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: LEAVENWORTH, KS **COOP ID: 144588**

Climate Division: KS 3 **NWS Call Sign:** **Elevation: 870 Feet** **Lat: 39˚16N** **Lon: 94˚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	36.7	16.4	26.6	73	1967	23	36.0	1989	-17+	1982	10	12.7	1979	1191	0	.0	.0	6.0	10.2	27.9	3.1
Feb	43.8	21.4	32.6	81	1972	29	43.6	2000	-19	1979	1	19.8	1978	907	0	.0	.0	10.6	6.4	22.1	1.7
Mar	54.5	30.8	42.7	87	1966	31	48.8	1986	-10	1978	4	35.4	1984	693	0	.0	.0	20.7	1.1	15.5	.1
Apr	65.4	41.9	53.7	93	1987	29	63.5	1981	4	1975	3	46.0	1983	357	15	.0	.3	27.8	.0	4.4	.0
May	75.6	54.1	64.9	97	1956	21	70.7	1987	27	1963	1	59.3	1995	113	108	.0	.6	31.0	.0	.1	.0
Jun	84.6	63.0	73.8	106	1980	27	78.4	1988	42	1983	1	68.9	1982	7	271	.2	7.8	30.0	.0	.0	.0
Jul	89.8	68.4	79.1	110+	1954	18	86.8	1980	45	1972	5	73.6	1971	0	436	2.0	16.8	31.0	.0	.0	.0
Aug	87.9	65.2	76.6	108	1984	29	83.2	1983	41	1967	20	70.1	1992	6	363	1.4	13.5	31.0	.0	.0	.0
Sep	79.9	56.2	68.1	104	2000	1	73.3	1978	30+	1984	30	62.1	1989	58	149	.1	4.3	30.0	.0	.2	.0
Oct	69.1	44.7	56.9	95+	1963	10	61.2	1973	18	1993	31	51.6+	1988	265	14	.0	.2	29.7	.0	2.6	.0
Nov	53.2	31.5	42.4	84	1980	8	50.1	1999	-2	1977	26	36.3	1976	680	0	.0	.0	18.8	1.1	15.2	.1
Dec	40.7	21.3	31.0	70+	2001	6	37.4	1999	-27	1989	23	13.1	1983	1054	0	.0	.0	7.8	6.6	25.7	1.7
Ann	65.1	42.9	54.0	110+	Jul 1954	18	86.8	Jul 1980	-27	Dec 1989	23	12.7	Jan 1979	5331	1356	3.7	43.5	274.4	25.4	113.7	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: 1948-2001

(3) Derived from 1971-2000 serially complete daily data

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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	1.07	.96	1.55	1988	30	2.77	1979	.00	1986
Feb	1.25	1.29	2.10	1997	21	4.23	1997	.00+	1996
Mar	2.83	2.43	2.62	1961	12	9.24	1973	.22	1994
Apr	3.70	3.49	3.52	1967	1	8.52	1983	.53	2000
May	5.38	5.18	4.43	1990	15	11.06	1995	1.46	1994
Jun	5.02	4.11	5.06	2001	20	12.53	1996	1.53	1988
Jul	4.73	4.21	6.23	1986	7	14.53	1986	.13	1999
Aug	4.03	3.69	3.95	1975	25	8.92	1977	.28	2000
Sep	4.93	4.29	6.97	1977	12	13.43	1977	1.22	1974
Oct	3.72	3.72	3.72	1977	22	9.67	1977	.32	1988
Nov	2.74	2.75	4.05	1964	16	6.14	1992	.00	1989
Dec	1.54	1.28	3.20	1980	7	4.77	1980	.03	1996
Ann	40.94	39.94	6.97	Sep 1977	12	14.53	Jul 1986	.00+	Feb 1996

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	5.1	2.7	.6	.2
Feb	5.2	3.1	.7	.1
Mar	8.0	4.9	2.1	.6
Apr	10.0	6.4	2.3	.8
May	11.2	7.7	3.5	1.7
Jun	9.8	6.9	3.5	1.5
Jul	8.2	5.9	2.8	1.4
Aug	8.3	6.0	2.8	1.2
Sep	7.6	5.4	2.8	1.5
Oct	7.0	5.2	2.2	1.1
Nov	7.3	4.7	2.0	1.0
Dec	5.0	2.9	1.2	.4
Ann	92.7	61.8	26.5	11.5

