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: MUTUAL, OK **COOP ID: 346139**

Climate Division: OK 3 **NWS Call Sign:** **Elevation: 1,865 Feet** **Lat: 36˚14N** **Lon: 99˚10W**

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	46.3	19.5	32.9	83	1967	22	42.2	1986	-13	1959	4	19.6	1979	995	0	.0	.0	13.5	6.1	28.3	.9
Feb	52.3	23.4	37.9	92	1962	12	47.5	1976	-11	1996	4	24.3	1978	760	0	.0	@	16.1	4.0	21.3	.7
Mar	60.8	31.5	46.2	92+	1989	12	51.1	1986	-6	1948	11	39.6	1996	584	0	.0	.2	24.1	.9	13.9	.0
Apr	70.6	40.4	55.5	100	1972	12	62.6	1981	18	1962	2	48.6	1983	306	20	@	.8	28.4	@	3.6	.0
May	78.7	50.9	64.8	105	1963	11	71.7	1996	30	1954	3	59.5	1976	109	104	.1	3.2	30.9	.0	@	.0
Jun	89.0	61.4	75.2	112	1953	24	80.3	1990	40	1964	2	69.4	1982	10	316	2.0	14.2	30.0	.0	.0	.0
Jul	95.6	65.9	80.8	115	1970	10	85.6	1980	48+	1990	14	75.9	1972	0	488	8.4	24.4	31.0	.0	.0	.0
Aug	93.9	64.6	79.3	113	1964	6	85.7	2000	47+	1988	29	73.6	1992	3	444	8.2	22.2	31.0	.0	.0	.0
Sep	84.6	56.2	70.4	110	2000	5	78.2	1998	31+	1985	30	61.6	1974	38	201	1.8	10.9	29.9	.0	.1	.0
Oct	73.1	44.1	58.6	101	1956	8	62.1	1979	13	1993	31	52.5	1976	215	16	.0	1.6	30.2	@	2.2	.0
Nov	58.2	31.4	44.8	88	1980	9	53.4	1999	6	1955	29	37.7	1972	607	0	.0	.0	21.6	.8	14.2	.0
Dec	48.4	22.7	35.6	88	1955	24	40.0	1988	-12	1989	23	21.5	1983	913	0	.0	.0	14.4	4.1	26.6	.6
Ann	71.0	42.7	56.8	115	Jul 1970	10	85.7	Aug 2000	-13	Jan 1959	4	19.6	Jan 1979	4540	1589	20.5	77.5	301.1	15.9	110.2	2.2

\+ 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	.76	.61	1.83	1990	17	2.61	1990	.00+	1986
Feb	.98	.75	2.27	1964	4	2.84	1985	.01+	1991
Mar	2.30	1.94	3.96	1983	4	7.46	1973	.00	1971
Apr	2.49	2.00	3.63	1970	18	7.24	1999	.00	1996
May	4.53	4.12	3.64	1977	21	10.23	1982	.35	1988
Jun	3.33	2.89	3.87	1984	11	8.82	1995	.25	1998
Jul	2.61	1.83	9.13	1972	8	13.67	1972	.00	1983
Aug	2.30	1.46	5.35	1974	28	10.00	1974	.05	2000
Sep	2.39	2.24	3.75	1962	18	4.80	1997	.01	2000
Oct	1.97	1.52	3.76	1998	2	7.36	1998	.00+	1987
Nov	1.53	1.28	3.20	1998	1	4.47	1975	.00+	1999
Dec	.98	.73	1.47	1997	24	3.21	1984	.00	1976
Ann	26.17	26.15	9.13	Jul 1972	8	13.67	Jul 1972	.00+	Nov 1999

