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: FREDONIA, KS **COOP ID: 142894**

Climate Division: KS 9 **NWS Call Sign:** **Elevation: 870 Feet** **Lat: 37˚31N** **Lon: 95˚49W**

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	41.7	17.8	29.8	75	1957	21	39.1	1990	-21	1949	30	16.9	1979	1093	0	.0	.0	10.3	7.0	27.2	1.7
Feb	48.7	23.7	36.2	88	1962	12	46.7	1976	-13	1979	1	23.5	1978	806	0	.0	.0	14.1	4.1	21.0	.8
Mar	58.7	32.7	45.7	93	1967	10	50.1	1986	-7	1943	7	39.6	1996	599	0	.0	.0	25.0	.5	12.8	@
Apr	68.3	43.0	55.7	98	1972	12	63.9	1981	16	1975	3	49.3	1983	293	12	.0	.3	29.0	.0	3.2	.0
May	77.0	53.2	65.1	99+	1956	22	69.7	1998	27	1944	6	60.5	1976	87	91	.0	.8	31.0	.0	.1	.0
Jun	86.1	62.0	74.1	107	1963	13	79.2	1994	43	1982	1	69.5	1992	6	278	.4	10.3	30.0	.0	.0	.0
Jul	91.8	66.8	79.3	117+	1954	14	85.7	1980	48+	1972	5	74.5	1989	0	442	3.3	21.0	31.0	.0	.0	.0
Aug	90.8	64.7	77.8	116	1956	6	84.7	1983	44	1988	29	70.7	1992	5	399	3.6	19.8	31.0	.0	.0	.0
Sep	82.7	56.5	69.6	111	1939	2	75.3	1998	25	1984	30	61.3	1974	47	185	.9	8.4	30.0	.0	.2	.0
Oct	71.5	44.0	57.8	100+	1963	7	61.3	2000	20+	2000	9	51.8	1976	239	14	.0	.7	30.5	.0	2.3	.0
Nov	56.6	32.5	44.6	85+	1980	6	51.9	1999	3	1975	27	38.1	1976	613	0	.0	.0	21.8	.4	14.0	.0
Dec	44.8	22.1	33.5	79	1966	7	39.0	1982	-15	1989	22	18.2	1983	979	0	.0	.0	11.9	4.2	24.4	.8
Ann	68.2	43.3	55.8	117+	Jul 1954	14	85.7	Jul 1980	-21	Jan 1949	30	16.9	Jan 1979	4767	1421	8.2	61.3	295.6	16.2	105.2	3.3

\+ 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: 1939-2001

(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	1.25	1.01	2.63	1971	3	3.99	1987	.00	1986
Feb	1.64	1.53	4.27	1997	21	5.21	1997	.00	1991
Mar	3.05	2.50	2.93	1984	19	9.22	1973	.28	1971
Apr	3.38	3.01	4.30	1994	28	12.40	1994	.28	1989
May	5.24	4.86	4.28	1961	6	10.79	1987	1.26	1992
Jun	5.25	5.32	5.30	1977	22	11.28	1977	.31	1980
Jul	4.08	2.86	7.19	1976	3	12.48	1992	.13	1974
Aug	3.82	3.26	4.26	1982	11	10.78	1985	.00	2000
Sep	4.09	3.56	5.49	1945	24	9.68	1986	.42	1979
Oct	3.75	3.34	8.47	1986	3	11.52	1986	.23	1995
Nov	3.21	3.07	4.12	1974	3	7.84	1998	.00	1989
Dec	1.93	1.69	2.00	1991	20	5.28	1984	.07	1977
Ann	40.69	40.32	8.47	Oct 1986	3	12.48	Jul 1992	.00+	Aug 2000

Mean Number of Days (3)

Month	Daily Precipitation >= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	4.8	3.1	.6	.2
Feb	4.8	3.5	.9	.3
Mar	6.7	5.3	2.3	.8
Apr	7.7	6.1	2.3	.9
May	8.8	7.5	3.5	1.7
Jun	8.1	6.6	3.3	1.6
Jul	6.1	4.9	2.8	1.5
Aug	6.5	4.6	2.3	1.1
Sep	6.6	5.3	2.7	1.2
Oct	6.7	5.2	2.3	1.1
Nov	5.9	4.7	2.1	1.0
Dec	4.8	3.0	1.5	.5
Ann	77.5	59.8	26.6	11.9

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	.06	.17	.36	.54	.74	.96	1.22	1.54	1.98	2.71	3.43
Feb	.13	.31	.58	.82	1.07	1.34	1.64	2.02	2.52	3.34	4.13
Mar	.57	.84	1.29	1.70	2.12	2.58	3.09	3.72	4.55	5.88	7.15
Apr	.68	.98	1.48	1.93	2.39	2.89	3.45	4.12	5.01	6.43	7.79
May	1.67	2.16	2.90	3.53	4.14	4.77	5.46	6.27	7.31	8.94	10.44
Jun	1.11	1.59	2.36	3.06	3.77	4.52	5.37	6.38	7.72	9.86	11.89
Jul	.49	.81	1.38	1.95	2.56	3.23	4.01	4.98	6.30	8.47	10.58
Aug	.36	.80	1.43	1.99	2.56	3.17	3.87	4.72	5.85	7.67	9.41
Sep	.73	1.09	1.69	2.25	2.82	3.44	4.14	4.99	6.12	7.94	9.68
Oct	.74	1.08	1.63	2.13	2.64	3.19	3.81	4.56	5.55	7.14	8.64
Nov	.25	.60	1.12	1.59	2.08	2.61	3.22	3.97	4.97	6.60	8.16
Dec	.15	.28	.53	.80	1.10	1.44	1.84	2.35	3.06	4.24	5.41
Ann	26.34	29.02	32.51	35.19	37.60	39.95	42.39	45.12	48.45	53.33	57.60

