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: SANBORN, IA **COOP ID: 137386**

Climate Division: IA 1 **NWS Call Sign:** **Elevation: 1,551 Feet** **Lat: 43˚11N** **Lon: 95˚40W**

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	22.1	3.1	12.6	64	1981	24	24.8	1990	-33	1972	15	-1.9	1979	1625	0	.0	.0	.4	22.7	30.9	12.3
Feb	28.2	10.3	19.3	64+	1954	14	31.4	1987	-28+	1994	9	5.3	1979	1281	0	.0	.0	2.0	15.7	27.4	6.6
Mar	40.2	21.6	30.9	84	1968	30	39.0	2000	-20	1962	1	21.9	1975	1057	0	.0	.0	8.8	7.2	25.9	2.0
Apr	55.9	33.9	44.9	92	1980	21	52.2	1987	3	1975	3	38.7	1975	604	2	.0	.1	21.9	.8	13.4	.0
May	69.5	47.2	58.4	102	1967	25	65.4	1977	16	1967	3	51.2	1997	251	45	.0	.8	30.3	.0	1.4	.0
Jun	78.7	57.1	67.9	102	1988	22	73.6	1988	37	1969	3	63.3	1999	46	133	.1	3.2	30.0	.0	.0	.0
Jul	82.1	61.7	71.9	101	1995	13	76.0	1974	38	1971	30	64.8	1992	13	227	@	5.4	31.0	.0	.0	.0
Aug	79.7	59.4	69.6	99+	1955	1	77.2	1983	38	1950	20	64.8	1992	34	174	.0	2.9	31.0	.0	.0	.0
Sep	72.2	49.4	60.8	101	1976	6	67.5	1998	25+	1974	30	54.3	1993	172	46	@	.9	29.6	.0	1.2	.0
Oct	59.6	36.6	48.1	92	1963	5	53.3	1973	9	1967	28	43.2	1976	525	0	.0	@	25.9	.2	9.8	.0
Nov	40.2	22.5	31.4	77	1999	9	42.7	1999	-16	1959	14	22.3	1985	1009	0	.0	.0	8.5	8.2	25.0	1.0
Dec	26.4	8.8	17.6	62	1998	2	25.5	1979	-29+	1989	22	.8	1983	1469	0	.0	.0	1.0	19.8	30.8	7.9
Ann	54.6	34.3	44.5	102+	Jun 1988	22	77.2	Aug 1983	-33	Jan 1972	15	-1.9	Jan 1979	8086	627	.1	13.3	220.4	74.6	165.8	29.8

\+ 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: 1948-2001

(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	.66	.58	.82	2001	30	1.92	1975	.06	1971
Feb	.64	.49	1.30	1951	28	1.80	1971	.02	1986
Mar	1.79	1.56	2.30	1965	17	4.26	1987	.03	1994
Apr	2.80	2.58	2.30	1991	13	6.23	1986	.40	1981
May	3.54	3.20	3.05	1993	30	6.99	1993	1.45	1988
Jun	4.32	3.22	3.75	1954	18	9.54	1983	1.79	1972
Jul	3.62	3.17	3.00	1950	9	7.93	1987	.41	1975
Aug	3.96	3.48	4.10	1995	6	10.34	1974	.61	1999
Sep	2.67	2.69	4.83	1964	7	7.77	1985	.81	1984
Oct	1.94	1.60	3.02	1979	30	5.48	1984	.03	1989
Nov	1.65	1.49	2.01	1977	9	4.93	1991	.08+	1980
Dec	.75	.61	1.18	1982	28	2.65	1982	.04	1979
Ann	28.34	28.88	4.83	Sep 1964	7	10.34	Aug 1974	.02	Feb 1986

Mean Number of Days (3)

Month	Daily Precipitation >= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	6.2	2.1	.3	.0
Feb	4.9	1.9	.2	@
Mar	7.9	4.1	1.1	.3
Apr	10.4	5.9	1.7	.6
May	11.9	7.5	2.1	.8
Jun	11.3	7.2	2.7	1.1
Jul	9.4	5.9	2.4	1.2
Aug	8.8	5.7	2.5	1.2
Sep	9.0	5.3	1.7	.7
Oct	7.3	4.1	1.2	.5
Nov	6.9	3.5	1.1	.3
Dec	5.7	2.0	.2	.1
Ann	99.7	55.2	17.2	6.8

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	.05	.10	.18	.27	.37	.49	.63	.80	1.04	1.44	1.83
Feb	.07	.12	.21	.30	.40	.50	.63	.78	.99	1.33	1.66
Mar	.21	.34	.59	.84	1.11	1.41	1.76	2.19	2.77	3.74	4.68
Apr	.62	.88	1.29	1.66	2.04	2.43	2.87	3.40	4.10	5.21	6.26
May	1.58	1.90	2.33	2.69	3.02	3.36	3.71	4.13	4.64	5.43	6.14
Jun	1.42	1.83	2.43	2.94	3.44	3.95	4.51	5.16	6.00	7.31	8.51
Jul	.79	1.12	1.65	2.13	2.61	3.13	3.71	4.40	5.31	6.76	8.14
Aug	.89	1.26	1.84	2.36	2.89	3.44	4.06	4.81	5.79	7.35	8.82
Sep	.77	1.02	1.41	1.74	2.06	2.40	2.77	3.21	3.78	4.68	5.51
Oct	.20	.34	.61	.88	1.17	1.50	1.89	2.37	3.04	4.14	5.21
Nov	.17	.30	.53	.76	1.00	1.28	1.61	2.01	2.57	3.48	4.38
Dec	.10	.16	.27	.37	.48	.60	.74	.91	1.15	1.53	1.90
Ann	19.65	21.32	23.47	25.10	26.56	27.97	29.43	31.05	33.01	35.87	38.35

