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: AUDUBON 1 SSE, IA **COOP ID: 130385**

Climate Division: IA 4 **NWS Call Sign:** **Elevation: 1,290 Feet** **Lat: 41˚42N** **Lon: 94˚55W**

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	27.4	7.2	17.3	67	1981	24	29.2	1990	-28	1957	14	4.1	1979	1479	0	.0	.0	1.6	17.2	30.4	8.5
Feb	33.4	12.6	23.0	69+	1972	28	32.4	1987	-29	1958	17	9.8	1979	1177	0	.0	.0	4.6	12.0	26.4	4.4
Mar	46.2	23.4	34.8	90	1986	29	41.6	2000	-23+	1960	5	25.4	1975	937	0	.0	@	14.4	3.8	22.3	.9
Apr	59.8	34.8	47.3	93+	1980	22	54.5	1981	5	1975	3	40.8	1983	532	2	.0	.3	24.9	.2	9.2	.0
May	71.1	47.6	59.4	99+	1967	24	65.7	1977	23	1961	2	54.7	1997	211	36	.0	.4	30.9	.0	.8	.0
Jun	80.5	57.1	68.8	101+	1985	8	73.6	1988	39	1951	4	64.2	1982	29	143	.2	4.8	30.0	.0	.0	.0
Jul	84.0	61.6	72.8	107	1955	31	78.1	1974	41	1967	4	67.6	1992	7	249	.3	8.9	31.0	.0	.0	.0
Aug	81.7	58.9	70.3	103	1955	27	77.5	1983	39+	1950	20	64.8	1992	31	195	.2	6.1	31.0	.0	.0	.0
Sep	74.6	48.3	61.5	101	2000	3	67.5	1998	26	1956	30	56.9	1993	152	45	@	1.9	29.9	.0	.8	.0
Oct	62.4	35.9	49.2	93	1997	4	53.8	2000	10	1960	20	43.8	1976	494	1	.0	.1	28.0	.1	7.4	.0
Nov	44.5	23.3	33.9	78+	1953	2	42.6	1999	-12	1991	7	25.8	1985	933	0	.0	.0	12.2	4.1	21.5	.4
Dec	30.9	11.9	21.4	66	1976	18	28.1	1998	-29	1989	23	4.6	1983	1352	0	.0	.0	2.4	13.5	29.5	4.9
Ann	58.0	35.2	46.6	107	Jul 1955	31	78.1	Jul 1974	-29+	Dec 1989	23	4.1	Jan 1979	7334	671	.7	22.5	240.9	50.9	148.3	19.1

\+ 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	.92	.81	1.39	1971	3	2.55	1975	.00	1987
Feb	.95	.72	1.70	2001	25	3.56	1971	.06	1988
Mar	2.26	2.10	2.28	1952	31	5.54	1990	.15	1994
Apr	3.41	2.71	3.39	1964	2	9.92	1984	.73	1990
May	4.13	3.93	2.60	1989	28	8.14	1982	1.15	1992
Jun	4.42	4.15	3.87	1957	16	10.50	1998	.88	1992
Jul	4.38	4.49	12.53	1958	2	9.38	1993	.32	1974
Aug	3.75	3.28	3.50+	1986	13	9.85	1987	.28	1976
Sep	3.50	2.91	5.57	1972	11	10.83	1972	.34	1980
Oct	2.71	2.66	3.44	1986	11	7.62	1984	.10	1988
Nov	1.91	1.66	2.11	1982	11	4.91	1983	.03	1976
Dec	1.07	.92	1.27	1982	28	4.55	1982	.13	1979
Ann	33.41	34.06	12.53	Jul 1958	2	10.83	Sep 1972	.00	Jan 1987

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	5.4	2.7	.4	.1
Feb	5.2	3.0	.3	.1
Mar	7.8	4.9	1.6	.5
Apr	9.6	6.5	2.3	.8
May	10.9	8.1	2.8	1.1
Jun	9.7	6.7	3.2	1.3
Jul	9.1	6.4	2.8	1.3
Aug	8.8	6.2	2.5	1.0
Sep	7.7	5.4	2.0	.8
Oct	7.0	4.9	2.0	.7
Nov	7.0	4.0	1.2	.3
Dec	6.9	3.4	.4	.1
Ann	95.1	62.2	21.5	8.1

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	.05	.14	.28	.42	.56	.72	.91	1.14	1.45	1.97	2.47
Feb	.11	.18	.31	.44	.59	.74	.93	1.16	1.48	2.00	2.51
Mar	.24	.41	.72	1.04	1.38	1.76	2.20	2.76	3.51	4.76	5.98
Apr	.64	.94	1.45	1.91	2.38	2.89	3.46	4.16	5.08	6.57	7.98
May	1.58	1.96	2.51	2.97	3.40	3.84	4.32	4.88	5.58	6.67	7.66
Jun	.97	1.38	2.03	2.61	3.20	3.82	4.52	5.36	6.47	8.23	9.89
Jul	.80	1.19	1.83	2.43	3.04	3.69	4.44	5.34	6.53	8.46	10.30
Aug	.90	1.25	1.79	2.28	2.77	3.28	3.85	4.54	5.44	6.86	8.19
Sep	.48	.77	1.27	1.76	2.27	2.83	3.48	4.28	5.35	7.11	8.81
Oct	.41	.64	1.03	1.40	1.79	2.22	2.71	3.30	4.11	5.42	6.68
Nov	.18	.32	.58	.84	1.13	1.46	1.84	2.33	2.99	4.09	5.16
Dec	.17	.26	.41	.56	.71	.88	1.07	1.30	1.61	2.12	2.61
Ann	21.27	23.52	26.45	28.72	30.75	32.74	34.81	37.12	39.95	44.11	47.74

