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: WAUBAY NATL WILDLIFE REF, SD **COOP ID: 398980**

Climate Division: SD 3 **NWS Call Sign:** **Elevation: 1,830 Feet** **Lat: 45˚26N** **Lon: 97˚21W**

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	20.7	.9	10.8	62+	1981	25	25.3	1990	-35	1972	15	-2.1	1982	1681	0	.0	.0	.2	24.2	31.0	15.5
Feb	27.5	7.6	17.6	63	1958	25	30.8	1987	-43	1994	9	2.9	1979	1329	0	.0	.0	1.2	16.6	27.7	9.8
Mar	39.3	19.4	29.4	79	1963	31	37.7	1973	-25	1962	1	20.3	1996	1106	0	.0	.0	6.1	8.4	28.0	3.2
Apr	56.0	33.0	44.5	94	1980	21	53.5	1987	-3	1975	3	35.1	1975	618	5	.0	.1	20.6	.9	15.7	.2
May	69.8	46.3	58.1	96	1959	1	66.1	1977	19+	1967	2	51.9	1979	248	34	.0	.0	30.2	.0	2.1	.0
Jun	77.7	55.7	66.7	105	1963	30	74.9	1988	33	1990	3	61.8	1982	61	113	.1	1.1	30.0	.0	.0	.0
Jul	83.2	61.0	72.1	104+	1976	25	76.6	1974	41	1971	30	62.9	1992	23	243	.3	5.8	31.0	.0	.0	.0
Aug	81.8	59.9	70.9	104	1988	1	77.9	1983	38+	1982	27	64.6	1992	29	211	.2	4.8	31.0	.0	.0	.0
Sep	72.7	50.2	61.5	97	1976	6	67.7	1998	22	1965	26	56.4	1993	157	49	.0	1.1	29.5	.0	1.0	.0
Oct	59.3	38.1	48.7	91	1993	6	54.8	1973	8+	1991	30	44.0	1976	506	0	.0	@	24.6	.4	10.5	.0
Nov	38.2	21.8	30.0	75	1975	5	42.1	1999	-23	1985	29	18.8	1996	1051	0	.0	.0	6.3	10.8	26.4	1.6
Dec	25.1	7.4	16.3	58	1969	1	26.8	1979	-34	1983	23	-.4	1983	1511	0	.0	.0	.6	21.5	30.8	10.2
Ann	54.3	33.4	43.9	105	Jun 1963	30	77.9	Aug 1983	-43	Feb 1994	9	-2.1	Jan 1982	8320	655	.6	12.9	211.3	82.8	173.2	40.5

\+ 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: 1952-2001

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

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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	.56	.48	1.45	1997	4	1.60	1997	.00+	1990
Feb	.50	.46	.72	1981	27	1.10	1998	.07	1999
Mar	1.06	.83	1.38	1977	12	3.73	1977	.08	1971
Apr	1.74	1.63	2.95	1998	25	5.54	1986	.00	1987
May	2.61	2.49	3.41	1998	12	6.99	1972	.60	1992
Jun	3.45	2.86	4.20	1971	29	8.64	1971	.86	1987
Jul	3.37	3.03	3.91	1993	25	9.06	1993	.45	1976
Aug	2.86	2.92	3.35	1988	2	5.96	1988	.64	1976
Sep	1.86	1.61	2.34	1988	19	4.47	1986	.12	1972
Oct	1.77	1.11	3.01	1998	16	7.78	1998	.28+	1988
Nov	.80	.60	.95	1970	8	3.12	2000	.00+	1999
Dec	.37	.35	.62	1960	5	1.13	1996	.00+	1989
Ann	20.95	20.39	4.20	Jun 1971	29	9.06	Jul 1993	.00+	Nov 1999

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	5.0	1.6	.1	@
Feb	4.2	1.6	.1	.0
Mar	5.6	2.9	.4	@
Apr	7.0	4.3	.9	.2
May	8.5	5.8	1.5	.5
Jun	9.1	6.0	2.3	.8
Jul	8.5	5.6	2.3	.8
Aug	7.3	5.4	1.9	.6
Sep	6.4	3.9	1.2	.4
Oct	5.8	3.5	1.1	.4
Nov	4.9	2.1	.4	.0
Dec	4.6	1.4	.0	.0
Ann	76.9	44.1	12.2	3.7

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	.00	.06	.16	.25	.34	.44	.56	.69	.88	1.19	1.48
Feb	.13	.17	.25	.31	.37	.44	.51	.60	.71	.89	1.06
Mar	.20	.30	.45	.60	.74	.90	1.08	1.29	1.58	2.04	2.47
Apr	.15	.34	.62	.88	1.14	1.42	1.75	2.15	2.68	3.54	4.36
May	.69	.93	1.31	1.64	1.97	2.31	2.70	3.15	3.74	4.67	5.54
Jun	.67	.98	1.48	1.95	2.42	2.93	3.50	4.20	5.12	6.59	7.99
Jul	.81	1.13	1.62	2.06	2.49	2.95	3.47	4.08	4.88	6.15	7.35
Aug	.84	1.11	1.52	1.87	2.21	2.57	2.97	3.43	4.03	4.98	5.85
Sep	.22	.36	.62	.88	1.16	1.47	1.83	2.27	2.88	3.88	4.85
Oct	.14	.25	.49	.73	1.00	1.31	1.68	2.15	2.80	3.88	4.96
Nov	.00	.00	.15	.30	.45	.61	.79	1.02	1.33	1.82	2.30
Dec	.00	.03	.09	.15	.21	.28	.36	.46	.60	.82	1.04
Ann	12.08	13.66	15.75	17.39	18.88	20.35	21.89	23.63	25.77	28.94	31.75

