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: LEON 6 ESE, IA **COOP ID: 134758**

Climate Division: IA 8 **NWS Call Sign:** **Elevation: 1,000 Feet** **Lat: 40˚44N** **Lon: 93˚38W**

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	31.1	10.3	20.7	63	1990	17	31.4	1989	-28	1999	5	7.5	1979	1374	0	.0	.0	2.6	15.1	29.9	7.1
Feb	37.6	15.0	26.3	75	1995	26	37.5	1998	-36+	1996	3	13.7	1978	1084	0	.0	.0	6.2	10.3	25.2	3.9
Mar	49.9	26.0	38.0	87	1986	29	43.7	1973	-21	1998	12	30.3	1984	839	0	.0	.0	15.8	2.9	20.9	.5
Apr	61.9	36.0	49.0	92	1989	26	56.2	1981	7	1982	6	42.4	1983	484	3	.0	.1	25.7	.2	9.6	.0
May	72.5	47.4	60.0	94	1967	25	66.5	1977	26	1992	6	53.5	1997	207	50	.0	.3	30.9	.0	1.0	.0
Jun	81.7	57.0	69.4	107	1988	25	74.3	1971	35+	1985	13	63.9	1982	30	160	.3	4.2	30.0	.0	.0	.0
Jul	86.7	62.2	74.5	105+	1983	22	79.7	1980	44+	1971	30	70.4	1994	6	300	.9	11.0	31.0	.0	.0	.0
Aug	84.8	59.6	72.2	107+	1983	17	81.9	1983	35	1986	28	65.4	1992	30	254	1.2	8.2	31.0	.0	.0	.0
Sep	76.8	49.7	63.3	100+	1983	8	68.4	1998	22	1984	29	56.8	1993	126	73	.1	2.6	30.0	.0	1.0	.0
Oct	65.2	38.4	51.8	95	1963	5	58.1	1971	13	1988	30	46.3	1976	412	3	.0	.1	28.8	.0	7.7	.0
Nov	48.1	26.5	37.3	80+	1999	9	44.8	1999	-12+	1991	8	30.0	1991	831	0	.0	.0	14.5	2.9	20.2	.3
Dec	35.1	14.9	25.0	68+	1984	28	31.7	1994	-33+	1989	23	9.8	1983	1240	0	.0	.0	4.1	11.5	28.8	4.0
Ann	61.0	36.9	49.0	107+	Jun 1988	25	81.9	Aug 1983	-36+	Feb 1996	3	7.5	Jan 1979	6663	843	2.5	26.5	250.6	42.9	144.3	15.8

\+ 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: 1962-2001

(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	.97	.85	1.17	1980	16	2.51	1973	.00	1981
Feb	1.28	1.29	2.45	1997	21	4.92	1997	.18	1991
Mar	2.26	2.05	1.90	1982	19	6.88	1973	.09	1994
Apr	3.62	3.39	2.92	1976	17	9.92	1991	.74	1989
May	4.91	4.59	3.26	1962	29	11.31+	1996	1.34	1988
Jun	4.45	4.46	3.85	1976	14	7.46	1979	.85	1988
Jul	4.60	3.63	4.61	1993	5	20.74	1993	.31	1983
Aug	4.14	3.64	3.90	1980	31	11.38	1980	.59	1983
Sep	4.03	2.93	6.64	1992	15	15.79	1992	1.03	1979
Oct	3.02	3.33	3.60	1974	31	6.82	1998	.04	1975
Nov	2.46	2.37	2.01	1975	29	6.23	1992	.04	1989
Dec	1.38	1.42	1.51	1965	24	3.92	1982	.08	1976
Ann	37.12	36.66	6.64	Sep 1992	15	20.74	Jul 1993	.00	Jan 1981

Mean Number of Days (3)

Month	Daily Precipitation >= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	6.1	3.0	.5	.1
Feb	6.3	3.4	.6	.2
Mar	8.3	4.9	1.5	.5
Apr	10.3	7.1	2.5	.9
May	12.1	8.3	3.4	1.4
Jun	10.3	7.3	3.0	1.2
Jul	9.6	6.6	3.2	1.4
Aug	8.5	6.3	2.9	1.3
Sep	8.4	6.0	2.7	1.1
Oct	7.6	4.9	1.8	.8
Nov	7.7	5.2	1.7	.5
Dec	7.1	3.8	.6	.1
Ann	102.3	66.8	24.4	9.5

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	.10	.21	.37	.51	.66	.81	.99	1.20	1.48	1.94	2.38
Feb	.27	.39	.58	.75	.92	1.10	1.31	1.56	1.88	2.40	2.89
Mar	.29	.48	.80	1.11	1.45	1.81	2.24	2.76	3.48	4.64	5.77
Apr	.88	1.22	1.75	2.22	2.68	3.18	3.73	4.38	5.24	6.59	7.87
May	1.55	2.01	2.71	3.30	3.87	4.46	5.11	5.88	6.86	8.39	9.81
Jun	1.70	2.12	2.71	3.20	3.67	4.14	4.66	5.26	6.02	7.18	8.25
Jul	.71	1.10	1.77	2.41	3.06	3.78	4.61	5.62	6.97	9.16	11.27
Aug	.83	1.20	1.81	2.37	2.93	3.53	4.21	5.03	6.12	7.86	9.51
Sep	.84	1.21	1.80	2.34	2.88	3.46	4.12	4.90	5.94	7.60	9.17
Oct	.30	.52	.94	1.36	1.81	2.33	2.93	3.69	4.72	6.44	8.12
Nov	.28	.47	.81	1.15	1.52	1.93	2.41	3.00	3.81	5.14	6.44
Dec	.19	.30	.50	.69	.89	1.11	1.37	1.68	2.11	2.80	3.47
Ann	23.65	26.15	29.41	31.92	34.19	36.39	38.69	41.26	44.40	49.02	53.06

