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: HENNESSEY 4 ESE, OK **COOP ID: 344055**

Climate Division: OK 5 **NWS Call Sign:** **Elevation: 1,150 Feet** **Lat: 36˚06N** **Lon: 97˚50W**

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	44.6	21.7	33.2	81+	1950	24	41.2	1990	-13	1988	8	20.3	1979	987	0	.0	.0	13.5	4.7	24.9	.4
Feb	50.8	26.3	38.6	88	1996	22	49.2	1976	-12	1996	4	25.2	1978	741	0	.0	.0	17.0	2.9	17.4	.3
Mar	59.6	34.2	46.9	92+	1967	11	51.8	1972	-1	1960	3	40.3	1996	561	0	.0	.1	26.1	.4	9.3	.0
Apr	69.1	44.1	56.6	102	1972	12	64.7	1981	21	1975	3	50.7	1983	274	22	@	.4	29.4	.0	1.9	.0
May	78.5	55.8	67.2	104	1985	30	72.9	1996	31	1954	3	62.8	1995	66	132	.1	3.3	31.0	.0	.0	.0
Jun	88.1	64.7	76.4	112	1953	15	81.6	1990	45	1964	1	72.0	1982	4	347	1.8	15.7	30.0	.0	.0	.0
Jul	94.2	69.9	82.1	114	1954	14	87.9	1980	51	1968	4	78.5	1989	0	529	7.9	25.1	31.0	.0	.0	.0
Aug	92.9	68.1	80.5	114	1964	6	86.6	2000	50+	1950	20	73.3	1992	2	482	7.3	23.9	31.0	.0	.0	.0
Sep	84.3	59.8	72.1	109+	2000	3	80.2	1998	32	1984	30	63.2	1974	32	245	1.8	11.4	30.0	.0	@	.0
Oct	72.8	47.6	60.2	99	1956	8	64.4	1979	14	1993	31	55.5	1976	179	30	.0	1.3	30.5	.0	1.0	.0
Nov	57.7	34.3	46.0	87	1950	1	53.7	1999	8	1991	3	40.6	2000	569	0	.0	.0	23.1	.3	10.1	.0
Dec	47.1	25.3	36.2	85	1955	24	41.4	1999	-13	1989	23	22.7	1983	894	0	.0	.0	15.1	2.9	21.9	.5
Ann	70.0	46.0	58.0	114+	Aug 1964	6	87.9	Jul 1980	-13+	Dec 1989	23	20.3	Jan 1979	4309	1787	18.9	81.2	307.7	11.2	86.5	1.2

\+ 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	.95	.80	2.09	1949	10	2.80	1973	.00+	1986
Feb	1.36	1.13	2.37	1997	21	4.29	1997	.03	1991
Mar	2.71	2.74	2.65	1989	28	6.22	1973	.00	1971
Apr	3.19	2.90	2.93	1997	11	8.74	1994	.09	1989
May	4.99	4.14	9.78	1957	15	13.06	1982	1.05	1988
Jun	4.09	3.46	4.55	1948	21	10.59	1995	.45	1998
Jul	2.54	2.54	3.96	1982	7	7.61	1982	.00+	1983
Aug	3.08	2.50	3.85	1986	15	9.36	1974	.00	2000
Sep	3.29	2.89	6.41	1961	13	9.86	1986	.00	2000
Oct	2.70	2.36	4.95	1986	3	8.96	1998	.07	1978
Nov	2.27	1.85	4.12	1994	20	5.73	1974	.06	1989
Dec	1.42	1.13	1.70	1991	20	4.74	1999	.00	1976
Ann	32.59	33.47	9.78	May 1957	15	13.06	May 1982	.00+	Sep 2000

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	4.4	2.1	.6	.2
Feb	4.4	3.0	.9	.3
Mar	6.6	4.4	1.9	.6
Apr	6.7	4.8	2.1	1.1
May	8.5	6.4	3.3	1.6
Jun	7.4	5.7	2.7	1.3
Jul	5.1	3.9	1.9	.7
Aug	5.8	3.9	1.8	1.1
Sep	6.1	4.4	1.8	1.0
Oct	5.2	3.8	1.6	.9
Nov	5.4	3.6	1.4	.6
Dec	4.9	2.9	1.0	.4
Ann	70.5	48.9	21.0	9.8

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	.07	.23	.37	.53	.71	.92	1.17	1.53	2.12	2.70
Feb	.09	.17	.34	.53	.74	.98	1.27	1.65	2.17	3.05	3.93
Mar	.17	.44	.87	1.27	1.69	2.15	2.68	3.34	4.23	5.69	7.10
Apr	.47	.74	1.20	1.64	2.10	2.60	3.19	3.90	4.86	6.42	7.91
May	1.06	1.51	2.25	2.91	3.58	4.29	5.09	6.06	7.33	9.36	11.28
Jun	.74	1.11	1.70	2.26	2.83	3.44	4.14	4.98	6.10	7.91	9.63
Jul	.00	.45	.96	1.36	1.76	2.17	2.64	3.17	3.90	5.06	6.16
Aug	.05	.22	.59	1.01	1.50	2.08	2.80	3.72	5.03	7.26	9.51
Sep	.44	.87	1.42	1.89	2.35	2.84	3.39	4.05	4.91	6.28	7.58
Oct	.22	.40	.75	1.13	1.54	2.01	2.58	3.29	4.27	5.93	7.56
Nov	.21	.36	.67	.98	1.33	1.72	2.18	2.77	3.57	4.90	6.21
Dec	.05	.16	.36	.57	.79	1.05	1.36	1.74	2.27	3.17	4.05
Ann	23.29	25.09	27.40	29.15	30.70	32.20	33.75	35.46	37.54	40.54	43.14

