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: LOVEWELL DAM, KS **COOP ID: 144857**

Climate Division: KS 2 **NWS Call Sign:** **Elevation: 1,602 Feet** **Lat: 39˚54N** **Lon: 98˚02W**

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	36.2	12.8	24.5	79	1990	11	34.4+	1992	-22+	1974	12	11.4	1979	1255	0	.0	.0	5.7	12.5	30.7	6.0
Feb	42.1	17.1	29.6	79	1972	29	39.1	1999	-21	1981	11	14.6	1979	991	0	.0	.0	9.7	8.5	26.3	3.9
Mar	52.8	27.4	40.1	86	1972	12	46.9	1986	-13	1978	4	32.4	1975	772	0	.0	.0	17.7	2.7	21.8	.6
Apr	64.0	38.1	51.1	98+	1989	25	59.1	1981	9	1975	3	45.4	1983	423	4	.0	.3	25.8	.2	7.6	.0
May	73.3	49.3	61.3	100	2000	31	66.6	1988	27+	1967	2	55.1	1995	172	57	@	.8	30.7	.0	.3	.0
Jun	83.9	59.1	71.5	107+	1988	22	76.9	1988	40	1964	1	66.1	1982	21	217	.7	7.8	30.0	.0	.0	.0
Jul	89.8	64.3	77.1	109	1964	6	81.4	1980	44	1971	30	72.4	1992	0	373	3.6	16.1	31.0	.0	.0	.0
Aug	87.4	62.0	74.7	109+	2000	9	82.1	2000	44	1964	12	70.1	1992	13	314	1.9	13.1	31.0	.0	.0	.0
Sep	79.6	52.1	65.9	108	2000	3	72.3	1998	25	1984	29	60.3	1974	81	105	.3	6.2	29.8	.0	.4	.0
Oct	67.6	39.8	53.7	95	2000	2	57.9	2000	14+	1997	27	49.0	1976	354	3	.0	.4	28.9	.1	6.0	.0
Nov	50.9	26.9	38.9	81	1980	7	48.5	1999	-9	1976	28	31.3	1985	784	0	.0	.0	16.7	2.5	22.3	.2
Dec	39.5	17.0	28.3	76	1964	24	35.0	1979	-29	1989	23	9.9	1983	1139	0	.0	.0	7.2	8.8	30.0	2.8
Ann	63.9	38.8	51.4	109+	Aug 2000	9	82.1	Aug 2000	-29	Dec 1989	23	9.9	Dec 1983	6005	1073	6.5	44.7	264.2	35.3	145.4	13.5

\+ 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: 1955-2001

(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	.64	.47	1.21	1971	3	2.14	1993	.00	1986
Feb	.69	.44	1.47	1966	9	2.81	1971	.00+	1996
Mar	2.12	1.78	2.47	1987	23	7.64	1987	.12	1994
Apr	2.58	2.33	2.55	1987	14	6.21	1986	.43	1989
May	3.92	4.06	2.95	2001	5	7.95	1972	1.04	1994
Jun	3.31	3.21	3.08	1970	16	6.39	1993	.61	1996
Jul	3.75	2.91	4.40	1978	22	14.91	1993	.19	1974
Aug	3.25	3.24	3.07	1989	25	10.32	1977	.39	1976
Sep	2.69	1.66	5.81	1978	18	12.71	1973	.32	1974
Oct	1.91	1.55	3.73	1986	11	5.89	1973	.00	1999
Nov	1.51	1.30	3.65	1996	16	5.89	1996	.00	1989
Dec	.77	.65	1.14	1984	16	2.65	1984	.00+	1977
Ann	27.14	25.96	5.81	Sep 1978	18	14.91	Jul 1993	.00+	Oct 1999

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	4.5	1.7	.3	@
Feb	4.9	1.7	.4	.1
Mar	7.2	4.3	1.4	.5
Apr	9.2	5.1	1.8	.4
May	11.6	7.3	2.5	1.1
Jun	9.1	5.6	2.5	1.0
Jul	8.9	5.7	2.3	1.1
Aug	9.4	5.3	2.0	1.0
Sep	7.3	4.4	1.6	.6
Oct	6.3	3.5	1.0	.4
Nov	5.7	2.9	.9	.4
Dec	4.2	2.0	.5	@
Ann	88.3	49.5	17.2	6.6

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	.02	.07	.16	.25	.35	.47	.61	.78	1.02	1.42	1.82
Feb	.00	.00	.12	.24	.35	.49	.65	.86	1.13	1.60	2.06
Mar	.17	.31	.59	.88	1.21	1.58	2.02	2.58	3.36	4.65	5.93
Apr	.71	.96	1.33	1.65	1.97	2.31	2.67	3.11	3.68	4.57	5.40
May	1.04	1.41	1.98	2.47	2.96	3.48	4.05	4.72	5.61	6.99	8.28
Jun	1.04	1.35	1.82	2.22	2.61	3.01	3.45	3.96	4.63	5.67	6.63
Jul	.26	.49	.96	1.48	2.05	2.72	3.52	4.55	5.97	8.38	10.77
Aug	.67	.97	1.45	1.88	2.32	2.79	3.32	3.95	4.79	6.14	7.41
Sep	.36	.58	.96	1.34	1.73	2.16	2.67	3.29	4.13	5.50	6.83
Oct	.07	.22	.49	.76	1.06	1.41	1.82	2.34	3.05	4.24	5.41
Nov	.04	.14	.34	.56	.80	1.08	1.42	1.84	2.44	3.45	4.44
Dec	.00	.05	.16	.28	.41	.55	.73	.95	1.25	1.76	2.27
Ann	15.56	17.61	20.35	22.50	24.45	26.37	28.39	30.67	33.48	37.64	41.33

