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: GRINNELL 3 SW, IA **COOP ID: 133473**

Climate Division: IA 5 **NWS Call Sign:** **Elevation: 905 Feet** **Lat: 41˚43N** **Lon: 92˚45W**

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	27.1	7.9	17.5	60+	1909	23	28.9	1989	-34	1974	13	5.3	1979	1471	0	.0	.0	1.0	19.2	30.6	10.3
Feb	33.1	12.7	22.9	74	1930	24	35.1	1998	-35+	1996	3	8.7	1979	1180	0	.0	.0	3.3	14.0	26.7	6.3
Mar	45.7	23.8	34.8	90	1910	23	42.0	1973	-17	1962	1	25.2	1975	938	0	.0	.0	11.0	5.0	23.9	.9
Apr	59.1	33.9	46.5	92+	1910	29	53.1	1977	1	1982	6	41.1	1983	556	1	.0	@	22.8	.4	12.5	.0
May	70.4	45.5	58.0	98	1925	22	65.6	1988	22	1907	4	51.7	1997	261	43	.0	.2	30.5	.0	2.1	.0
Jun	79.9	55.8	67.9	102	1911	5	73.6	1971	35+	1983	6	63.0	1982	47	132	.1	2.2	30.0	.0	.0	.0
Jul	84.1	60.9	72.5	106+	1911	3	76.4	1999	29	1920	5	67.9	1992	8	240	.2	6.3	31.0	.0	.0	.0
Aug	81.9	58.2	70.1	107+	1918	5	77.1	1983	36	1950	20	64.8	1992	36	193	.2	4.4	31.0	.0	.0	.0
Sep	74.6	48.6	61.6	101	1925	4	66.5	1998	21	1984	29	56.8	1974	144	43	.0	1.1	30.0	.0	1.5	.0
Oct	62.6	36.5	49.6	95+	1920	20	56.6	1971	2	1925	28	43.7	1988	480	1	.0	.1	27.6	.1	11.8	.0
Nov	45.8	25.4	35.6	82	1968	1	42.9	1999	-15	1976	30	28.1	1976	881	0	.0	.0	11.3	4.0	22.8	.4
Dec	31.9	14.0	23.0	69	1998	5	29.9	1982	-32	1985	19	8.7	1983	1304	0	.0	.0	2.3	14.3	29.6	5.6
Ann	58.0	35.3	46.7	107+	Aug 1918	5	77.1	Aug 1983	-35+	Feb 1996	3	5.3	Jan 1979	7306	653	.5	14.3	231.8	57.0	161.5	23.5

\+ 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: 1893-2001

(3) Derived from 1971-2000 serially complete daily data

Issue Date: February 2004

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: GRINNELL 3 SW, IA **COOP ID: 133473**

Climate Division: IA 5 **NWS Call Sign:** **Elevation: 905 Feet** **Lat: 41˚43N** **Lon: 92˚45W**

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	1.20	1.05	2.14	1971	4	3.01	1979	.12	1981
Feb	1.28	1.25	1.63	1969	28	2.73	1976	.02	1987
Mar	2.40	2.35	2.24	1993	31	6.02	1991	.21	1981
Apr	3.58	3.34	4.17	1991	13	11.00	1991	.84	1988
May	4.31	4.00	4.00	1918	24	11.94	1996	1.02	1981
Jun	4.64	4.51	3.93	1967	10	9.58	1975	.53	1992
Jul	4.09	3.31	3.61	1978	19	10.43	1992	.32	1975
Aug	4.41	3.76	6.92	1970	5	13.20	1993	.16	1984
Sep	3.55	2.78	5.52	1919	30	8.84	1978	.56	1976
Oct	2.73	2.25	4.15	1970	9	6.38	1997	.19	1975
Nov	2.41	2.13	3.35	1958	18	6.10	1983	.09	1989
Dec	1.47	1.41	1.47	1965	25	3.34	1982	.31	1998
Ann	36.07	36.48	6.92	Aug 1970	5	13.20	Aug 1993	.02	Feb 1987

