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: KNOXVILLE EXP STN, TN **COOP ID: 404946**

Climate Division: TN 1 **NWS Call Sign:** **Elevation: 830 Feet** **Lat: 35˚53N** **Lon: 83˚57W**

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	46.1	26.2	36.2	74+	1985	1	46.9	1974	-20	1985	21	24.4	1977	895	0	.0	.0	12.6	3.4	23.0	.5
Feb	51.3	28.4	39.9	81	1996	24	46.1	1990	-12	1996	5	30.6	1978	705	0	.0	.0	16.1	1.8	19.2	.1
Mar	60.6	36.2	48.4	84	1998	31	54.1	1973	2	1993	15	42.7	1999	517	2	.0	.0	25.4	.2	13.3	@
Apr	69.3	43.4	56.4	90	1986	28	61.7	1981	22+	1982	6	52.4	1983	268	9	.0	@	29.1	.0	4.0	.0
May	77.0	53.2	65.1	90+	1996	25	70.9	1991	32	1989	8	60.4	1989	97	99	.0	@	31.0	.0	.1	.0
Jun	84.1	62.2	73.2	100	1988	25	76.6	1981	42	1984	1	69.1	1999	5	249	@	4.3	30.0	.0	.0	.0
Jul	87.7	66.9	77.3	100	1988	10	81.0	1980	48	1988	2	74.7	1976	0	381	.1	11.3	31.0	.0	.0	.0
Aug	87.0	65.3	76.2	102	1983	21	80.4	1995	48	1968	29	73.0	1992	0	345	.1	8.2	31.0	.0	.0	.0
Sep	81.7	58.6	70.2	96	1999	8	73.7	1978	37+	1983	23	66.1	1982	22	177	.0	3.1	30.0	.0	.0	.0
Oct	70.9	45.0	58.0	89	1986	3	65.6	1984	23	1976	29	52.2	1988	251	33	.0	.0	30.7	.0	3.3	.0
Nov	59.8	36.4	48.1	82+	1974	1	56.8	1985	15+	1969	15	40.5	1976	509	2	.0	.0	24.6	.1	12.6	.0
Dec	49.9	29.3	39.6	78	1982	4	47.9	1971	-5	1983	25	30.5	1989	787	0	.0	.0	16.3	1.5	22.1	.1
Ann	68.8	45.9	57.4	102	Aug 1983	21	81.0	Jul 1980	-20	Jan 1985	21	24.4	Jan 1977	4056	1297	.2	26.9	307.8	7.0	97.6	.7

\+ 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: 1966-2001

(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	5.30	5.28	2.93	1987	19	9.29	1974	.80	1981
Feb	4.43	4.48	2.98	1994	11	9.42	1994	1.04	1978
Mar	5.66	5.19	3.98	1973	16	12.61	1975	1.83	1985
Apr	4.22	3.71	3.20	1998	19	11.82	1998	.59	1976
May	4.98	5.01	4.92	2000	24	10.02	1974	1.57	1985
Jun	4.49	4.36	3.05	1972	28	9.02	1977	1.04	1990
Jul	4.91	4.59	3.34	1990	14	10.59	1982	1.44	1995
Aug	3.52	3.22	3.00	1980	12	6.81	1991	.93	1999
Sep	3.25	3.46	2.35	1977	8	8.54	1989	.43	1985
Oct	3.05	2.83	2.54	1974	16	6.80	1972	.07	2000
Nov	4.43	4.38	3.32	1973	28	7.49	1973	2.19+	1998
Dec	5.09	4.71	3.60	1969	30	12.12	1991	1.68	1985
Ann	53.33	51.47	4.92	May 2000	24	12.61	Mar 1975	.07	Oct 2000

Mean Number of Days (3)

Month	Daily Precipitation >= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	12.6	8.7	4.2	1.6
Feb	11.2	7.8	3.2	1.1
Mar	13.1	9.3	3.6	1.3
Apr	11.0	8.0	2.6	1.2
May	12.1	8.5	3.5	1.3
Jun	10.3	7.3	3.4	1.3
Jul	11.3	8.3	3.6	1.4
Aug	8.7	6.0	2.2	1.1
Sep	8.4	5.7	2.4	.8
Oct	8.1	5.3	2.2	.8
Nov	10.4	7.5	3.2	1.3
Dec	12.2	8.4	3.5	1.3
Ann	129.4	90.8	37.6	14.5

