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: HOWARD 5 NE, KS **COOP ID: 143822**

Climate Division: KS 9 **NWS Call Sign:** **Elevation: 1,100 Feet** **Lat: 37˚31N** **Lon: 96˚12W**

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	41.8	18.2	30.0	76	1951	19	39.6	1990	-16	1979	8	16.3	1979	1085	0	.0	.0	10.7	7.1	27.4	1.8
Feb	48.6	22.7	35.7	86	1962	12	46.2	1976	-15	1982	6	22.9	1978	821	0	.0	.0	14.2	3.8	20.9	1.2
Mar	58.6	31.8	45.2	90	1967	11	50.0	1986	-2	1980	2	39.3	1984	615	0	.0	.0	24.5	.6	13.0	@
Apr	68.4	42.5	55.5	97	1972	12	63.4	1981	15+	1975	3	48.0	1983	299	13	.0	.5	29.0	.0	3.1	.0
May	76.6	54.0	65.3	99	1953	26	69.9	1987	28	1976	3	60.6	1995	87	96	.0	.8	31.0	.0	.1	.0
Jun	85.0	63.2	74.1	107+	1980	27	78.7	1980	42	1954	4	69.9	1982	8	281	.4	8.3	30.0	.0	.0	.0
Jul	91.4	68.1	79.8	115	1954	14	88.1	1980	47	1971	31	75.8	1972	0	458	3.4	20.2	31.0	.0	.0	.0
Aug	90.8	65.6	78.2	111	1956	6	84.7	2000	43	1988	29	71.9	1992	4	412	4.2	19.4	31.0	.0	.0	.0
Sep	82.8	57.1	70.0	109	2000	3	77.4	1998	27	1984	30	61.8	1974	45	193	1.0	8.2	30.0	.0	.1	.0
Oct	71.9	45.0	58.5	97+	1963	9	61.7	1973	13	1993	31	52.3	1976	221	17	.0	.8	30.4	.0	2.9	.0
Nov	56.5	32.4	44.5	85+	1980	8	52.8	1999	-3	1975	27	38.5	1976	616	0	.0	.0	22.3	.5	14.3	@
Dec	44.8	22.5	33.7	80	1955	24	38.3	1991	-17	1989	22	18.5	1983	972	0	.0	.0	12.3	3.9	25.0	1.0
Ann	68.1	43.6	55.9	115	Jul 1954	14	88.1	Jul 1980	-17	Dec 1989	22	16.3	Jan 1979	4773	1470	9.0	58.2	296.4	15.9	106.8	4.0

\+ 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	1.01	.76	2.45	1971	3	2.68	1975	.00	1986
Feb	1.53	1.41	4.60	1997	21	5.45	1997	.00	1991
Mar	2.95	2.70	2.15	1974	10	9.33	1973	.25	1971
Apr	3.34	2.86	3.90	1988	1	8.70	1994	.81	1989
May	4.86	4.90	4.40	1989	22	9.22	1982	1.07	1994
Jun	5.10	4.16	5.94	1977	22	10.67	1977	.40	1980
Jul	3.79	3.20	3.00	1967	5	13.81	1976	.02	1974
Aug	3.52	2.56	4.27	1957	17	11.72	1974	.00	2000
Sep	3.83	3.03	6.54	1961	13	10.65	1986	.63	1980
Oct	3.35	2.92	6.28	1986	3	9.37	1986	.08	1995
Nov	2.81	2.65	3.89	1974	3	6.62	1992	.00+	1989
Dec	1.83	1.52	2.20	1973	4	4.23	1992	.09	1977
Ann	37.92	38.91	6.54	Sep 1961	13	13.81	Jul 1976	.00+	Aug 2000

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	4.9	2.4	.4	.1
Feb	4.9	3.3	.9	.2
Mar	7.5	5.3	2.2	.9
Apr	8.4	6.0	2.1	.9
May	9.9	7.3	3.2	1.5
Jun	9.1	6.4	3.3	1.5
Jul	7.3	5.3	2.3	1.2
Aug	7.2	4.8	2.1	1.2
Sep	7.6	5.3	2.5	1.4
Oct	7.4	4.7	2.1	1.1
Nov	6.3	4.3	1.9	.7
Dec	5.1	3.1	1.4	.5
Ann	85.6	58.2	24.4	11.2

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	.04	.12	.27	.42	.58	.76	.97	1.24	1.61	2.22	2.83
Feb	.14	.31	.56	.78	1.01	1.26	1.54	1.89	2.34	3.09	3.80
Mar	.58	.85	1.28	1.68	2.08	2.51	3.00	3.59	4.37	5.62	6.81
Apr	.87	1.19	1.67	2.10	2.52	2.96	3.45	4.04	4.80	6.00	7.12
May	1.56	2.02	2.70	3.28	3.84	4.42	5.06	5.81	6.77	8.26	9.64
Jun	1.00	1.46	2.20	2.89	3.59	4.34	5.18	6.21	7.56	9.73	11.80
Jul	.26	.50	.98	1.50	2.08	2.76	3.57	4.60	6.04	8.46	10.86
Aug	.20	.53	1.07	1.59	2.14	2.75	3.46	4.34	5.53	7.50	9.41
Sep	.63	.96	1.52	2.05	2.59	3.18	3.85	4.68	5.78	7.56	9.26
Oct	.38	.64	1.11	1.58	2.08	2.63	3.28	4.09	5.18	6.99	8.75
Nov	.00	.53	1.10	1.55	1.98	2.43	2.93	3.51	4.29	5.53	6.71
Dec	.14	.26	.49	.74	1.02	1.35	1.73	2.22	2.90	4.03	5.16
Ann	26.16	28.40	31.30	33.50	35.47	37.38	39.35	41.54	44.20	48.07	51.43