+ 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: 1939-2001
(3) Derived from 1971-2000 serially complete daily data

Complete documentation available from:
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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	3.5	3.0	1	#
Feb	3.6	4.0	#	#
Mar	.8	.0	#	0
Apr	.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
Nov	.7	.0	#	0
Dec	1.9	.0	#	0
Ann	10.5	7.0	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	1987	18	16.2	1987	8	1987	21	4	1979
Feb	9.0	1980	8	9.0+	1980	9	1980	13	2	1980
Mar	7.0	1975	10	8.0	1975	7	1975	10	1	1975
Apr	.5	1994	6	.5	1994	#	1990	6	#	1990
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	#	1996	23	#	1996	#	1996	23	#	1996
Nov	7.0	1971	23	7.0	1971	7	1971	23	1	1975
Dec	7.0	2000	13	10.7	2000	7	2000	15	3	2000
Ann	9.0	Feb 1980	8	16.2	Jan 1987	9	Feb 1980	13	4	Jan 1979

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	2.0	1.5	.5	.1	.0
Feb	1.5	1.2	.5	.2	.0
Mar	.4	.3	.2	@	.0
Apr	@	.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	.0	.0	.0	.0	.0
Nov	.2	.2	.1	.1	.0
Dec	1.1	.7	.2	.1	.0
Ann	5.2	3.9	1.5	.5	.0

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	4.8	3.0	1.5	.0
Feb	3.6	2.0	.9	.0
Mar	.3	.2	.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	.2	.2	.2	.0
Dec	2.3	1.4	.5	.0
Ann	11.2	6.8	3.2	.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	5/10	5/06	5/02	4/29	4/27	4/24	4/21	4/18	4/13
32	4/26	4/22	4/19	4/16	4/13	4/11	4/08	4/05	4/01
28	4/19	4/13	4/09	4/06	4/03	3/31	3/28	3/24	3/18
24	4/05	3/31	3/27	3/23	3/20	3/17	3/14	3/10	3/04
20	3/30	3/22	3/16	3/11	3/07	3/02	2/25	2/19	2/11
16	3/21	3/13	3/07	3/02	2/25	2/20	2/15	2/09	1/31

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	9/24	9/28	10/01	10/04	10/07	10/09	10/12	10/15	10/19
32	10/02	10/08	10/12	10/15	10/19	10/22	10/26	10/30	11/05
28	10/14	10/20	10/24	10/27	10/31	11/03	11/06	11/10	11/16
24	10/26	10/31	11/04	11/08	11/11	11/14	11/18	11/22	11/28
20	11/02	11/09	11/13	11/18	11/22	11/25	11/30	12/05	12/11
16	11/14	11/21	11/25	11/29	12/03	12/07	12/11	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	179	173	169	166	162	159	155	151	145
32	208	201	196	192	188	184	179	174	167
28	233	225	219	214	210	205	200	195	187
24	257	249	244	239	235	231	227	221	214
20	290	279	272	265	259	253	247	239	229
16	313	302	294	287	280	274	267	259	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	1093	806	599	293	87	6	0	5	47	239	613	979	4767
60	938	673	446	174	31	0	0	0	15	123	468	824	3692
57	846	594	361	118	14	0	0	0	6	73	386	733	3131
55	785	543	306	87	7	0	0	0	3	49	333	674	2787
50	640	420	187	33	1	0	0	0	0	14	218	530	2043
32	211	115	10	0	0	0	0	0	0	0	18	143	497

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	141	233	434	709	1027	1262	1465	1417	1127	798	395	187	9195
55	2	17	17	106	322	572	752	704	440	134	20	5	3091
57	1	13	10	77	266	512	690	642	383	96	13	2	2705
60	0	7	3	44	191	422	597	549	302	53	5	0	2173
65	0	0	0	12	91	278	442	399	185	14	0	0	1421
70	0	0	0	2	32	154	294	260	99	2	0	0	843

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	116	291	526	821	1060	1257	1215	926	608	235	68	43	159	450	976	1797	2857	4114	5329	6255	6863	7098	7166
45	13	58	184	386	666	910	1102	1060	777	456	142	32	13	71	255	641	1307	2217	3319	4379	5156	5612	5754	5786
50	2	25	101	253	512	760	947	905	628	314	81	8	2	27	128	381	893	1653	2600	3505	4133	4447	4528	4536
55	0	9	48	150	359	610	792	750	482	194	33	2	0	9	57	207	566	1176	1968	2718	3200	3394	3427	3429
60	0	1	18	74	220	460	637	595	342	101	10	0	0	1	19	93	313	773	1410	2005	2347	2448	2458	2458
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	40	94	198	336	527	716	836	804	605	387	153	53	40	134	332	668	1195	1911	2747	3551	4156	4543	4696	4749

(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