\+ 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	7.8	5.0	7	6
Feb	4.6	4.5	6	3
Mar	7.2	5.6	2	1
Apr	2.4	1.0	#	#
May	#	.0	0	0
Jun	.0	.0	0	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	#	.0	0	0
Oct	.5	.0	#	0
Nov	5.7	5.8	1	1
Dec	7.9	7.0	3	2
Ann	36.1	28.9	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	1975	11	32.0	1975	33	1994	31	25	1994
Feb	7.0	1997	4	8.5	1978	36	1994	14	32	1994
Mar	12.0	1977	2	27.0	1983	30	1994	1	11	1993
Apr	4.0	1980	3	10.0	1983	5	1997	12	1	1997
May	#	1976	2	#	1976	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	#	1985	28	#	1985	0	0	0	0	0
Oct	3.0	1976	18	3.0+	1990	3	1990	18	#+	1999
Nov	9.0	1991	1	15.0	1983	11+	1993	30	5	1991
Dec	15.0	1982	28	21.0	1982	16+	2000	31	12+	2000
Ann	15.0	Dec 1982	28	32.0	Jan 1975	36	Feb 1994	14	32	Feb 1994

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	5.4	3.1	.9	.4	@
Feb	3.5	2.5	.7	.2	.0
Mar	3.1	2.1	.9	.3	.1
Apr	1.5	1.1	.3	.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	.3	.2	.1	.0	.0
Nov	3.3	2.2	.7	.2	.0
Dec	4.6	2.7	1.1	.2	@
Ann	21.7	13.9	4.7	1.3	.1

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	21.8	14.2	9.8	4.3
Feb	16.2	10.5	6.7	.7
Mar	6.4	3.5	1.4	.4
Apr	.8	.2	@	.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	.2	.1	.0	.0
Nov	6.7	4.1	2.2	.3
Dec	17.7	11.1	7.2	2.4
Ann	69.8	43.7	27.3	8.1

+ 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	5/22	5/18	5/15	5/12	5/10	5/07	5/05	5/01	4/27
32	5/13	5/08	5/05	5/02	4/30	4/27	4/24	4/21	4/17
28	5/06	5/02	4/28	4/26	4/23	4/20	4/17	4/14	4/10
24	4/24	4/19	4/16	4/13	4/10	4/07	4/04	4/01	3/27
20	4/14	4/10	4/06	4/04	4/01	3/29	3/26	3/23	3/19
16	4/11	4/06	4/03	3/31	3/28	3/25	3/22	3/19	3/14

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	9/13	9/17	9/19	9/22	9/24	9/26	9/29	10/02	10/06
32	9/18	9/22	9/25	9/28	9/30	10/03	10/06	10/09	10/13
28	9/25	9/30	10/04	10/07	10/10	10/13	10/16	10/19	10/25
24	10/09	10/14	10/18	10/21	10/24	10/27	10/30	11/03	11/08
20	10/17	10/21	10/25	10/28	10/31	11/03	11/06	11/09	11/14
16	10/26	10/31	11/03	11/06	11/09	11/12	11/15	11/19	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	157	150	145	141	137	133	129	124	117
32	170	164	160	156	153	150	146	142	136
28	187	181	176	173	169	165	162	157	151
24	217	210	205	200	196	192	188	182	175
20	233	226	221	216	212	208	204	199	191
16	247	240	234	230	226	222	217	212	205

***** 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)

Base	Heating Degree Days (1)												
Below	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
65	1625	1281	1057	604	251	46	13	34	172	525	1009	1469	8086
60	1470	1141	902	461	153	12	0	8	84	374	859	1314	6778
57	1377	1057	809	380	106	4	0	2	48	289	769	1221	6062
55	1315	1001	747	330	81	2	0	1	31	238	710	1159	5615
50	1160	861	599	217	36	0	0	0	7	130	568	1004	4582
32	639	417	173	15	0	0	0	0	0	3	168	494	1909

Base	Cooling Degree Days (1)												
Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	37	61	139	402	817	1077	1237	1163	864	501	149	47	6494
55	0	0	0	27	185	390	524	451	205	23	0	0	1805
57	0	0	0	18	148	332	462	390	162	12	0	0	1524
60	0	0	0	9	102	250	369	303	108	4	0	0	1145
65	0	0	0	2	45	133	227	174	46	0	0	0	627
70	0	0	0	0	16	54	114	82	14	0	0	0	280

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	4	58	245	606	865	1011	942	652	312	50	1	0	4	62	307	913	1778	2789	3731	4383	4695	4745	4746
45	0	0	25	145	453	715	856	787	505	195	21	0	0	0	25	170	623	1338	2194	2981	3486	3681	3702	3702
50	0	0	7	81	314	566	701	632	364	104	5	0	0	0	7	88	402	968	1669	2301	2665	2769	2774	2774
55	0	0	2	41	194	417	546	477	237	48	0	0	0	0	2	43	237	654	1200	1677	1914	1962	1962	1962
60	0	0	0	16	100	276	393	323	137	16	0	0	0	0	0	16	116	392	785	1108	1245	1261	1261	1261
Base	Growing Degree Units for Corn (Monthly)												Growing Degree Units for Corn (Accumulated Monthly)											
50/86	0	2	43	163	369	560	683	621	409	194	30	0	0	2	45	208	577	1137	1820	2441	2850	3044	3074	3074

(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