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: SPENCER 1 N, IA **COOP ID: 137844**

Climate Division: IA 1 **NWS Call Sign: 3SE** **Elevation: 1,326 Feet** **Lat: 43˚10N** **Lon: 95˚09W**

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	24.0	5.2	14.6	66+	1944	25	26.8	1990	-38	1912	12	1.5	1979	1562	0	.0	.0	.5	22.3	30.8	11.6
Feb	30.5	12.5	21.5	67	1896	26	32.3	1987	-36	1899	9	8.1	1979	1218	0	.0	.0	2.2	15.6	27.3	6.5
Mar	42.6	24.1	33.4	87	1928	23	40.4	2000	-28	1948	11	23.3	1975	982	0	.0	.0	9.2	6.8	25.4	1.5
Apr	57.8	35.2	46.5	92	1980	21	54.5	1977	0	1975	3	40.3	1975	560	3	.0	.1	22.0	.6	12.2	@
May	71.1	47.5	59.3	109	1934	30	67.3	1977	20	1967	3	52.7	1997	232	55	.0	1.0	30.5	.0	1.5	.0
Jun	80.4	57.5	69.0	106	1933	10	74.0	1988	30	1896	11	63.3	1982	33	152	.2	4.5	30.0	.0	.0	.0
Jul	83.8	61.8	72.8	113	1936	17	77.7	1974	40	1971	30	65.6	1992	13	253	.2	7.0	31.0	.0	.0	.0
Aug	81.5	59.2	70.4	111	1930	3	77.0	1983	34	1950	20	65.4	1992	27	192	.1	4.5	31.0	.0	.0	.0
Sep	73.6	49.3	61.5	102+	1925	2	67.6	1978	21	1942	28	56.6	1993	154	47	.0	1.3	29.5	.0	1.1	.0
Oct	60.7	37.0	48.9	93+	1963	5	54.6	1973	-8+	1925	29	43.1	1976	501	1	.0	.1	25.8	.1	10.6	.0
Nov	41.4	23.3	32.4	79	1999	8	41.4	1999	-17	1959	14	22.4	1985	979	0	.0	.0	8.5	7.6	25.1	1.0
Dec	27.7	10.3	19.0	66	1998	1	28.1	1979	-30	1914	26	3.4	1983	1426	0	.0	.0	1.1	19.1	30.7	7.9
Ann	56.3	35.2	45.8	113	Jul 1936	17	77.7	Jul 1974	-38	Jan 1912	12	1.5	Jan 1979	7687	703	.5	18.5	221.3	72.1	164.7	28.5

\+ 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: 1895-2001

(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	.58	.49	1.00	1922	12	1.61	1975	.12+	1987
Feb	.49	.44	1.35	1951	28	2.35	1971	.03+	1986
Mar	1.87	1.48	2.19	1985	3	4.60	1977	.09	1994
Apr	3.08	2.98	2.51	1993	19	6.89	1991	.77	1980
May	3.68	3.68	3.76	1959	20	6.89	1993	1.26	1989
Jun	4.04	2.94	4.15	1934	8	9.34	1993	1.40	1992
Jul	4.02	3.36	4.68	1987	8	10.11	1987	.22	1975
Aug	4.22	4.05	4.10	1939	10	12.13	1975	.56+	1999
Sep	2.70	2.70	5.01	1964	7	7.06	1985	.45	1984
Oct	1.96	1.75	2.41	1970	6	4.60	1992	.17	1989
Nov	1.42	1.18	2.85	1896	26	3.39	1973	.03	1980
Dec	.60	.57	1.50	1926	7	1.82	1982	.08	1998
Ann	28.66	28.80	5.01	Sep 1964	7	12.13	Aug 1975	.03+	Feb 1986

Mean Number of Days (3)

Month	Daily Precipitation >= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	6.4	2.0	.1	.0
Feb	5.5	1.4	.1	.0
Mar	8.2	4.0	1.1	.3
Apr	10.7	6.0	1.9	.8
May	11.7	7.5	2.4	.8
Jun	11.6	7.2	3.1	1.1
Jul	9.9	6.4	2.3	1.1
Aug	9.3	6.3	2.6	1.5
Sep	8.8	5.5	1.7	.8
Oct	8.3	4.2	1.2	.4
Nov	7.5	3.2	.8	.3
Dec	6.1	1.8	.2	.0
Ann	104.0	55.5	17.5	7.1

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	.13	.21	.29	.38	.47	.57	.70	.88	1.16	1.43
Feb	.05	.08	.15	.22	.29	.38	.47	.60	.77	1.05	1.32
Mar	.29	.45	.72	.98	1.25	1.54	1.88	2.29	2.84	3.74	4.60
Apr	.68	.97	1.42	1.83	2.24	2.67	3.16	3.74	4.51	5.74	6.89
May	1.53	1.86	2.34	2.73	3.09	3.46	3.86	4.32	4.90	5.79	6.59
Jun	1.23	1.62	2.19	2.68	3.16	3.65	4.20	4.84	5.66	6.95	8.15
Jul	.80	1.16	1.75	2.29	2.84	3.42	4.09	4.89	5.95	7.64	9.26
Aug	.93	1.32	1.94	2.49	3.06	3.65	4.32	5.13	6.19	7.87	9.47
Sep	.62	.87	1.27	1.62	1.97	2.35	2.77	3.27	3.93	4.97	5.96
Oct	.31	.48	.77	1.04	1.32	1.62	1.97	2.40	2.97	3.89	4.78
Nov	.12	.21	.40	.60	.82	1.06	1.36	1.73	2.24	3.10	3.95
Dec	.09	.15	.23	.32	.40	.50	.60	.73	.91	1.20	1.47
Ann	18.28	20.20	22.72	24.66	26.40	28.10	29.88	31.86	34.28	37.84	40.95