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	3.7	1.8	.4	.1
Feb	4.4	2.3	.7	.1
Mar	6.0	3.9	1.5	.6
Apr	7.2	4.5	1.7	.6
May	8.9	6.5	3.0	1.6
Jun	8.5	5.5	2.2	.9
Jul	5.6	3.9	1.4	.7
Aug	6.3	4.1	1.5	.6
Sep	6.8	4.1	1.4	.7
Oct	4.9	3.2	1.3	.4
Nov	5.3	2.7	.8	.3
Dec	4.3	2.1	.7	.2
Ann	71.9	44.6	16.6	6.8

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	.03	.12	.22	.35	.50	.68	.91	1.25	1.82	2.40
Feb	.03	.08	.18	.31	.46	.64	.87	1.17	1.59	2.33	3.08
Mar	.05	.18	.47	.79	1.16	1.59	2.11	2.78	3.73	5.33	6.94
Apr	.27	.58	.99	1.35	1.72	2.11	2.55	3.08	3.78	4.91	5.98
May	1.00	1.41	2.08	2.68	3.28	3.92	4.64	5.50	6.63	8.44	10.15
Jun	.59	.89	1.37	1.83	2.29	2.79	3.37	4.06	4.98	6.47	7.89
Jul	.08	.27	.63	1.00	1.42	1.89	2.47	3.19	4.19	5.88	7.55
Aug	.10	.21	.46	.76	1.12	1.54	2.07	2.75	3.72	5.39	7.07
Sep	.15	.30	.60	.92	1.29	1.72	2.24	2.90	3.82	5.38	6.93
Oct	.00	.11	.39	.69	1.02	1.40	1.85	2.42	3.22	4.56	5.89
Nov	.00	.00	.30	.56	.82	1.12	1.48	1.92	2.50	3.50	4.47
Dec	.03	.09	.22	.36	.52	.70	.91	1.19	1.58	2.23	2.87
Ann	19.94	21.18	22.74	23.92	24.95	25.95	26.97	28.09	29.44	31.39	33.06

\+ 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)

Month	Snow Fall Mean	Snow Fall Median	Snow Depth Mean	Snow Depth Median
Jan	2.7	1.0	1	#
Feb	3.0	.6	1	#
Mar	1.9	.3	#	0
Apr	.4	.0	#	0
May	.0	.0	0	0
Jun	.0	.0	0	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	.0	.0	0	0
Oct	.1	.0	#	0
Nov	1.2	.0	#	0
Dec	2.6	1.3	#	#
Ann	11.9	3.2	N/A	N/A

Extremes (2)

Month	Highest Daily Snow Fall	Year	Day	Highest Monthly Snow Fall	Year	Highest Daily Snow Depth	Year	Day	Highest Monthly Mean Snow Depth	Year
Jan	6.0	1988	6	10.3	1988	11	1988	11	4	1988
Feb	14.0	1971	21	17.0	1971	16	1971	22	4	1978
Mar	8.0	1994	9	15.5	1988	9	1994	9	1	1988
Apr	6.0	1973	8	6.0	1973	4	1973	8	#+	1999
May	.0	0	0	.0	0	0	0	0	0	0
Jun	.0	0	0	.0	0	0	0	0	0	0
Jul	.0	0	0	.0	0	0	0	0	0	0
Aug	.0	0	0	.0	0	0	0	0	0	0
Sep	.0	0	0	.0	0	0	0	0	0	0
Oct	2.0	1991	31	2.0	1991	2	1991	31	#+	1997
Nov	7.0	1972	18	14.0	1972	7	1972	21	1	1972
Dec	9.0	1971	2	9.0+	1989	13	1987	15	2	1987
Ann	14.0	Feb 1971	21	17.0	Feb 1971	16	Feb 1971	22	4+	Jan 1988

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	2.0	1.2	.4	.1	.0
Feb	1.6	1.0	.3	.2	@
Mar	1.0	.5	.2	.1	.0
Apr	.1	.1	.1	@	.0
May	.0	.0	.0	.0	.0
Jun	.0	.0	.0	.0	.0
Jul	.0	.0	.0	.0	.0
Aug	.0	.0	.0	.0	.0
Sep	.0	.0	.0	.0	.0
Oct	.1	@	.0	.0	.0
Nov	.7	.3	.1	.1	.0
Dec	1.7	1.2	.4	.2	.0
Ann	7.2	4.3	1.5	.7	@

