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: NEWELL, SD **COOP ID: 396054**

Climate Division: SD 1 **NWS Call Sign:** **Elevation: 2,860 Feet** **Lat: 44˚43N** **Lon: 103˚26W**

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	30.2	7.8	19.0	69+	1989	31	32.1	1992	-36	1949	21	4.0	1979	1426	0	.0	.0	2.6	15.3	30.8	9.8
Feb	36.2	13.4	24.8	75	1982	22	36.1	1999	-35	1994	9	9.7	1979	1125	0	.0	.0	6.2	10.9	27.4	5.7
Mar	45.1	21.7	33.4	81+	1986	29	41.7	1992	-26	1960	4	23.4	1996	980	0	.0	.0	12.5	6.1	27.6	2.0
Apr	57.6	32.3	45.0	92	1980	22	51.8	1987	2	1997	13	38.1	1997	602	0	.0	.1	21.5	1.0	15.0	.0
May	68.4	43.4	55.9	97	1969	28	62.0	1985	12	1950	1	50.4	1996	300	19	.0	.4	29.2	.0	3.1	.0
Jun	78.7	53.3	66.0	104	1966	30	76.5	1988	32+	1969	13	59.9	1998	90	119	.3	3.5	29.9	.0	.0	.0
Jul	86.7	58.9	72.8	110	1973	7	77.2	1989	36	1959	1	65.3	1992	17	259	1.3	11.1	31.0	.0	.0	.0
Aug	86.2	57.2	71.7	108	1975	8	78.6	1983	36	1964	12	66.8	1992	27	235	.7	10.2	31.0	.0	.0	.0
Sep	75.5	46.0	60.8	106+	1978	7	67.8	1998	19	1984	26	55.0	1986	185	58	.3	3.5	29.1	.0	2.3	.0
Oct	62.0	33.4	47.7	95	1953	2	50.9	1973	-10	1991	31	44.0	1972	536	0	.0	.3	25.0	.5	14.0	@
Nov	44.1	20.4	32.3	81+	1999	9	42.0	1999	-24	1959	14	16.0	1985	983	0	.0	.0	10.7	7.0	27.2	1.6
Dec	33.6	10.0	21.8	69	1998	2	31.8	1999	-38	1989	22	3.2	1983	1339	0	.0	.0	3.4	13.0	30.6	7.2
Ann	58.7	33.2	45.9	110	Jul 1973	7	78.6	Aug 1983	-38	Dec 1989	22	3.2	Dec 1983	7610	690	2.6	29.1	232.1	53.8	178.0	26.3

+ 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	.38	.30	.90	1976	1	1.16	1996	.02+	1992
Feb	.44	.38	.75	1987	15	1.56	1987	.00+	1999
Mar	.94	.75	1.40	1977	29	3.31	1982	.00	1981
Apr	1.69	1.78	1.56	1967	14	3.57	1986	.04	1981
May	2.70	2.64	2.71	1982	20	8.10	1982	.37	1994
Jun	2.80	2.56	2.55	1998	18	7.07	1998	.19	1987
Jul	1.91	1.78	2.15	1976	13	5.49	1993	.19	1991
Aug	1.30	1.00	2.20	1973	23	3.85	1987	.10	2000
Sep	.99	.76	3.14	1986	25	6.25	1986	.00	1975
Oct	1.40	.80	1.98	1977	1	5.27	1998	.11+	1993
Nov	.58	.59	1.40	2000	1	1.81	2000	.08	1979
Dec	.35	.22	.47	1992	13	1.06	1996	.00+	2000
Ann	15.48	14.68	3.14	Sep 1986	25	8.10	May 1982	.00+	Dec 2000

Mean Number of Days (3)

Month	Daily Precipitation >= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	4.3	1.3	@	.0
Feb	4.2	1.5	.1	.0
Mar	5.6	2.7	.4	.1
Apr	7.6	4.3	.9	.2
May	9.5	6.2	1.7	.5
Jun	9.9	6.2	1.8	.5
Jul	7.8	4.8	1.1	.3
Aug	5.4	3.0	.8	.2
Sep	4.7	2.4	.5	.2
Oct	5.3	2.9	.9	.3
Nov	4.3	1.7	.2	@
Dec	3.9	1.4	.0	.0
Ann	72.5	38.4	8.4	2.3

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	.05	.10	.15	.21	.28	.36	.46	.61	.86	1.11
Feb	.00	.06	.14	.21	.28	.35	.44	.54	.68	.91	1.13
Mar	.10	.21	.37	.50	.64	.79	.96	1.16	1.43	1.86	2.27
Apr	.28	.43	.68	.91	1.15	1.41	1.71	2.07	2.55	3.33	4.07
May	.57	.82	1.21	1.57	1.93	2.32	2.75	3.28	3.96	5.06	6.11
Jun	.50	.75	1.15	1.54	1.93	2.35	2.83	3.41	4.19	5.44	6.63
Jul	.40	.58	.86	1.11	1.37	1.64	1.95	2.32	2.81	3.59	4.33
Aug	.10	.18	.35	.53	.73	.96	1.23	1.58	2.06	2.87	3.67
Sep	.05	.13	.28	.43	.58	.76	.97	1.22	1.58	2.16	2.73
Oct	.07	.14	.31	.49	.71	.97	1.28	1.69	2.26	3.24	4.23
Nov	.06	.11	.19	.27	.36	.45	.57	.71	.91	1.23	1.54
Dec	.00	.02	.07	.13	.19	.25	.33	.44	.58	.82	1.05
Ann	9.79	10.84	12.22	13.29	14.24	15.18	16.16	17.25	18.58	20.54	22.26