\+ 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	5.1	3.2	1	#
Feb	3.8	2.0	1	#
Mar	1.5	.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
Oct	#	.0	0	0
Nov	1.1	.0	#	0
Dec	1.9	.4	#	#
Ann	13.5	5.6	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	9.0	1979	30	27.5	1979	10	1988	8	5	1979
Feb	11.0	1980	8	13.1	1982	11	1980	9	3	1980
Mar	6.0	1975	10	9.3	1975	7	1990	1	1	1975
Apr	2.0	1979	4	2.0	1979	#+	1997	8	#+	1997
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	#	1993	23	#	1993
Oct	#	1993	29	#+	1993	0	0	0	0	0
Nov	6.0	1971	23	10.5	1972	6	1975	26	1	1975
Dec	6.0	1995	19	14.0	1973	10	1987	15	2+	2000
Ann	11.0	Feb 1980	8	27.5	Jan 1979	11	Feb 1980	9	5	Jan 1979

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	2.4	1.8	.5	.2	.0
Feb	1.7	1.2	.4	.2	.1
Mar	.9	.7	.3	.1	.0
Apr	.1	.1	.0	.0	.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	.0	.0	.0	.0	.0
Nov	.5	.3	.1	.1	.0
Dec	1.3	.9	.2	.1	.0
Ann	6.9	5.0	1.5	.7	.1

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	6.5	3.4	1.3	.1
Feb	4.6	2.2	1.0	.2
Mar	1.0	.4	.1	.0
Apr	.0	.0	.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	.0
Nov	.5	.2	.1	.0
Dec	2.3	.9	.2	.0
Ann	14.9	7.1	2.7	.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	5/11	5/07	5/03	4/30	4/28	4/25	4/22	4/19	4/14
32	4/25	4/20	4/17	4/14	4/12	4/09	4/06	4/03	3/30
28	4/20	4/14	4/10	4/07	4/04	3/31	3/28	3/24	3/18
24	4/09	4/03	3/30	3/26	3/23	3/20	3/16	3/12	3/06
20	4/04	3/27	3/22	3/17	3/13	3/08	3/03	2/26	2/18
16	3/25	3/17	3/11	3/05	3/01	2/24	2/19	2/13	2/04

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	9/20	9/26	9/29	10/03	10/06	10/09	10/12	10/15	10/21
32	9/29	10/05	10/09	10/13	10/16	10/20	10/23	10/27	11/02
28	10/14	10/19	10/23	10/26	10/29	11/01	11/04	11/08	11/13
24	10/23	10/29	11/03	11/07	11/11	11/14	11/18	11/23	11/30
20	11/04	11/10	11/14	11/18	11/22	11/25	11/29	12/03	12/09
16	11/10	11/17	11/22	11/27	12/01	12/05	12/09	12/14	12/21

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	182	174	169	164	160	156	151	146	138
32	210	202	196	191	187	182	177	171	163
28	231	223	217	212	207	203	198	192	184
24	258	249	243	237	232	227	222	215	206
20	285	274	266	259	253	247	240	232	221
16	308	297	288	281	274	268	261	252	241

***** 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	1085	821	615	299	87	8	0	4	45	221	616	972	4773
60	930	688	462	180	32	1	0	0	14	109	472	817	3705
57	838	610	376	122	14	0	0	0	5	63	390	725	3143
55	778	558	319	91	7	0	0	0	2	41	337	666	2799
50	633	434	197	35	1	0	0	0	0	11	223	522	2056
32	207	124	11	0	0	0	0	0	0	0	20	134	496

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	145	226	419	704	1031	1263	1481	1432	1139	819	394	185	9238
55	3	16	15	104	326	573	768	719	451	148	21	4	3148
57	1	12	9	76	270	513	706	657	394	107	14	1	2760
60	0	7	2	43	195	424	613	564	312	60	6	0	2226
65	0	0	0	13	96	281	458	412	193	17	0	0	1470
70	0	0	0	2	34	158	308	271	105	3	0	0	881

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	43	115	283	529	810	1040	1246	1214	923	608	228	64	43	158	441	970	1780	2820	4066	5280	6203	6811	7039	7103
45	14	57	180	386	655	890	1091	1059	773	458	136	28	14	71	251	637	1292	2182	3273	4332	5105	5563	5699	5727
50	2	24	102	259	500	740	936	904	624	319	69	8	2	26	128	387	887	1627	2563	3467	4091	4410	4479	4487
55	0	11	48	152	349	590	781	749	478	200	29	1	0	11	59	211	560	1150	1931	2680	3158	3358	3387	3388
60	0	1	17	79	214	440	626	594	343	104	7	0	0	1	18	97	311	751	1377	1971	2314	2418	2425	2425
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	42	96	198	336	522	705	835	800	603	393	149	52	42	138	336	672	1194	1899	2734	3534	4137	4530	4679	4731

(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