\+ 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: 1962-2001
(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	6.3	5.3	2	2
Feb	5.2	4.0	2	1
Mar	3.9	2.5	1	#
Apr	1.3	.0	#	0
May	.0	.0	#	0
Jun	.0	.0	0	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	.0	.0	0	0
Oct	.2	.0	#	0
Nov	2.5	1.0	#	#
Dec	6.0	4.5	2	1
Ann	25.4	17.3	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	5.5	1987	10	14.3	1985	14+	1996	29	7	1982
Feb	10.0	1978	13	13.4	1978	14	1978	22	9	1978
Mar	10.0	1998	9	18.0	1984	14	1978	2	7	1978
Apr	8.3	1997	11	12.0	1973	11	1997	12	1+	1997
May	.0	0	0	.0	0	#+	1998	20	#+	1998
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	3.2	1997	27	3.7	1997	3	1997	27	#+	1997
Nov	6.0	1974	30	10.6	1991	6	1991	23	1	1992
Dec	8.3	1995	7	17.5	1983	18	2000	31	11	2000
Ann	10.0+	Mar 1998	9	18.0	Mar 1984	18	Dec 2000	31	11	Dec 2000

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	4.1	2.4	.6	.2	.0
Feb	3.4	2.1	.6	.1	@
Mar	2.1	1.0	.4	.1	@
Apr	.6	.5	.2	.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
Nov	1.5	1.0	.3	.1	.0
Dec	3.9	2.3	.8	.2	.0
Ann	15.7	9.3	2.9	.8	@

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	15.1	9.0	3.7	.5
Feb	9.4	4.8	1.9	.0
Mar	2.6	1.5	.5	.2
Apr	.7	.4	.2	.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	.1	@	.0	.0
Nov	1.9	.6	.2	.0
Dec	10.5	6.1	2.9	.1
Ann	40.3	22.4	9.4	.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	5/31	5/24	5/19	5/15	5/11	5/07	5/03	4/28	4/21
32	5/15	5/09	5/05	5/02	4/28	4/25	4/22	4/18	4/12
28	5/02	4/27	4/23	4/20	4/17	4/14	4/11	4/07	4/02
24	4/19	4/15	4/12	4/09	4/07	4/04	4/02	3/30	3/25
20	4/19	4/13	4/08	4/04	4/01	3/28	3/24	3/20	3/13
16	4/09	4/03	3/30	3/26	3/22	3/18	3/14	3/10	3/03

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	9/11	9/16	9/19	9/22	9/25	9/28	10/01	10/05	10/10
32	9/16	9/22	9/26	9/30	10/03	10/06	10/10	10/14	10/19
28	9/25	10/02	10/07	10/11	10/15	10/19	10/23	10/28	11/04
24	10/07	10/13	10/17	10/21	10/24	10/28	10/31	11/05	11/10
20	10/19	10/24	10/28	10/31	11/03	11/06	11/10	11/13	11/19
16	11/06	11/10	11/13	11/16	11/19	11/21	11/24	11/27	12/02

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	166	156	148	142	136	131	125	117	107
32	182	174	167	162	157	152	146	140	131
28	208	199	192	186	180	175	169	162	152
24	222	214	209	204	200	196	191	186	179
20	241	232	226	221	216	211	206	200	191
16	268	259	252	246	241	236	230	224	214

***** 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	1374	1084	839	484	207	30	6	30	126	412	831	1240	6663
60	1219	944	684	344	115	6	0	9	54	271	681	1085	5412
57	1126	860	593	267	74	2	0	3	28	198	592	992	4735
55	1064	809	537	221	53	1	0	1	16	155	533	930	4320
50	911	678	395	125	19	0	0	0	3	73	395	782	3381
32	417	279	70	2	0	0	0	0	0	0	69	316	1153

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	66	119	254	511	867	1120	1316	1247	938	614	228	98	7378
55	0	5	7	40	207	431	603	535	264	55	2	0	2149
57	0	0	1	27	166	372	541	475	215	36	1	0	1834
60	0	0	0	13	114	287	448	388	152	17	0	0	1419
65	0	0	0	3	50	160	300	254	73	3	0	0	843
70	0	0	0	0	17	69	167	148	27	0	0	0	428

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	5	32	134	351	658	923	1103	1038	742	417	111	13	5	37	171	522	1180	2103	3206	4244	4986	5403	5514	5527
45	0	10	77	229	504	773	948	883	596	284	57	5	0	10	87	316	820	1593	2541	3424	4020	4304	4361	4366
50	0	1	40	140	359	623	793	728	451	169	25	1	0	1	41	181	540	1163	1956	2684	3135	3304	3329	3330
55	0	0	16	71	229	474	638	573	314	89	4	0	0	0	16	87	316	790	1428	2001	2315	2404	2408	2408
60	0	0	3	35	123	326	483	419	197	34	0	0	0	0	3	38	161	487	970	1389	1586	1620	1620	1620
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	1	25	99	234	415	609	740	689	483	266	73	9	1	26	125	359	774	1383	2123	2812	3295	3561	3634	3643

(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:
www.ncdc.noaa.gov/oa/climate/normals/usnormals.html

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