\+ 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: 1895-2001
(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	6.9	6.4	3	0
Feb	3.9	3.6	3	0
Mar	5.0	4.3	1	0
Apr	1.2	.1	#	0
May	#	.0	#	0
Jun	.0	.0	#	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	#	.0	0	0
Oct	.5	.0	#	0
Nov	4.7	2.5	1	0
Dec	7.4	6.6	2	0
Ann	29.6	23.5	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	6.2	1990	20	15.9	1997	14	1997	27	7+	1999
Feb	6.4	1991	18	9.5	1997	24+	1982	6	15	1982
Mar	14.0	1977	3	14.0	1977	14+	1977	5	3+	1993
Apr	6.0	2000	7	8.0	1984	5	2000	7	#	2000
May	#	1996	2	#+	1996	#	2000	13	#	2000
Jun	.0	0	0	.0	0	#	1999	5	#	1999
Jul	.0	0	0	.0	0	0	0	0	0	0
Aug	.0	0	0	.0	0	0	0	0	0	0
Sep	#	1995	21	#+	1995	#	1995	21	0	0
Oct	5.0	1991	31	6.7	1991	1+	1999	1	#	1999
Nov	7.0	1997	14	12.4	1985	8+	1997	15	2+	2000
Dec	6.0	1993	13	22.7	2000	19	2000	31	9	2000
Ann	14.0	Mar 1977	3	22.7	Dec 2000	24+	Feb 1982	6	15	Feb 1982

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	5.2	2.2	.7	.2	.0
Feb	3.2	1.1	.4	.1	.0
Mar	3.1	1.2	.8	.2	.1
Apr	1.1	.3	.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	.3	.2	.1	.1	.0
Nov	3.7	1.6	.4	.1	.0
Dec	4.9	2.4	.8	.2	.0
Ann	21.5	9.0	3.4	1.0	.1

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	20.0	14.1	9.4	1.2
Feb	16.6	8.3	5.0	1.8
Mar	5.9	2.6	1.4	.3
Apr	.4	.1	@	.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	.0	.0	.0
Nov	6.5	2.9	1.3	.0
Dec	17.5	10.7	6.3	1.4
Ann	67.0	38.7	23.4	4.7

+ 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	5/24	5/20	5/16	5/13	5/11	5/08	5/05	5/02	4/27
32	5/14	5/10	5/07	5/05	5/02	4/30	4/27	4/24	4/20
28	5/07	5/02	4/28	4/25	4/22	4/20	4/17	4/13	4/08
24	4/20	4/16	4/13	4/11	4/08	4/06	4/03	3/31	3/27
20	4/14	4/09	4/06	4/04	4/01	3/30	3/27	3/24	3/20
16	4/08	4/03	3/30	3/27	3/24	3/20	3/17	3/13	3/08

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	9/10	9/13	9/16	9/18	9/20	9/22	9/24	9/27	9/30
32	9/17	9/21	9/24	9/26	9/29	10/01	10/03	10/06	10/10
28	9/22	9/28	10/01	10/05	10/08	10/11	10/15	10/19	10/24
24	10/02	10/07	10/11	10/15	10/18	10/22	10/25	10/29	11/04
20	10/11	10/17	10/21	10/25	10/28	10/31	11/04	11/08	11/14
16	10/21	10/27	10/31	11/04	11/07	11/10	11/14	11/18	11/24

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	148	142	138	135	131	128	125	121	115
32	165	160	155	152	149	145	142	138	132
28	185	179	175	171	168	164	161	157	151
24	210	204	200	196	192	189	185	180	174
20	231	223	218	213	209	204	200	194	187
16	252	244	238	233	228	223	218	212	203

***** 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	1562	1218	982	560	232	33	13	27	154	501	979	1426	7687
60	1407	1078	827	419	139	7	0	5	71	353	829	1271	6406
57	1314	994	734	340	96	3	0	1	39	272	739	1178	5710
55	1252	938	673	291	73	1	0	0	24	223	680	1116	5271
50	1097	804	529	186	31	0	0	0	5	121	538	961	4272
32	580	368	134	9	0	0	0	0	0	3	147	461	1702

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	41	75	175	443	845	1109	1264	1188	883	525	158	59	6765
55	0	0	1	35	205	420	551	475	216	32	1	0	1936
57	0	0	0	24	166	361	489	414	171	19	0	0	1644
60	0	0	0	12	116	276	396	325	114	7	0	0	1246
65	0	0	0	3	55	152	253	192	47	1	0	0	703
70	0	0	0	0	20	65	135	93	13	0	0	0	326

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	0	5	59	245	607	877	1024	951	658	305	49	2	0	5	64	309	916	1793	2817	3768	4426	4731	4780	4782
45	0	0	23	147	454	727	869	796	510	190	18	0	0	0	23	170	624	1351	2220	3016	3526	3716	3734	3734
50	0	0	8	78	314	577	714	641	366	102	3	0	0	0	8	86	400	977	1691	2332	2698	2800	2803	2803
55	0	0	2	40	194	430	559	486	242	45	0	0	0	0	2	42	236	666	1225	1711	1953	1998	1998	1998
60	0	0	0	19	104	287	404	333	140	19	0	0	0	0	0	19	123	410	814	1147	1287	1306	1306	1306
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	3	44	163	372	568	685	625	415	195	35	1	0	3	47	210	582	1150	1835	2460	2875	3070	3105	3106

(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