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	7.3	3.5	.5	.1
Feb	6.9	3.6	.6	.1
Mar	9.7	5.6	1.6	.4
Apr	11.3	6.6	2.3	.7
May	12.6	8.2	2.8	.8
Jun	10.8	7.2	3.2	1.6
Jul	10.3	6.8	3.0	1.2
Aug	10.2	6.6	3.0	1.5
Sep	9.4	5.7	2.4	1.1
Oct	8.4	5.1	1.7	.7
Nov	9.0	5.1	1.6	.4
Dec	8.1	4.1	.6	.1
Ann	114.0	68.1	23.3	8.7

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	.20	.31	.48	.65	.82	1.00	1.21	1.46	1.81	2.36	2.88
Feb	.18	.29	.48	.65	.84	1.04	1.28	1.56	1.95	2.58	3.19
Mar	.32	.51	.86	1.19	1.54	1.93	2.38	2.93	3.67	4.89	6.07
Apr	.88	1.21	1.73	2.20	2.66	3.15	3.69	4.33	5.18	6.52	7.78
May	1.06	1.47	2.10	2.65	3.21	3.79	4.44	5.22	6.24	7.84	9.35
Jun	1.24	1.68	2.35	2.94	3.52	4.12	4.79	5.59	6.63	8.26	9.78
Jul	.86	1.23	1.83	2.38	2.93	3.52	4.18	4.97	6.02	7.70	9.29
Aug	.64	1.01	1.64	2.25	2.89	3.59	4.40	5.38	6.71	8.88	10.97
Sep	.80	1.13	1.65	2.12	2.58	3.08	3.64	4.30	5.18	6.57	7.89
Oct	.39	.62	1.01	1.39	1.79	2.22	2.72	3.33	4.16	5.50	6.79
Nov	.32	.52	.86	1.20	1.55	1.94	2.39	2.94	3.69	4.92	6.11
Dec	.33	.46	.68	.87	1.07	1.28	1.51	1.79	2.15	2.74	3.29
Ann	23.03	25.44	28.60	31.04	33.22	35.36	37.59	40.07	43.11	47.57	51.48

\+ 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: 1893-2001
(3) Derived from 1971-2000 serially complete daily data

Complete documentation available from:
www.ncdc.noaa.gov/oa/climate/normals/usnormals.html

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data,
and Information Services

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: GRINNELL 3 SW, IA **COOP ID: 133473**

Climate Division: IA 5 **NWS Call Sign:** **Elevation: 905 Feet** **Lat: 41°43N** **Lon: 92°45W**

Snow (inches)

Snow Totals

Means/Medians (1)

Month	Snow Fall Mean	Snow Fall Median	Snow Depth Mean	Snow Depth Median
Jan	8.1	8.1	3	2
Feb	7.2	7.0	3	2
Mar	3.8	2.3	1	#
Apr	1.8	.3	#	0
May	#	.0	#	0
Jun	.0	.0	0	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	.0	.0	0	0
Oct	.5	.0	#	0
Nov	2.1	1.1	#	#
Dec	6.7	5.5	2	1
Ann	30.2	24.3	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	12.0	1996	27	23.8	1982	22	1979	31	14	1979
Feb	8.2	1976	22	15.7	1994	27	1979	12	22	1979
Mar	7.0	1998	9	22.1	1984	16	1984	21	6	1978
Apr	10.0	1973	10	15.0	1973	15	1973	10	2	1973
May	#	1997	1	#+	1997	#	1997	1	#	1997
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	7.8	1997	27	8.6	1997	8	1997	27	1	1997
Nov	6.0	1972	14	9.0	1974	7	1991	26	2	1991
Dec	9.0	1990	3	20.5	1985	18	2000	29	11+	2000
Ann	12.0	Jan 1996	27	23.8	Jan 1982	27	Feb 1979	12	22	Feb 1979

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	5.7	3.0	1.0	.3	@
Feb	4.4	2.3	.9	.3	.0
Mar	3.0	1.4	.4	.2	.0
Apr	1.0	.5	.2	.1	@
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	.2	.1	@	@	.0
Nov	1.8	.9	.4	.1	.0
Dec	4.8	2.5	.7	.2	.0
Ann	20.9	10.7	3.6	1.2	@