\+ 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	2.9	1.8	#	0	6.0	1988	6	8.0+	2000	8+	2000	28	1+	2000	1.2	.9	.3	.1	.0	.5	.2	.2	.0
Feb	2.8	.3	#	0	6.0	1986	8	12.5	1978	6	1978	9	2	1978	1.0	.8	.4	.2	.0	2.4	1.1	.2	.0
Mar	.6	.0	#	0	3.0	1988	17	6.0	1988	9	1994	9	1	1994	.4	.3	.1	.0	.0	.1	.0	.0	.0
Apr	.0	.0	#	0	.5	1979	3	.5	1979	1	1979	3	#	1979	@	.0	.0	.0	.0	.1	.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	#	1993	30	#	1993	#	1993	30	#	1993	.0	.0	.0	.0	.0	.0	.0	.0	.0
Nov	.1	.0	#	0	2.0	2000	8	2.5	1991	3	2000	8	#+	2000	.2	.2	.0	.0	.0	.1	.1	.0	.0
Dec	1.0	.3	#	0	4.0	1984	5	6.0	1992	6	2000	26	1	2000	1.1	.8	.3	.0	.0	.1	.0	.0	.0
Ann	7.4	2.4	N/A	N/A	6.0+	Jan 1988	6	12.5	Feb 1978	9	Mar 1994	9	2	Feb 1978	3.9	3.0	1.1	.3	.0	3.3	1.4	.4	.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	5/02	4/28	4/25	4/22	4/19	4/17	4/14	4/11	4/06
32	4/18	4/14	4/12	4/09	4/07	4/05	4/03	4/01	3/28
28	4/11	4/06	4/03	3/31	3/28	3/25	3/22	3/19	3/14
24	4/04	3/28	3/23	3/19	3/15	3/10	3/06	3/01	2/22
20	3/21	3/12	3/06	3/01	2/24	2/19	2/14	2/08	1/30
16	3/12	3/03	2/24	2/18	2/13	2/08	2/02	1/27	1/17

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	10/03	10/09	10/13	10/17	10/20	10/23	10/27	10/31	11/06
32	10/13	10/18	10/23	10/26	10/30	11/02	11/06	11/10	11/16
28	10/23	10/29	11/02	11/06	11/10	11/13	11/17	11/22	11/28
24	10/30	11/07	11/12	11/17	11/21	11/26	11/30	12/06	12/13
20	11/11	11/18	11/23	11/27	12/01	12/05	12/10	12/15	12/22
16	11/15	11/25	12/03	12/09	12/15	12/21	12/27	1/04	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	203	196	191	187	183	179	175	170	163
32	222	216	211	208	204	201	197	193	187
28	249	241	235	230	226	221	216	211	203
24	278	269	262	256	251	246	240	233	224
20	316	303	294	287	280	272	265	256	243
16	342	324	314	307	300	294	287	279	268

***** 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	987	741	561	274	66	4	0	2	32	179	569	894	4309
60	832	611	411	164	23	0	0	0	9	80	423	739	3292
57	740	533	326	112	10	0	0	0	3	43	341	648	2756
55	680	483	272	83	5	0	0	0	1	27	289	589	2429
50	535	365	159	32	1	0	0	0	0	5	178	447	1722
32	136	85	6	0	0	0	0	0	0	0	9	89	325

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	172	268	468	738	1089	1333	1552	1504	1203	874	430	218	9849
55	3	22	20	131	381	643	839	791	513	188	20	5	3556
57	1	16	12	100	324	583	777	729	456	142	12	2	3154
60	0	10	4	62	244	493	684	636	372	86	4	0	2595
65	0	0	0	22	132	347	529	482	245	30	0	0	1787
70	0	0	0	6	56	214	374	335	145	7	0	0	1137

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	69	163	342	579	886	1136	1332	1300	1008	689	276	92	69	232	574	1153	2039	3175	4507	5807	6815	7504	7780	7872
45	26	90	220	434	731	986	1177	1145	858	537	173	38	26	116	336	770	1501	2487	3664	4809	5667	6204	6377	6415
50	5	44	127	297	577	836	1022	990	708	388	94	13	5	49	176	473	1050	1886	2908	3898	4606	4994	5088	5101
55	0	14	60	181	424	686	867	835	562	252	41	1	0	14	74	255	679	1365	2232	3067	3629	3881	3922	3923
60	0	2	27	94	279	536	712	680	420	146	14	0	0	2	29	123	402	938	1650	2330	2750	2896	2910	2910
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	60	114	218	360	577	763	874	857	663	432	168	68	60	174	392	752	1329	2092	2966	3823	4486	4918	5086	5154

(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