\+ 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: 1955-2001
(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	5.8	5.0	2	1
Feb	4.9	3.8	2	#
Mar	2.9	1.7	#	#
Apr	.8	.0	#	0
May	.0	.0	0	0
Jun	.0	.0	0	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	.1	.0	#	0
Oct	.0	.0	#	0
Nov	1.9	.3	#	#
Dec	4.6	3.5	1	1
Ann	21.0	14.3	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	10.0	1971	3	16.8	1979	15	1993	21	8	1993
Feb	12.0	1971	22	17.5	1971	14	1971	23	7	1985
Mar	10.0	1998	8	12.5	1984	10	1998	8	3	1998
Apr	11.0	1997	12	11.0	1997	11	1997	12	1	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	1.5	1985	30	1.5	1985	#	1985	30	#	1985
Oct	.3	1987	10	.3	1987	1	1979	22	#+	1987
Nov	6.0	1987	28	7.8	1975	8	1991	2	2	1991
Dec	5.0	1972	30	13.5	1973	15	1983	31	9	1983
Ann	12.0	Feb 1971	22	17.5	Feb 1971	15+	Jan 1993	21	9	Dec 1983

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	3.4	2.1	.6	.2	@
Feb	2.6	1.7	.5	.2	@
Mar	1.4	.9	.3	.2	@
Apr	.4	.3	.1	@	@
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
Oct	@	.0	.0	.0	.0
Nov	.9	.6	.2	.1	.0
Dec	2.3	1.6	.4	.1	.0
Ann	11.0	7.2	2.1	.8	@

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	11.4	6.2	4.0	1.0
Feb	8.0	5.0	2.8	.6
Mar	2.2	1.0	.5	@
Apr	.4	.1	@	@
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	1.3	.5	.2	.0
Dec	6.1	3.0	1.4	.0
Ann	29.4	15.8	8.9	1.6

+ 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	5/14	5/10	5/06	5/04	5/01	4/28	4/26	4/23	4/18
32	5/06	5/01	4/28	4/25	4/22	4/19	4/16	4/13	4/08
28	4/21	4/17	4/14	4/12	4/09	4/07	4/05	4/02	3/29
24	4/13	4/09	4/06	4/03	3/31	3/29	3/26	3/23	3/19
20	4/07	4/01	3/28	3/24	3/20	3/17	3/13	3/08	3/02
16	4/01	3/24	3/19	3/14	3/10	3/05	2/28	2/23	2/15

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	9/14	9/18	9/22	9/25	9/28	9/30	10/03	10/07	10/11
32	9/24	9/29	10/03	10/06	10/09	10/12	10/15	10/19	10/24
28	10/06	10/12	10/16	10/19	10/22	10/25	10/29	11/02	11/07
24	10/18	10/24	10/28	10/31	11/04	11/07	11/11	11/15	11/21
20	10/20	10/27	11/01	11/06	11/10	11/14	11/19	11/24	12/01
16	10/30	11/07	11/12	11/16	11/21	11/25	11/29	12/05	12/12

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	168	162	157	153	149	145	141	136	129
32	188	182	177	173	169	165	161	157	150
28	212	206	202	198	195	192	188	184	178
24	238	231	226	221	217	213	208	203	195
20	263	253	246	240	234	228	222	215	206
16	286	275	268	261	255	249	243	235	225

***** 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	1255	991	772	423	172	21	0	13	81	354	784	1139	6005
60	1100	857	617	287	87	4	0	2	27	215	634	984	4814
57	1008	779	530	215	52	1	0	0	11	146	546	891	4179
55	947	726	472	173	35	0	0	0	6	107	490	829	3785
50	797	599	335	89	10	0	0	0	0	43	355	683	2911
32	329	240	50	0	0	0	0	0	0	0	57	239	915

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	97	173	301	572	908	1186	1396	1324	1015	671	264	122	8029
55	1	15	10	55	230	496	683	611	330	65	7	0	2503
57	0	12	7	37	185	437	621	549	276	42	2	0	2168
60	0	6	1	19	127	350	528	458	202	18	0	0	1709
65	0	0	0	4	57	217	373	314	105	3	0	0	1073
70	0	0	0	0	19	111	227	188	45	0	0	0	590

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	8	46	148	358	672	960	1166	1089	790	445	114	15	8	54	202	560	1232	2192	3358	4447	5237	5682	5796	5811
45	0	13	80	235	517	810	1011	934	642	309	52	2	0	13	93	328	845	1655	2666	3600	4242	4551	4603	4605
50	0	1	37	139	368	660	856	779	495	192	20	0	0	1	38	177	545	1205	2061	2840	3335	3527	3547	3547
55	0	0	7	70	235	510	701	624	356	99	4	0	0	0	7	77	312	822	1523	2147	2503	2602	2606	2606
60	0	0	2	32	125	363	546	469	235	40	0	0	0	0	2	34	159	522	1068	1537	1772	1812	1812	1812
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	17	54	121	234	406	631	768	718	503	295	95	26	17	71	192	426	832	1463	2231	2949	3452	3747	3842	3868

(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