0	.0	.7	18.5	28.2	12.1
Mar	36.4	16.1	26.3	75	1993	25	37.2	1986	-40	1962	1	15.4	1996	1202	0	.0	.0	4.9	12.1	30.0	5.5
Apr	53.4	28.1	40.8	93	1980	21	47.8	1980	-17	1975	2	30.4	1979	728	0	.0	.1	18.1	2.4	21.3	.4
May	66.8	39.9	53.4	101	1980	23	61.9	1977	12	1967	2	46.4	1979	377	16	@	.4	28.5	@	6.5	.0
Jun	75.3	49.5	62.4	102	1988	21	74.0	1988	24	1969	12	56.7	1993	152	74	.1	1.9	29.9	.0	.3	.0
Jul	81.2	53.6	67.4	108	1981	7	72.6	1975	32	1967	3	59.9	1993	72	147	.4	4.8	31.0	.0	.0	.0
Aug	80.9	52.0	66.5	107	1958	9	74.3	1983	27	1982	27	59.3	1977	103	149	.2	5.9	31.0	.0	.3	.0
Sep	68.2	40.7	54.5	101	1998	5	61.5	1998	12	1974	30	48.7	1984	337	20	.1	1.3	27.7	.0	5.5	.0
Oct	55.0	29.7	42.4	92+	1992	2	47.5	1973	-6	1991	30	36.9	1976	703	0	.0	.1	20.8	1.5	21.0	.2
Nov	34.0	15.8	24.9	76	1999	7	36.2	1999	-27+	1978	30	13.1	1985	1203	0	.0	.0	4.4	13.8	28.9	4.6
Dec	21.7	2.5	12.1	55	1979	5	24.2	1997	-50	1983	24	-4.3	1983	1640	0	.0	.0	.2	22.4	31.0	13.7
Ann	51.2	27.6	39.4	108	Jul 1981	7	74.3	Aug 1983	-50	Dec 1983	24	-9.2	Jan 1982	9719	406	.8	14.5	197.2	96.0	204.0	55.0

+ 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	.48	.35	.50	1968	1	1.70	1982	.00	1973
Feb	.36	.26	.92	1998	26	1.62	1998	.00+	1997
Mar	.58	.53	.50	1987	21	1.76	1982	.00	1977
Apr	1.17	1.04	2.35	1984	28	4.00	1975	.09	1998
May	2.00	1.70	2.88	1965	6	5.73	1999	.12	1980
Jun	2.60	2.15	3.41	1975	9	6.01	1981	.74	1979
Jul	2.20	2.08	2.83	1986	17	6.97	1993	.10	1984
Aug	1.80	1.66	4.30	1993	22	5.54	1993	.00	1971
Sep	1.58	1.33	2.00	1954	13	3.87	1977	.32	1974
Oct	.94	.65	1.65	1958	21	3.23	1982	.04	1976
Nov	.59	.52	.82	2000	2	2.25	2000	.07	1979
Dec	.40	.39	.57	1950	25	.89	1996	.00	1997
Ann	14.70	14.22	4.30	Aug 1993	22	6.97	Jul 1993	.00+	Dec 1997

Mean Number of Days (3)

Month	Daily Precipitation >= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	5.9	1.6	.0	.0
Feb	4.6	1.1	@	.0
Mar	5.8	2.2	@	.0
Apr	6.9	2.9	.5	.1
May	9.2	5.4	1.1	.3
Jun	10.8	6.3	1.5	.4
Jul	9.0	5.2	1.1	.5
Aug	7.7	4.0	1.0	.4
Sep	7.4	4.2	.8	.2
Oct	5.8	2.4	.6	.1
Nov	5.1	1.9	.2	.0
Dec	5.2	1.5	.0	.0
Ann	83.4	38.7	6.8	2.0

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	.06	.12	.21	.27	.34	.41	.49	.59	.71	.91	1.10
Feb	.00	.02	.07	.12	.18	.25	.33	.44	.58	.83	1.07
Mar	.08	.16	.25	.34	.42	.50	.60	.71	.86	1.09	1.31
Apr	.14	.24	.40	.56	.74	.93	1.15	1.43	1.80	2.42	3.02
May	.30	.47	.76	1.04	1.32	1.64	2.00	2.44	3.04	4.01	4.94
Jun	.83	1.07	1.44	1.75	2.05	2.37	2.71	3.11	3.63	4.44	5.19
Jul	.39	.59	.91	1.21	1.52	1.85	2.23	2.68	3.29	4.27	5.20
Aug	.12	.30	.59	.85	1.13	1.43	1.79	2.22	2.81	3.77	4.70
Sep	.30	.45	.68	.89	1.11	1.34	1.60	1.92	2.34	3.02	3.67
Oct	.06	.12	.24	.36	.51	.68	.88	1.14	1.50	2.11	2.72
Nov	.07	.12	.20	.28	.37	.47	.58	.73	.92	1.24	1.55
Dec	.03	.07	.13	.19	.25	.32	.39	.49	.61	.82	1.02
Ann	9.00	10.04	11.41	12.46	13.42	14.36	15.34	16.43	17.78	19.76	21.51