\+ 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)

Extremes (2)

Mean Number of Days (1)

Snow Fall >= Thresholds

Snow Depth >= Thresholds

Month	Snow Fall Mean	Snow Fall Median	Snow Depth Mean	Snow Depth Median	Highest Daily Snow Fall	Year	Day	Highest Monthly Snow Fall	Year	Highest Daily Snow Depth	Year	Day	Highest Monthly Mean Snow Depth	Year	0.1	1.0	3.0	5.0	10.0	1	3	5	10
Jan	7.6	5.3	2	1	13.5	1971	3	23.0	1975	17	1971	4	8	1971	2.8	2.2	.8	.4	@	-9.9	-9.9	-9.9	-9.9
Feb	6.3	6.0	2	#	9.0	1971	22	14.5	1971	15	1993	26	10	1993	2.3	1.8	.8	.3	.0	-9.9	-9.9	-9.9	-9.9
Mar	4.8	4.0	#	0	8.0	1983	26	18.0	1984	14	1999	9	4	1998	1.8	1.5	.6	.3	.0	-9.9	-9.9	-9.9	-9.9
Apr	1.9	.0	#	0	10.0	1997	12	14.0	1997	7	1973	9	#+	1996	.7	.6	.3	.1	@	.1	.0	.0	.0
May	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Jun	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Jul	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Aug	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Sep	.0	.0	0	0	.5	1985	29	.5	1985	0	0	0	0	0	@	.0	.0	.0	.0	.0	.0	.0	.0
Oct	.5	.0	#	0	4.0	1997	27	5.0	1997	#+	1995	30	#+	1995	.2	.2	.1	.0	.0	.0	.0	.0	.0
Nov	3.3	3.0	#	0	9.8	1972	13	11.5	1983	7	1991	23	1	1991	1.6	1.3	.3	.1	.0	-9.9	-9.9	-9.9	-9.9
Dec	7.2	6.4	1	#	9.0	1994	7	15.5	1983	14	2000	31	8	2000	3.3	2.5	.7	.2	.0	-9.9	-9.9	-9.9	-9.9
Ann	31.6	24.7	N/A	N/A	13.5	Jan 1971	3	23.0	Jan 1975	17	Jan 1971	4	10	Feb 1993	12.7	10.1	3.6	1.4	@	-9.9	-9.9	-9.9	-9.9

+ 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	5/23	5/18	5/14	5/11	5/08	5/06	5/03	4/29	4/24
32	5/12	5/07	5/04	5/01	4/28	4/26	4/23	4/19	4/15
28	5/04	4/29	4/25	4/22	4/19	4/16	4/12	4/08	4/03
24	4/19	4/15	4/11	4/09	4/06	4/04	4/01	3/29	3/24
20	4/14	4/09	4/06	4/03	3/31	3/28	3/25	3/22	3/17
16	4/09	4/03	3/30	3/26	3/23	3/20	3/16	3/12	3/06

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	9/16	9/19	9/21	9/23	9/26	9/28	10/01	10/04
32	9/19	9/24	9/27	9/30	10/03	10/05	10/08	10/12	10/16
28	9/27	10/03	10/08	10/11	10/15	10/19	10/23	10/27	11/03
24	10/09	10/15	10/19	10/23	10/26	10/29	11/02	11/06	11/12
20	10/17	10/23	10/26	10/30	11/02	11/05	11/09	11/12	11/18
16	10/24	10/30	11/03	11/07	11/11	11/14	11/18	11/23	11/29

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	175	169	164	160	157	153	149	145	138
28	204	195	189	184	179	174	169	162	154
24	223	216	211	206	202	198	194	189	181
20	239	231	225	220	215	211	206	200	192
16	258	249	243	237	232	227	221	215	206

***** 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	1479	1177	937	532	211	29	7	31	152	494	933	1352	7334
60	1324	1037	782	391	114	5	0	7	68	345	783	1197	6053
57	1231	953	690	312	72	1	0	2	36	264	693	1104	5358
55	1169	897	629	263	51	0	0	0	21	215	633	1042	4920
50	1014	764	485	160	17	0	0	0	4	114	492	887	3937
32	508	335	110	6	0	0	0	0	0	2	115	394	1470

Base	Cooling Degree Days (1)												
Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	52	82	195	465	848	1104	1265	1187	883	532	172	65	6850
55	0	0	2	33	186	414	552	475	214	32	1	0	1909
57	0	0	0	21	145	355	490	414	169	19	0	0	1613
60	0	0	0	10	94	269	397	327	110	7	0	0	1214
65	0	0	0	2	36	143	249	195	45	1	0	0	671
70	0	0	0	0	9	56	125	98	12	0	0	0	300

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	18	110	331	665	931	1082	1013	731	399	87	6	0	18	128	459	1124	2055	3137	4150	4881	5280	5367	5373
45	0	1	56	218	512	781	927	858	582	266	40	2	0	1	57	275	787	1568	2495	3353	3935	4201	4241	4243
50	0	0	25	125	364	631	772	703	438	159	16	0	0	0	25	150	514	1145	1917	2620	3058	3217	3233	3233
55	0	0	6	62	232	481	617	548	303	78	3	0	0	0	6	68	300	781	1398	1946	2249	2327	2330	2330
60	0	0	2	28	125	335	462	394	188	32	0	0	0	0	2	30	155	490	952	1346	1534	1566	1566	1566
Base	Growing Degree Units for Corn (Monthly)												Growing Degree Units for Corn (Accumulated Monthly)											
50/86	0	20	81	221	415	613	735	677	473	251	59	3	0	20	101	322	737	1350	2085	2762	3235	3486	3545	3548

(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

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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