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	16.8	8.9	4.8	.2
Feb	13.5	8.7	4.8	1.2
Mar	4.2	1.9	1.0	.2
Apr	.9	.5	.4	.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	.2	@	@	.0
Nov	1.6	.6	.2	.0
Dec	13.1	7.8	4.9	2.0
Ann	50.3	28.4	16.1	3.7

+ 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

Complete documentation available from:
www.ncdc.noaa.gov/oa/climate/normals/usnormals.html

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: GRINNELL 3 SW, IA **COOP ID: 133473**

Climate Division: IA 5 **NWS Call Sign:** **Elevation: 905 Feet** **Lat: 41˚43N** **Lon: 92˚45W**

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	6/01	5/27	5/24	5/21	5/18	5/15	5/12	5/09	5/04
32	5/20	5/15	5/12	5/09	5/06	5/03	4/30	4/26	4/22
28	5/10	5/05	5/01	4/28	4/25	4/23	4/20	4/16	4/11
24	4/27	4/22	4/19	4/16	4/13	4/10	4/07	4/04	3/30
20	4/17	4/13	4/10	4/08	4/05	4/03	4/01	3/29	3/25
16	4/12	4/07	4/03	3/30	3/27	3/24	3/20	3/16	3/11

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	9/09	9/13	9/16	9/18	9/20	9/23	9/25	9/28	10/02
32	9/16	9/20	9/23	9/25	9/27	9/30	10/02	10/05	10/09
28	9/26	9/30	10/03	10/05	10/08	10/10	10/13	10/16	10/20
24	10/05	10/10	10/14	10/18	10/21	10/24	10/28	11/01	11/06
20	10/16	10/22	10/26	10/29	11/01	11/04	11/08	11/12	11/17
16	10/25	11/01	11/05	11/09	11/13	11/17	11/20	11/25	12/01

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	144	137	132	128	124	121	117	112	105
32	163	157	152	148	144	140	136	131	124
28	182	176	172	168	165	161	158	154	148
24	211	204	198	194	190	186	182	177	170
20	231	223	218	213	209	205	200	195	188
16	257	248	241	235	230	225	219	213	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

Complete documentation available from:
www.ncdc.noaa.gov/oa/climate/normals/usnormals.html

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: GRINNELL 3 SW, IA **COOP ID: 133473**

Climate Division: IA 5 **NWS Call Sign:** **Elevation: 905 Feet** **Lat: 41˚43N** **Lon: 92˚45W**

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	1471	1180	938	556	261	47	8	36	144	480	881	1304	7306
60	1316	1040	783	410	159	13	0	10	61	334	731	1149	6006
57	1223	956	690	328	111	5	0	3	31	256	641	1056	5300
55	1161	902	631	277	85	3	0	1	18	209	583	994	4864
50	1006	771	488	165	37	0	0	0	3	113	444	844	3871
32	494	351	117	3	0	0	0	0	0	2	91	363	1421

Base	Cooling Degree Days (1)												
Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	46	96	202	438	805	1075	1255	1180	889	546	200	82	6814
55	0	2	3	21	177	388	542	467	217	40	2	0	1859
57	0	0	0	13	142	330	480	408	170	25	0	0	1568
60	0	0	0	5	97	248	387	321	110	11	0	0	1179
65	0	0	0	1	43	132	240	193	43	1	0	0	653
70	0	0	0	0	15	52	118	99	11	0	0	0	295

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	11	78	258	572	849	1021	942	663	331	76	6	0	11	89	347	919	1768	2789	3731	4394	4725	4801	4807
45	0	0	38	155	421	699	866	787	513	213	33	2	0	0	38	193	614	1313	2179	2966	3479	3692	3725	3727
50	0	0	15	81	281	549	711	632	375	123	14	0	0	0	15	96	377	926	1637	2269	2644	2767	2781	2781
55	0	0	3	39	168	402	556	478	250	61	3	0	0	0	3	42	210	612	1168	1646	1896	1957	1960	1960
60	0	0	1	17	86	265	403	327	144	23	0	0	0	0	1	18	104	369	772	1099	1243	1266	1266	1266
Base	Growing Degree Units for Corn (Monthly)												Growing Degree Units for Corn (Accumulated Monthly)											
50/86	0	13	61	170	360	559	687	622	427	224	54	4	0	13	74	244	604	1163	1850	2472	2899	3123	3177	3181

(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