\+ 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	6.6	5.0	7	6	6.0	1989	7	20.0	1982	24	1982	31	19	1979	5.5	3.0	.5	.2	.0	28.4	21.5	14.3	7.6
Feb	4.9	4.1	7	6	10.0	1998	26	18.0	1998	28	1982	14	22+	1982	4.2	2.3	.3	@	@	21.0	16.2	11.5	7.3
Mar	5.8	5.5	4	2	6.0	1985	28	16.0	1982	27	1979	5	21	1979	4.2	2.7	.5	.1	.0	15.7	10.0	6.9	4.8
Apr	4.2	2.0	1	#	20.0	1984	28	26.0	1984	19	1979	13	10	1979	2.3	1.5	.4	.1	@	2.9	1.7	1.1	.7
May	1.1	.0	#	0	6.5	1974	14	9.0	1983	6	1983	13	1	1983	.4	.4	.2	.1	.0	.4	.1	.1	.0
Jun	.0	.0	#	0	.5	1998	2	.5	1998	#	1998	2	#	1998	@	.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	.5	.0	#	0	4.5	1984	24	6.5	1984	2	1984	24	#+	2000	.2	.2	.1	.0	.0	.1	.0	.0	.0
Oct	2.2	1.0	#	#	8.5	1985	8	12.5	1985	5	1991	29	1	1985	1.4	.9	.2	.1	.0	1.4	.4	.1	.0
Nov	6.1	5.5	2	1	10.0	1993	24	18.0	1993	15	1993	27	6+	2000	4.0	2.6	.6	.2	@	11.5	4.7	1.7	.6
Dec	4.8	4.5	4	3	5.0	1988	27	12.0	1996	19	1996	31	13+	1996	4.6	2.4	.3	@	.0	23.7	14.0	7.5	2.3
Ann	36.2	27.6	N/A	N/A	20.0	Apr 1984	28	26.0	Apr 1984	28	Feb 1982	14	22+	Feb 1982	26.8	16.0	3.1	.8	@	105.1	68.6	43.2	23.3

+ 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	7/04	6/25	6/18	6/12	6/07	6/02	5/27	5/20	5/11
32	6/09	6/04	5/30	5/27	5/24	5/20	5/17	5/12	5/07
28	5/26	5/22	5/18	5/15	5/13	5/10	5/07	5/04	4/29
24	5/17	5/11	5/08	5/04	5/01	4/28	4/25	4/21	4/16
20	5/08	5/03	4/29	4/26	4/23	4/20	4/17	4/14	4/08
16	4/24	4/19	4/15	4/12	4/10	4/07	4/04	3/31	3/26

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	9/10	9/14	9/19
32	8/21	8/27	9/01	9/04	9/08	9/11	9/15	9/20	9/26
28	9/07	9/12	9/15	9/18	9/21	9/24	9/27	9/30	10/05
24	9/18	9/22	9/25	9/28	10/01	10/03	10/06	10/09	10/13
20	9/25	10/01	10/05	10/08	10/12	10/15	10/18	10/22	10/28
16	10/04	10/11	10/15	10/19	10/23	10/26	10/30	11/04	11/10

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	115	105	98	93	87	82	76	69	60
32	125	119	114	110	107	103	99	95	88
28	152	145	140	135	131	126	122	117	109
24	174	166	161	156	152	147	143	137	130
20	194	186	180	175	171	166	161	155	147
16	218	210	205	200	196	191	187	181	173

***** 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	1802	1400	1202	728	377	152	72	103	337	703	1203	1640	9719
60	1647	1260	1047	583	250	77	24	46	218	548	1053	1485	8238
57	1554	1176	954	499	188	44	12	26	158	455	963	1392	7421
55	1492	1120	892	446	151	29	7	17	123	394	903	1330	6904
50	1337	987	749	320	79	9	0	4	56	253	758	1175	5727
32	812	536	300	51	1	0	0	0	0	14	306	657	2677

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	33	61	121	313	662	912	1098	1069	673	335	93	39	5409
55	0	0	1	17	99	252	392	373	106	2	0	0	1242
57	0	0	0	11	74	207	335	320	81	1	0	0	1029
60	0	0	0	5	44	149	255	247	51	0	0	0	751
65	0	0	0	0	16	74	147	149	20	0	0	0	406
70	0	0	0	0	4	28	70	76	6	0	0	0	184

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	14	136	427	674	849	813	436	155	13	0	0	0	14	150	577	1251	2100	2913	3349	3504	3517	3517
45	0	0	1	70	296	524	694	658	300	80	3	0	0	0	1	71	367	891	1585	2243	2543	2623	2626	2626
50	0	0	0	33	183	376	539	505	188	34	0	0	0	0	0	33	216	592	1131	1636	1824	1858	1858	1858
55	0	0	0	11	94	240	388	356	104	9	0	0	0	0	0	11	105	345	733	1089	1193	1202	1202	1202
60	0	0	0	3	43	131	239	221	49	3	0	0	0	0	0	3	46	177	416	637	686	689	689	689
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	1	13	113	273	410	537	512	286	132	13	0	0	1	14	127	400	810	1347	1859	2145	2277	2290	2290

(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