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	1.88	2.38	3.11	3.71	4.29	4.89	5.53	6.29	7.25	8.74	10.11
Feb	1.88	2.28	2.84	3.31	3.74	4.18	4.65	5.19	5.88	6.92	7.87
Mar	2.33	2.84	3.57	4.17	4.74	5.31	5.93	6.64	7.54	8.92	10.17
Apr	1.33	1.73	2.33	2.83	3.32	3.83	4.39	5.04	5.89	7.20	8.41
May	1.82	2.28	2.96	3.52	4.06	4.61	5.20	5.90	6.78	8.15	9.40
Jun	1.34	1.76	2.40	2.96	3.49	4.05	4.67	5.39	6.33	7.79	9.15
Jul	1.80	2.26	2.92	3.48	4.01	4.55	5.14	5.82	6.69	8.03	9.26
Aug	1.15	1.49	1.98	2.39	2.80	3.21	3.66	4.20	4.88	5.94	6.92
Sep	.78	1.08	1.56	1.98	2.40	2.84	3.34	3.93	4.71	5.94	7.10
Oct	.59	.87	1.31	1.72	2.14	2.59	3.10	3.71	4.52	5.83	7.06
Nov	2.12	2.50	3.03	3.45	3.84	4.23	4.65	5.13	5.73	6.63	7.44
Dec	1.60	2.09	2.80	3.42	4.01	4.62	5.30	6.09	7.11	8.70	10.17
Ann	39.61	42.31	45.74	48.33	50.62	52.83	55.09	57.59	60.61	64.96	68.70

\+ 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: 1966-2001
(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	1.1	.0	#	0	3.4	1975	20	6.3	1975	3+	1975	20	#+	1975	.4	.3	.2	.0	.0	.3	.1	.0	.0
Feb	.1	#	#	0	.3	1975	7	.3	1975	#+	1975	7	#+	1975	.2	.0	.0	.0	.0	.0	.0	.0	.0
Mar	.3	.0	#	0	1.2	1975	2	1.2	1975	1+	1975	2	#+	1975	.3	.2	.0	.0	.0	.1	.0	.0	.0
Apr	.0	.0	0	0	.0	0	0	.0	0	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	#	1993	1	#+	1993	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Dec	.4	.0	#	0	4.0	1982	11	4.0	1982	#	1974	2	#	1974	.2	.1	.1	.0	.0	.0	.0	.0	.0
Ann	1.9	#	N/A	N/A	4.0	Dec 1982	11	6.3	Jan 1975	3+	Jan 1975	20	#+	Mar 1975	1.1	.6	.3	.0	.0	.4	.1	.0	.0

+ 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	5/11	5/06	5/03	4/30	4/27	4/24	4/21	4/17	4/12
32	4/28	4/24	4/21	4/18	4/16	4/13	4/10	4/07	4/03
28	4/15	4/10	4/07	4/03	4/01	3/29	3/25	3/22	3/17
24	4/04	3/29	3/25	3/21	3/18	3/14	3/11	3/07	3/01
20	3/16	3/09	3/05	3/01	2/25	2/21	2/17	2/13	2/06
16	3/09	3/01	2/24	2/19	2/15	2/11	2/06	2/01	1/25

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	10/01	10/05	10/09	10/12	10/14	10/17	10/20	10/23	10/28
32	10/08	10/13	10/17	10/20	10/22	10/25	10/28	11/01	11/06
28	10/22	10/27	10/30	11/02	11/05	11/07	11/10	11/14	11/18
24	11/05	11/10	11/13	11/15	11/18	11/20	11/23	11/26	12/01
20	11/16	11/22	11/27	12/01	12/04	12/08	12/11	12/16	12/22
16	11/25	12/04	12/10	12/15	12/20	12/25	12/30	1/05	1/14

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	190	183	178	174	170	166	162	157	150
32	206	200	196	193	189	186	182	178	172
28	237	230	225	221	217	214	210	205	198
24	266	259	253	249	245	240	236	230	223
20	301	294	289	285	281	278	273	269	262
16	340	327	319	312	306	300	293	285	275

***** 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	895	705	517	268	97	5	0	0	22	251	509	787	4056
60	740	565	372	146	38	0	0	0	5	147	367	632	3012
57	655	482	291	91	18	0	0	0	1	100	288	543	2469
55	596	431	243	63	10	0	0	0	1	74	240	486	2144
50	454	303	143	18	1	0	0	0	0	30	140	346	1435
32	102	31	4	0	0	0	0	0	0	0	3	43	183

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	230	251	512	731	1026	1235	1404	1368	1144	805	485	279	9470
55	10	6	38	103	322	545	691	655	455	166	32	9	3032
57	7	1	24	72	268	485	629	593	396	129	21	3	2628
60	0	0	12	37	195	395	536	500	309	84	10	0	2078
65	0	0	2	9	99	249	381	345	177	33	2	0	1297
70	0	0	0	1	38	122	228	197	75	9	0	0	670

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	71	126	284	498	767	979	1143	1067	890	549	269	109	71	197	481	979	1746	2725	3868	4935	5825	6374	6643	6752
45	31	61	174	361	612	829	988	912	740	400	165	50	31	92	266	627	1239	2068	3056	3968	4708	5108	5273	5323
50	8	24	90	233	458	679	833	757	590	262	83	24	8	32	122	355	813	1492	2325	3082	3672	3934	4017	4041
55	1	4	38	132	311	529	678	602	441	141	36	1	1	5	43	175	486	1015	1693	2295	2736	2877	2913	2914
60	0	0	4	60	180	381	523	447	301	66	7	0	0	0	4	64	244	625	1148	1595	1896	1962	1969	1969
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	47	94	194	319	491	666	789	724	588	355	179	78	47	141	335	654	1145	1811	2600	3324	3912	4267	4446	4524

(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