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: RED WILLOW DAM, NE **COOP ID: 257110**

Climate Division: NE 7 **NWS Call Sign:** **Elevation: 2,561 Feet** **Lat: 40˚21N** **Lon: 100˚40W**

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	37.5	11.5	24.5	72	1990	11	34.4	1986	-23	1963	28	11.3	1979	1256	0	.0	.0	6.7	10.2	30.9	5.7
Feb	43.8	16.1	30.0	80	1970	18	38.4	1976	-20+	1985	6	17.2	1978	982	0	.0	.0	11.0	7.0	27.5	3.4
Mar	52.6	24.4	38.5	87	1967	30	45.4	1986	-14+	1978	5	32.4	1996	822	0	.0	.0	18.3	2.7	26.4	.6
Apr	63.4	34.1	48.8	93+	1980	22	56.3	1981	10	1994	6	43.4	1984	489	1	.0	.5	25.1	.3	13.8	.0
May	72.5	45.6	59.1	102+	2000	30	64.0	1977	22	1976	4	53.1	1995	215	30	.1	1.1	30.5	.0	1.9	.0
Jun	83.3	56.0	69.7	105+	1988	22	76.3	1988	25	1964	9	64.3	1982	36	174	.9	7.8	29.9	.0	.0	.0
Jul	88.8	61.6	75.2	109	1990	2	80.0	1980	40	1990	14	70.1	1992	2	320	3.1	15.5	31.0	.0	.0	.0
Aug	87.4	59.2	73.3	105+	1995	9	80.3	1983	39	1967	27	67.2	1992	14	270	1.4	13.5	31.0	.0	.0	.0
Sep	78.9	48.3	63.6	104	1971	8	70.0	1998	18	1984	30	58.4	1993	118	76	.5	5.9	29.6	.0	1.7	.0
Oct	67.5	35.5	51.5	95	1967	4	54.0	1975	10+	1997	27	46.5	1976	419	1	.0	.5	28.5	.2	11.7	.0
Nov	50.2	22.7	36.5	84	1980	7	43.6	1999	-10+	1986	14	28.4	1985	856	0	.0	.0	16.2	2.8	26.8	.4
Dec	40.6	14.8	27.7	77	1964	24	35.7	1979	-29+	1989	23	10.3	1983	1157	0	.0	.0	8.5	8.0	30.9	3.3
Ann	63.9	35.8	49.9	109	Jul 1990	2	80.3	Aug 1983	-29+	Dec 1989	23	10.3	Dec 1983	6366	872	6.0	44.8	266.3	31.2	171.6	13.4

\+ 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: 1962-2001

(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	.35	.23	.87	1988	19	1.30	1992	.00+	1987
Feb	.47	.30	1.27	1971	19	1.45	1987	.00+	1996
Mar	1.18	.71	1.71	1983	5	4.69	1983	.00	1994
Apr	1.99	1.75	2.03	1979	25	4.51	1984	.06	1989
May	3.10	2.69	3.47	1977	21	6.60	1977	.25	2000
Jun	3.35	3.44	3.21	1985	26	6.95	1975	.21	1978
Jul	2.91	2.30	2.87	1981	18	9.53	1993	.46	1999
Aug	2.73	2.96	3.54	1988	13	6.75	1999	.12	1983
Sep	1.31	.91	2.83	1969	18	5.12	1996	.13	1974
Oct	1.27	.94	1.72	1997	25	3.47	1997	.01	1999
Nov	.84	.61	1.38	1975	20	3.19	1975	.01	1989
Dec	.45	.27	1.20	1982	28	3.40	1982	.00	1995
Ann	19.95	19.34	3.54	Aug 1988	13	9.53	Jul 1993	.00+	Feb 1996

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	2.6	1.1	.1	.0
Feb	3.2	1.5	.2	@
Mar	5.7	3.0	.7	.1
Apr	6.9	3.9	1.3	.5
May	10.0	6.0	1.9	.6
Jun	8.1	5.4	1.9	.8
Jul	8.2	5.2	1.6	.8
Aug	7.2	4.7	1.4	.7
Sep	5.3	2.9	.9	.2
Oct	4.3	2.4	.8	.4
Nov	3.7	1.9	.6	@
Dec	2.9	.9	.2	@
Ann	68.1	38.9	11.6	4.1

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	.00	.02	.06	.11	.17	.24	.32	.42	.57	.81	1.06
Feb	.00	.02	.08	.15	.23	.32	.43	.57	.78	1.12	1.46
Mar	.04	.13	.30	.47	.65	.87	1.12	1.44	1.89	2.63	3.36
Apr	.40	.58	.87	1.14	1.41	1.70	2.03	2.43	2.95	3.79	4.58
May	.65	.94	1.39	1.81	2.22	2.67	3.17	3.77	4.56	5.83	7.03
Jun	.91	1.23	1.71	2.14	2.55	2.99	3.47	4.04	4.78	5.95	7.04
Jul	.59	.86	1.29	1.67	2.07	2.49	2.96	3.54	4.29	5.50	6.65
Aug	.37	.60	.99	1.37	1.76	2.20	2.71	3.34	4.18	5.56	6.89
Sep	.10	.18	.35	.53	.73	.96	1.24	1.59	2.08	2.91	3.73
Oct	.04	.09	.22	.38	.57	.81	1.11	1.50	2.07	3.06	4.06
Nov	.04	.09	.19	.30	.43	.58	.76	1.00	1.34	1.92	2.50
Dec	.00	.01	.05	.10	.16	.25	.36	.51	.74	1.14	1.56
Ann	13.70	14.89	16.42	17.60	18.64	19.66	20.71	21.87	23.29	25.35	27.14