\+ 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: 1952-2001
(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	7.2	6.0	8	8
Feb	6.5	6.3	8	6
Mar	5.7	4.1	5	2
Apr	2.9	2.0	#	#
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	.8	.0	#	0
Nov	6.5	5.5	1	1
Dec	5.5	5.5	5	2
Ann	35.1	29.4	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	18.0	1997	4	21.8	1994	35	1997	29	32	1997
Feb	8.0	1991	18	15.5	1994	32+	1997	16	29	1997
Mar	9.0	1982	20	14.4	1989	32	1997	15	25	1997
Apr	10.0	1998	1	10.0	1998	13+	1998	1	4	1979
May	1.0	1976	2	1.0	1976	1	1976	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	.5	1985	24	.5	1985	0	0	0	0	0
Oct	6.0	1995	23	9.0	1995	6	1995	23	1	1995
Nov	9.0	1993	24	21.7	1985	20	1985	30	6	1977
Dec	5.0	1972	4	13.9	1972	25	1996	31	20	1985
Ann	18.0	Jan 1997	4	21.8	Jan 1994	35	Jan 1997	29	32	Jan 1997

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	5.5	2.9	.8	.4	.1
Feb	3.7	2.5	.9	.2	.0
Mar	3.3	2.2	.8	.1	.0
Apr	1.0	.8	.3	.1	@
May	@	@	.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
Oct	.4	.4	.1	@	.0
Nov	3.6	2.5	.7	.2	.0
Dec	4.6	2.4	.5	.2	.0
Ann	22.1	13.7	4.1	1.2	.1

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	25.3	21.4	17.2	8.7
Feb	21.5	17.1	14.0	10.3
Mar	13.3	10.2	8.1	4.7
Apr	1.7	1.1	.8	.2
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	.4	.1	@	.0
Nov	10.4	5.5	3.0	.8
Dec	19.6	14.7	11.5	5.5
Ann	92.2	70.1	54.6	30.2

+ 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	5/28	5/23	5/20	5/18	5/15	5/13	5/10	5/07	5/03
32	5/21	5/17	5/13	5/10	5/08	5/05	5/02	4/29	4/24
28	5/13	5/08	5/04	5/01	4/28	4/25	4/21	4/17	4/12
24	4/26	4/22	4/19	4/17	4/15	4/12	4/10	4/07	4/03
20	4/17	4/13	4/10	4/08	4/05	4/03	3/31	3/28	3/24
16	4/14	4/09	4/06	4/03	3/31	3/28	3/25	3/21	3/16

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	9/15	9/18	9/20	9/22	9/24	9/27	9/29	10/03
32	9/19	9/23	9/26	9/28	9/30	10/02	10/05	10/07	10/11
28	9/24	9/29	10/03	10/06	10/09	10/12	10/15	10/19	10/24
24	10/04	10/10	10/14	10/17	10/21	10/24	10/28	11/01	11/07
20	10/12	10/18	10/23	10/26	10/30	11/02	11/06	11/11	11/17
16	10/25	10/29	11/01	11/04	11/07	11/09	11/12	11/15	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	147	141	136	133	129	126	122	118	111
32	163	157	152	148	145	141	137	133	126
28	186	178	173	168	164	159	154	149	141
24	213	204	198	193	188	183	178	172	164
20	230	222	216	212	207	203	198	192	184
16	241	234	229	224	220	216	212	207	200

***** 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	1681	1329	1106	618	248	61	23	29	157	506	1051	1511	8320
60	1526	1189	951	479	147	17	6	8	72	354	901	1356	7006
57	1433	1105	858	400	100	6	0	2	38	269	811	1263	6285
55	1371	1049	796	351	75	3	0	0	23	218	751	1201	5838
50	1216	916	646	242	32	0	0	0	4	114	612	1048	4830
32	692	470	209	27	0	0	0	0	0	3	204	547	2152

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	35	65	126	403	808	1042	1243	1205	883	520	143	59	6532
55	0	0	0	37	171	354	530	492	216	23	0	0	1823
57	0	0	0	26	134	298	468	431	171	11	0	0	1539
60	0	0	0	15	87	219	381	344	114	3	0	0	1163
65	0	0	0	5	34	113	243	211	49	0	0	0	655
70	0	0	0	0	10	43	136	111	15	0	0	0	315

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	0	29	199	558	800	985	942	618	276	32	0	0	0	29	228	786	1586	2571	3513	4131	4407	4439	4439
45	0	0	6	113	408	650	830	787	473	168	10	0	0	0	6	119	527	1177	2007	2794	3267	3435	3445	3445
50	0	0	0	58	270	500	675	632	332	90	1	0	0	0	0	58	328	828	1503	2135	2467	2557	2558	2558
55	0	0	0	27	158	352	520	478	207	38	0	0	0	0	0	27	185	537	1057	1535	1742	1780	1780	1780
60	0	0	0	10	74	214	366	325	117	11	0	0	0	0	0	10	84	298	664	989	1106	1117	1117	1117
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	1	24	140	342	509	656	617	381	170	22	0	0	1	25	165	507	1016	1672	2289	2670	2840	2862	2862

(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