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: HOWARD, SD **COOP ID: 394037**

Climate Division: SD 7 **NWS Call Sign:** **Elevation: 1,560 Feet** **Lat: 44˚01N** **Lon: 97˚32W**

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	22.6	2.5	12.6	61	1981	24	26.6	1990	-35	1966	29	-1.4	1978	1627	0	.0	.0	.6	21.8	30.9	12.1
Feb	29.8	8.9	19.4	70	1958	23	31.5	1998	-36+	1994	9	5.4	1989	1278	0	.0	.0	2.4	14.6	27.3	7.1
Mar	41.9	20.6	31.3	82+	1978	30	41.3	2000	-18+	1998	10	23.8	1975	1046	0	.0	.0	9.5	5.8	25.7	1.9
Apr	57.4	32.1	44.8	96	1980	21	52.5	1981	3	1975	3	38.3	1995	610	2	.0	.2	22.8	.6	12.6	.0
May	70.4	44.9	57.7	102	1967	25	64.9	1977	17	1967	3	52.2	1997	260	31	.0	.3	30.5	.0	1.4	.0
Jun	79.7	54.6	67.2	108+	1988	24	74.8	1988	32	1956	1	61.3	1993	63	127	.2	4.1	30.0	.0	.0	.0
Jul	85.1	59.9	72.5	109	1966	10	78.1	1974	38	1971	30	64.1	1992	24	256	1.1	9.5	31.0	.0	.0	.0
Aug	82.8	56.9	69.9	105+	1965	13	75.3	1976	37+	1964	13	63.5	1992	37	187	.5	7.1	31.0	.0	.0	.0
Sep	73.5	46.2	59.9	104+	1976	6	66.3	1998	19	1974	30	53.7	1993	194	40	.1	2.1	29.6	.0	1.2	.0
Oct	60.1	34.9	47.5	91+	1963	5	51.5	1975	4	1960	19	42.5	1976	544	0	.0	@	26.0	.1	10.3	.0
Nov	40.2	20.6	30.4	78	1999	9	42.6	1999	-17	1964	30	18.4	1985	1039	0	.0	.0	8.3	8.1	25.7	1.2
Dec	26.8	7.7	17.3	65	1998	2	26.9	1999	-31	1989	22	-1.0	1983	1482	0	.0	.0	.9	18.9	30.5	8.3
Ann	55.9	32.5	44.2	109	Jul 1966	10	78.1	Jul 1974	-36+	Feb 1994	9	-1.4	Jan 1978	8204	643	1.9	23.3	222.6	69.9	165.6	30.6

\+ 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

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: HOWARD, SD

COOP ID: 394037

Climate Division: SD 7 **NWS Call Sign:** **Elevation: 1,560 Feet** **Lat: 44˚01N** **Lon: 97˚32W**

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	.54	.48	.95	2001	29	1.85	1988	.00	1990
Feb	.63	.63	1.15	1971	19	1.94	1977	.00	1983
Mar	1.57	1.24	1.55	1966	4	4.63	1995	.39	1978
Apr	2.45	2.12	2.40	1986	14	7.31	1986	.38	1987
May	3.03	2.98	2.62	1982	30	7.45	1972	.43	1976
Jun	3.64	3.54	3.00	1990	15	8.63	1993	.80	1997
Jul	3.13	2.55	2.51	1948	29	8.02	1993	.50	1975
Aug	2.90	2.49	2.61	1982	31	5.90	1992	.78	1972
Sep	2.25	2.21	3.87	1999	3	6.10	1986	.11	1974
Oct	1.90	1.56	3.35	1990	2	6.11	1998	.00	1988
Nov	1.20	1.02	1.78+	1998	10	3.63	1983	.02+	1984
Dec	.49	.45	1.08	1987	27	1.98	1987	.00+	1991
Ann	23.73	23.70	3.87	Sep 1999	3	8.63	Jun 1993	.00+	Dec 1991