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	.08	.20	.37	.52	.69	.86	1.07	1.32	1.65	2.20	2.72
Feb	.00	.17	.40	.60	.80	1.02	1.27	1.56	1.96	2.60	3.22
Mar	.48	.73	1.14	1.53	1.93	2.36	2.85	3.45	4.25	5.55	6.78
Apr	.84	1.18	1.72	2.21	2.69	3.21	3.79	4.48	5.40	6.85	8.22
May	1.71	2.22	2.98	3.62	4.25	4.90	5.60	6.44	7.51	9.18	10.72
Jun	1.50	1.98	2.69	3.31	3.91	4.53	5.21	6.02	7.06	8.69	10.20
Jul	.46	.80	1.45	2.11	2.82	3.63	4.58	5.77	7.41	10.13	12.78
Aug	.80	1.17	1.76	2.31	2.85	3.44	4.11	4.91	5.97	7.67	9.29
Sep	1.08	1.53	2.26	2.91	3.57	4.26	5.05	5.99	7.23	9.20	11.07
Oct	.46	.76	1.28	1.80	2.35	2.96	3.67	4.55	5.73	7.68	9.58
Nov	.46	.83	1.30	1.67	2.05	2.43	2.86	3.37	4.03	5.06	6.04
Dec	.09	.18	.37	.58	.81	1.09	1.43	1.86	2.46	3.48	4.51
Ann	26.30	29.02	32.57	35.31	37.77	40.16	42.66	45.45	48.85	53.85	58.22

\+ 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	2.5	1.2	#	0
Feb	3.4	1.3	#	#
Mar	1.6	.0	#	0
Apr	#	.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	.3	.0	#	0
Nov	.7	.0	#	0
Dec	1.6	.0	#	0
Ann	10.1	2.5	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	7.0	1993	9	9.0	1983	6	1991	26	2	1995
Feb	6.2	1993	26	15.3	1993	6	1993	26	1	1993
Mar	7.0	1990	24	7.0	1990	7	1990	24	#+	2000
Apr	#	1992	21	#	1992	1	1997	10	#	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	0	0	0	0	0
Oct	7.0	1996	23	7.0	1996	7	1996	23	#	1996
Nov	2.5	1991	23	4.5	1991	1+	1983	23	#+	1983
Dec	3.0	1993	14	6.8	1989	7	1997	25	2	2000
Ann	7.0+	Oct 1996	23	15.3	Feb 1993	7+	Dec 1997	25	2+	Dec 2000

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	1.2	1.0	.4	.1	.0
Feb	1.5	.8	.3	.2	.0
Mar	.5	.4	.2	.1	.0
Apr	.0	.0	.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	.1	.1	.1	.1	.0
Nov	.3	.3	.0	.0	.0
Dec	.7	.6	.1	.0	.0
Ann	4.3	3.2	1.1	.5	.0

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	-9.9	-9.9	-9.9	-9.9
Feb	1.3	.0	.0	.0
Mar	.3	.1	.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	.1	.1	.1	.0
Nov	.1	.0	.0	.0
Dec	1.1	.5	.0	.0
Ann	-9.9	-9.9	-9.9	-9.9

+ 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	5/12	5/06	5/02	4/29	4/26	4/23	4/19	4/15	4/10
32	4/27	4/22	4/19	4/16	4/14	4/11	4/08	4/05	3/31
28	4/17	4/13	4/10	4/07	4/04	4/02	3/30	3/27	3/22
24	4/14	4/07	4/01	3/28	3/24	3/20	3/15	3/10	3/03
20	4/03	3/26	3/21	3/16	3/11	3/07	3/02	2/24	2/16
16	3/26	3/17	3/11	3/05	2/28	2/23	2/18	2/12	2/03

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

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	186	178	172	167	163	158	154	148	140
32	209	201	194	189	184	179	174	168	160
28	234	226	221	216	211	206	202	196	188
24	258	249	242	236	230	225	219	212	202
20	287	276	268	261	255	249	242	234	223
16	313	300	290	282	275	267	259	249	236

***** 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	1191	907	693	357	113	7	0	6	58	265	680	1054	5331
60	1036	771	540	235	52	1	0	0	18	146	532	899	4230
57	944	693	454	174	29	0	0	0	7	92	448	806	3647
55	883	641	397	139	18	0	0	0	3	65	393	748	3287
50	739	514	269	70	5	0	0	0	0	22	268	604	2491
32	288	175	28	0	0	0	0	0	0	0	29	195	715

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	120	192	358	649	1018	1254	1459	1381	1081	772	339	164	8787
55	2	14	15	97	324	564	746	668	394	124	13	4	2965
57	0	11	10	73	272	504	684	606	338	89	8	0	2595
60	0	5	2	44	202	415	591	513	259	50	2	0	2083
65	0	0	0	15	108	271	436	363	149	14	0	0	1356
70	0	0	0	4	46	148	290	228	71	2	0	0	789

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	25	84	218	466	782	1025	1214	1150	858	543	182	40	25	109	327	793	1575	2600	3814	4964	5822	6365	6547	6587
45	5	41	130	332	627	875	1059	995	708	399	102	16	5	46	176	508	1135	2010	3069	4064	4772	5171	5273	5289
50	0	14	69	212	474	725	904	840	558	264	49	4	0	14	83	295	769	1494	2398	3238	3796	4060	4109	4113
55	0	4	29	120	326	575	749	685	414	156	19	0	0	4	33	153	479	1054	1803	2488	2902	3058	3077	3077
60	0	1	12	60	199	425	594	530	282	74	4	0	0	1	13	73	272	697	1291	1821	2103	2177	2181	2181
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	22	63	149	285	493	695	826	777	564	333	109	32	22	85	234	519	1012	1707	2533	3310	3874	4207	4316	4348

(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