\+ 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	5.0	5.9	2	2
Feb	4.8	4.0	2	1
Mar	10.4	8.9	1	1
Apr	3.5	.0	#	0
May	.5	.0	#	0
Jun	.0	.0	0	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	#	.0	0	0
Oct	1.5	.0	#	0
Nov	5.8	2.9	1	#
Dec	6.2	5.3	2	1
Ann	37.7	27.0	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	9.0	1996	4	16.3	1994	12	1993	25	10	1993
Feb	7.0	1998	26	14.0	1979	15	1993	28	11	1993
Mar	12.0	1973	14	23.0	1977	20	1977	30	6	1998
Apr	10.0	1997	6	21.5	1997	18	1997	8	6	1997
May	6.0	1983	12	6.0	1983	1	1972	2	#+	1979
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	#	1984	23	#+	1984	0	0	0	0	0
Oct	6.0	1991	29	8.5	1991	6	1991	31	1	1991
Nov	8.0	1985	9	31.0	1985	14	1985	11	4	1985
Dec	7.0	1980	1	13.0+	1989	20	1996	26	10	1996
Ann	12.0	Mar 1973	14	31.0	Nov 1985	20+	Dec 1996	26	11	Feb 1993

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	3.6	2.7	.8	.1	.0
Feb	2.9	1.8	.6	.2	.0
Mar	2.6	2.1	.9	.4	.1
Apr	1.0	.8	.3	.2	@
May	.2	.2	.1	@	.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	.5	.4	.2	@	.0
Nov	2.4	1.8	.6	.2	.0
Dec	2.7	2.0	.7	.2	.0
Ann	15.9	11.8	4.2	1.3	.1

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	11.0	6.3	4.1	1.6
Feb	8.9	7.5	6.3	2.3
Mar	6.4	3.7	2.8	.9
Apr	1.2	.9	.7	.3
May	@	.0	.0	.0
Jun	.0	.0	.0	.0
Jul	.0	.0	.0	.0
Aug	.0	.0	.0	.0
Sep	.0	.0	.0	.0
Oct	.5	.3	.1	.0
Nov	3.5	1.8	.7	.2
Dec	9.4	5.5	3.8	.8
Ann	40.9	26.0	18.5	6.1

+ 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	6/09	6/03	5/29	5/25	5/22	5/18	5/14	5/10	5/04
32	5/24	5/20	5/16	5/14	5/11	5/08	5/06	5/02	4/28
28	5/14	5/09	5/05	5/01	4/28	4/24	4/21	4/17	4/11
24	5/03	4/28	4/25	4/22	4/20	4/17	4/14	4/11	4/06
20	4/23	4/18	4/15	4/12	4/09	4/06	4/03	3/30	3/25
16	4/14	4/09	4/05	4/01	3/29	3/25	3/22	3/18	3/12

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	9/08	9/11	9/14	9/16	9/18	9/20	9/22	9/25	9/28
32	9/11	9/16	9/19	9/22	9/25	9/27	9/30	10/04	10/08
28	9/19	9/24	9/28	10/02	10/05	10/08	10/11	10/15	10/20
24	9/27	10/03	10/07	10/10	10/13	10/17	10/20	10/24	10/29
20	10/07	10/12	10/16	10/20	10/23	10/26	10/29	11/02	11/07
16	10/13	10/20	10/24	10/28	11/01	11/05	11/09	11/13	11/20

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	141	133	128	123	119	114	109	104	96
32	156	149	144	140	136	132	128	122	115
28	185	176	170	164	159	154	149	142	133
24	199	191	185	181	176	172	167	161	153
20	219	211	205	201	196	192	187	181	173
16	242	233	227	222	217	211	206	200	191

***** 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	1426	1125	980	602	300	90	17	27	185	536	983	1339	7610
60	1271	991	825	456	182	36	3	7	96	383	833	1184	6267
57	1180	914	733	371	126	18	0	2	58	293	743	1091	5529
55	1119	861	673	318	94	11	0	1	39	236	690	1029	5071
50	975	731	529	199	39	2	0	0	11	118	550	886	4040
32	491	344	139	8	0	0	0	0	0	2	171	410	1565

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	88	142	182	396	742	1019	1265	1231	863	488	178	94	6688
55	3	16	3	15	123	340	552	519	212	10	7	0	1800
57	1	13	1	9	92	287	490	458	171	4	0	0	1526
60	0	6	0	3	56	215	400	370	119	1	0	0	1170
65	0	0	0	0	19	119	259	235	58	0	0	0	690
70	0	0	0	0	4	53	144	128	22	0	0	0	351

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	1	16	63	210	492	769	1004	966	609	269	52	3	1	17	80	290	782	1551	2555	3521	4130	4399	4451	4454
45	0	1	23	120	344	619	849	811	464	162	19	0	0	1	24	144	488	1107	1956	2767	3231	3393	3412	3412
50	0	0	4	57	217	472	694	656	331	83	6	0	0	0	4	61	278	750	1444	2100	2431	2514	2520	2520
55	0	0	1	25	125	329	539	502	217	33	0	0	0	0	1	26	151	480	1019	1521	1738	1771	1771	1771
60	0	0	0	7	53	204	387	351	122	10	0	0	0	0	0	7	60	264	651	1002	1124	1134	1134	1134
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	4	26	62	157	299	476	641	618	390	209	57	9	4	30	92	249	548	1024	1665	2283	2673	2882	2939	2948

(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