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	4.6	1.6	.9	.2
Feb	3.2	1.6	1.1	.1
Mar	.9	.4	.2	.0
Apr	.1	@	.0	.0
May	.0	.0	.0	.0
Jun	.0	.0	.0	.0
Jul	.0	.0	.0	.0
Aug	.0	.0	.0	.0
Sep	.0	.0	.0	.0
Oct	@	.0	.0	.0
Nov	.7	.3	.1	.0
Dec	3.6	.9	.3	.0
Ann	13.1	4.8	2.6	.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	5/07	5/02	4/29	4/27	4/24	4/22	4/19	4/16	4/11
32	4/25	4/20	4/17	4/14	4/11	4/09	4/06	4/02	3/29
28	4/13	4/09	4/06	4/03	4/01	3/29	3/26	3/23	3/19
24	4/07	3/31	3/27	3/23	3/19	3/15	3/11	3/06	2/28
20	4/03	3/25	3/18	3/13	3/07	3/02	2/24	2/18	2/08
16	3/22	3/12	3/05	2/27	2/21	2/15	2/09	2/02	1/23

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	9/25	9/30	10/04	10/07	10/10	10/13	10/17	10/20	10/26
32	10/07	10/13	10/17	10/20	10/24	10/27	10/31	11/04	11/10
28	10/19	10/25	10/29	11/02	11/05	11/09	11/12	11/17	11/22
24	10/25	11/01	11/06	11/10	11/14	11/18	11/22	11/26	12/03
20	11/10	11/15	11/19	11/22	11/26	11/29	12/02	12/06	12/11
16	11/13	11/20	11/25	11/30	12/04	12/08	12/13	12/18	12/25

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	187	180	176	172	169	165	161	157	150
32	214	207	203	199	195	191	187	182	175
28	238	231	226	222	218	214	210	205	198
24	261	253	248	243	239	235	230	225	218
20	294	283	275	269	263	256	250	242	231
16	322	310	301	293	285	278	270	261	248

***** 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	995	760	584	306	109	10	0	3	38	215	607	913	4540
60	840	629	432	191	47	2	0	0	11	103	461	758	3474
57	749	551	346	135	25	0	0	0	4	58	377	665	2910
55	689	499	291	104	15	0	0	0	1	37	324	605	2565
50	544	380	174	45	3	0	0	0	0	9	207	460	1822
32	145	92	7	0	0	0	0	0	0	0	13	86	343

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	173	257	446	704	1017	1296	1511	1465	1153	824	396	196	9438
55	4	20	17	118	320	606	798	752	464	149	17	2	3267
57	2	15	10	89	267	546	736	690	406	107	10	0	2878
60	0	9	3	55	197	457	643	597	323	60	3	0	2347
65	0	0	0	20	104	316	488	444	201	16	0	0	1589
70	0	0	0	5	43	192	335	300	109	3	0	0	987

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	52	127	273	497	801	1078	1294	1250	943	606	225	69	52	179	452	949	1750	2828	4122	5372	6315	6921	7146	7215
45	18	67	168	361	646	928	1139	1095	793	456	133	30	18	85	253	614	1260	2188	3327	4422	5215	5671	5804	5834
50	1	29	91	237	494	778	984	940	646	317	71	8	1	30	121	358	852	1630	2614	3554	4200	4517	4588	4596
55	0	9	46	138	347	628	829	785	500	196	25	0	0	9	55	193	540	1168	1997	2782	3282	3478	3503	3503
60	0	0	13	66	214	480	674	630	365	104	5	0	0	0	13	79	293	773	1447	2077	2442	2546	2551	2551
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	60	115	194	325	503	710	840	804	602	383	155	72	60	175	369	694	1197	1907	2747	3551	4153	4536	4691	4763

(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