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	4.3	1.8	.2	.0
Feb	4.2	1.9	.2	.1
Mar	6.4	4.0	.9	.2
Apr	8.5	6.1	1.6	.4
May	8.7	6.6	2.2	.5
Jun	9.2	6.9	2.4	1.0
Jul	8.3	5.8	2.3	.8
Aug	6.6	5.1	2.1	.9
Sep	6.6	4.3	1.6	.4
Oct	5.4	3.6	1.2	.5
Nov	4.8	2.9	.7	.2
Dec	3.6	1.8	.1	@
Ann	76.6	50.8	15.5	5.0

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	.02	.07	.15	.23	.32	.41	.53	.67	.86	1.19	1.50
Feb	.05	.11	.22	.31	.40	.51	.63	.78	.98	1.31	1.62
Mar	.29	.43	.66	.87	1.09	1.33	1.59	1.92	2.35	3.03	3.69
Apr	.62	.85	1.21	1.53	1.84	2.17	2.53	2.97	3.54	4.43	5.27
May	.70	.98	1.42	1.82	2.22	2.64	3.11	3.67	4.41	5.58	6.69
Jun	.95	1.29	1.82	2.28	2.74	3.22	3.76	4.39	5.22	6.52	7.74
Jul	.88	1.17	1.62	2.02	2.40	2.80	3.25	3.77	4.45	5.52	6.52
Aug	1.00	1.28	1.68	2.01	2.34	2.67	3.03	3.45	4.00	4.83	5.60
Sep	.28	.45	.77	1.08	1.41	1.78	2.21	2.74	3.46	4.65	5.80
Oct	.07	.22	.49	.77	1.07	1.41	1.82	2.33	3.03	4.21	5.36
Nov	.05	.11	.25	.41	.59	.81	1.09	1.44	1.95	2.81	3.68
Dec	.00	.05	.14	.22	.30	.39	.49	.60	.77	1.03	1.29
Ann	15.61	17.13	19.11	20.63	22.00	23.32	24.70	26.24	28.11	30.85	33.24

\+ 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

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: HOWARD, SD **COOP ID: 394037**

Climate Division: SD 7 **NWS Call Sign:** **Elevation: 1,560 Feet** **Lat: 44°01N** **Lon: 97°32W**

Snow (inches)

Snow Totals

Means/Medians (1)

Month	Snow Fall Mean	Snow Fall Median	Snow Depth Mean	Snow Depth Median
Jan	6.2	4.0	5	4
Feb	5.5	4.8	3	#
Mar	6.0	2.5	1	#
Apr	2.0	.0	#	0
May	.0	.0	0	0
Jun	.0	.0	0	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	.1	.0	0	0
Oct	.9	.0	#	0
Nov	4.6	3.3	1	0
Dec	5.5	6.0	2	1
Ann	30.8	20.6	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	7.0	1996	18	18.0+	1988	18+	1982	24	14	1982
Feb	9.0	1991	17	13.0	1992	22	1979	21	19	1979
Mar	14.0	1998	31	24.0	1989	18	1979	8	9	1979
Apr	8.0	1994	29	15.0	1995	8	2000	7	#+	2000
May	.0	0	0	.0	0	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	2.0	1984	24	2.0	1984	0	0	0	0	0
Oct	8.0	1995	24	8.0	1995	5	1982	19	#+	1999
Nov	12.0	1998	10	16.0	1983	12	1983	30	10	1975
Dec	10.0	1996	15	13.0	1978	15	1983	22	12	1983
Ann	14.0	Mar 1998	31	24.0	Mar 1989	22	Feb 1979	21	19	Feb 1979

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	3.2	2.8	1.0	.3	.0
Feb	3.0	2.7	.9	.2	.0
Mar	2.4	2.3	.8	.2	@
Apr	.6	.6	.3	.2	.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
Oct	.3	.3	.2	.1	.0
Nov	2.1	1.9	.8	.2	@
Dec	2.5	2.2	.6	.3	@
Ann	14.1	12.8	4.6	1.5	@