\+ 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: 1962-2001
(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	4.0	3.2	2	#
Feb	2.6	1.5	1	1
Mar	1.9	1.6	#	#
Apr	.8	.0	#	0
May	.0	.0	0	0
Jun	.0	.0	0	0
Jul	.0	.0	#	0
Aug	.0	.0	0	0
Sep	.0	.0	#	0
Oct	.2	.0	#	0
Nov	2.4	1.5	#	#
Dec	3.7	2.8	1	#
Ann	15.6	10.6	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	10.0	1990	20	10.0+	1990	18	1993	16	11	1993
Feb	6.5	1975	15	11.0	1975	12	1978	15	8	1978
Mar	12.0	1984	19	12.0	1984	12	1984	19	1	1995
Apr	4.0	1984	2	4.5	1974	5	1983	9	1	1983
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	#	2000	4	#	2000
Aug	.0	0	0	.0	0	0	0	0	0	0
Sep	.0	0	0	.0	0	7	1985	29	#	1985
Oct	4.0	1997	26	4.0	1997	5	1997	26	#+	1997
Nov	10.0	1975	20	17.0	1975	12	1983	30	3+	2000
Dec	8.0	1982	28	16.0	1973	14	1982	29	5	1983
Ann	12.0	Mar 1984	19	17.0	Nov 1975	18	Jan 1993	16	11	Jan 1993

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	2.3	1.4	.4	.2	.1
Feb	1.9	1.1	.4	.2	.0
Mar	1.5	.9	.2	.1	@
Apr	.6	.5	.1	.0	.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	.0	.0
Oct	.1	@	@	.0	.0
Nov	1.2	.8	.2	.1	@
Dec	1.7	1.2	.4	.2	.0
Ann	9.3	5.9	1.7	.8	.1

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	6.2	3.2	1.2	.1
Feb	4.7	2.1	.3	.0
Mar	1.9	.4	.1	@
Apr	.3	.1	.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	.0	.0	.0
Nov	2.3	1.2	.9	.2
Dec	4.8	2.0	.6	.0
Ann	20.3	9.0	3.1	.3

+ 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	5/17	5/14	5/11	5/09	5/05	5/01
32	5/17	5/13	5/10	5/07	5/04	5/02	4/29	4/26	4/22
28	5/10	5/05	5/01	4/28	4/25	4/22	4/19	4/15	4/10
24	4/27	4/22	4/19	4/16	4/13	4/10	4/07	4/04	3/30
20	4/14	4/10	4/06	4/04	4/01	3/29	3/26	3/23	3/19
16	4/10	4/04	3/31	3/27	3/24	3/21	3/17	3/13	3/07

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	9/17	9/20	9/22	9/24	9/27	9/30	10/04
32	9/16	9/20	9/23	9/26	9/29	10/01	10/04	10/07	10/11
28	9/28	10/03	10/06	10/09	10/11	10/14	10/17	10/20	10/24
24	10/07	10/12	10/15	10/18	10/21	10/24	10/27	10/30	11/04
20	10/11	10/18	10/22	10/26	10/30	11/02	11/06	11/10	11/17
16	10/23	10/29	11/02	11/05	11/09	11/12	11/15	11/19	11/25

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	146	141	137	133	130	127	124	120	114
32	164	158	154	150	146	143	139	135	129
28	184	178	175	171	168	165	162	158	153
24	210	203	199	194	191	187	182	178	171
20	232	224	219	215	211	207	202	197	190
16	256	246	240	234	229	224	218	211	202

***** 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	1256	982	822	489	215	36	2	14	118	419	856	1157	6366
60	1101	842	667	346	113	9	0	2	49	270	706	1002	5107
57	1008	758	574	266	69	3	0	0	24	189	616	909	4416
55	946	708	512	218	47	1	0	0	13	142	556	847	3990
50	793	577	366	119	14	0	0	0	2	57	416	701	3045
32	310	203	40	0	0	0	0	0	0	0	73	253	879

Base — Cooling Degree Days (1)

Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	77	145	241	503	838	1128	1340	1279	947	604	207	119	7428
55	0	6	0	31	172	439	627	566	271	33	0	0	2145
57	0	1	0	19	132	381	565	505	221	19	0	0	1843
60	0	0	0	8	82	297	472	414	156	6	0	0	1435
65	0	0	0	1	30	174	320	270	76	1	0	0	872
70	0	0	0	0	7	84	182	149	29	0	0	0	451

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	37	110	296	591	884	1089	1033	715	372	82	12	1	38	148	444	1035	1919	3008	4041	4756	5128	5210	5222
45	0	10	51	184	439	734	934	878	568	241	33	0	0	10	61	245	684	1418	2352	3230	3798	4039	4072	4072
50	0	1	18	101	296	585	779	723	423	135	7	0	0	1	19	120	416	1001	1780	2503	2926	3061	3068	3068
55	0	0	3	47	174	439	624	568	293	60	0	0	0	0	3	50	224	663	1287	1855	2148	2208	2208	2208
60	0	0	0	17	82	295	469	414	178	17	0	0	0	0	0	17	99	394	863	1277	1455	1472	1472	1472
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	24	63	127	230	370	562	706	667	457	286	92	33	24	87	214	444	814	1376	2082	2749	3206	3492	3584	3617

(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