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	-9.9	-9.9	-9.9	-9.9
Feb	-9.9	-9.9	-9.9	-9.9
Mar	-9.9	-9.9	-9.9	-9.9
Apr	.1	.0	.0	.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	.1	.1	.0
Nov	1.6	.5	.4	.2
Dec	-9.9	-9.9	-9.9	-9.9
Ann	-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

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: HOWARD, SD **COOP ID: 394037**

Climate Division: SD 7 **NWS Call Sign:** **Elevation: 1,560 Feet** **Lat: 44˚01N** **Lon: 97˚32W**

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	5/26	5/21	5/18	5/15	5/12	5/09	5/07	5/03	4/28
32	5/15	5/11	5/07	5/05	5/02	4/29	4/26	4/23	4/19
28	5/10	5/05	5/01	4/27	4/24	4/21	4/18	4/14	4/09
24	4/26	4/21	4/17	4/14	4/11	4/09	4/06	4/02	3/28
20	4/13	4/09	4/05	4/03	3/31	3/29	3/26	3/23	3/19
16	4/11	4/05	4/01	3/29	3/26	3/23	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	9/11	9/14	9/17	9/19	9/21	9/23	9/26	9/28	10/02
32	9/18	9/21	9/24	9/26	9/28	9/30	10/02	10/05	10/09
28	9/20	9/26	9/30	10/03	10/06	10/09	10/13	10/17	10/22
24	10/02	10/08	10/12	10/15	10/18	10/21	10/25	10/29	11/03
20	10/07	10/12	10/16	10/19	10/22	10/25	10/29	11/01	11/07
16	10/20	10/26	10/30	11/03	11/06	11/09	11/13	11/17	11/22

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	152	145	140	135	131	127	123	118	111
32	167	161	156	152	148	145	141	136	130
28	183	177	172	168	164	160	156	151	145
24	209	202	197	193	189	185	181	176	169
20	224	218	213	208	204	200	196	191	184
16	249	240	234	229	224	219	214	207	199

***** 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: HOWARD, SD **COOP ID: 394037**

Climate Division: SD 7 **NWS Call Sign:** **Elevation: 1,560 Feet** **Lat: 44˚01N** **Lon: 97˚32W**

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	1627	1278	1046	610	260	63	24	37	194	544	1039	1482	8204
60	1472	1138	891	467	154	19	7	10	101	392	889	1327	6867
57	1379	1054	798	385	106	8	0	3	61	306	799	1234	6133
55	1317	998	736	334	79	4	0	1	41	254	739	1172	5675
50	1162	870	589	222	33	0	0	0	11	142	599	1018	4646
32	649	436	166	16	0	0	0	0	0	4	189	519	1979

Base	Cooling Degree Days (1)												
Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	45	82	143	398	794	1054	1255	1173	836	484	140	60	6464
55	0	0	0	26	160	368	542	461	186	20	0	0	1763
57	0	0	0	17	124	312	480	401	147	11	0	0	1492
60	0	0	0	9	80	234	394	315	96	4	0	0	1132
65	0	0	0	2	31	127	256	187	40	0	0	0	643
70	0	0	0	0	9	55	148	94	12	0	0	0	318

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	7	54	252	603	859	1045	982	655	312	41	1	0	7	61	313	916	1775	2820	3802	4457	4769	4810	4811
45	0	1	23	157	450	709	890	827	507	189	17	0	0	1	24	181	631	1340	2230	3057	3564	3753	3770	3770
50	0	0	5	84	308	560	735	672	367	101	4	0	0	0	5	89	397	957	1692	2364	2731	2832	2836	2836
55	0	0	0	42	191	412	580	519	244	40	0	0	0	0	0	42	233	645	1225	1744	1988	2028	2028	2028
60	0	0	0	18	96	269	426	365	139	13	0	0	0	0	0	18	114	383	809	1174	1313	1326	1326	1326
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	6	41	171	370	553	695	645	415	197	30	0	0	6	47	218	588	1141	1836	2481	2896	3093	3123	3123

(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