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: RIVERDALE, ND **COOP ID: 327585**

Climate Division: ND 4 **NWS Call Sign:** **Elevation: 1,960 Feet** **Lat: 47˚29N** **Lon: 101˚23W**

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	.0	.0	.0	55	1981	24	.0	0	-40	1977	8	.0	0	0	0	.0	.0	.1	24.4	30.9	17.3
Feb	.0	.0	.0	65	1958	26	.0	0	-33	1959	1	.0	0	0	0	.0	.0	.8	18.4	28.1	11.0
Mar	.0	.0	.0	74	1963	24	.0	0	-32	1962	1	.0	0	0	0	.0	.0	5.1	11.3	29.4	3.8
Apr	.0	.0	.0	92+	1980	22	.0	0	-5+	1975	2	.0	0	0	0	.0	.1	17.8	1.7	21.4	.2
May	.0	.0	.0	97	1969	28	.0	0	16	1979	4	.0	0	0	0	.0	.4	29.2	.0	3.3	.0
Jun	.0	.0	.0	99+	1968	4	.0	0	30	1969	20	.0	0	0	0	@	1.9	30.0	.0	@	.0
Jul	.0	.0	.0	104+	1977	18	.0	0	38	1972	4	.0	0	0	0	.4	4.2	31.0	.0	.0	.0
Aug	.0	.0	.0	102+	1978	13	.0	0	34	1979	14	.0	0	0	0	.3	5.1	31.0	.0	.0	.0
Sep	.0	.0	.0	105	1978	6	.0	0	16	1974	30	.0	0	0	0	.1	1.1	28.7	.0	2.5	.0
Oct	.0	.0	.0	95	1953	2	.0	0	9+	1972	18	.0	0	0	0	.0	.1	21.6	.9	15.8	@
Nov	.0	.0	.0	78	1999	8	.0	0	-20	1977	26	.0	0	0	0	.0	.0	4.9	11.2	28.5	2.7
Dec	.0	.0	.0	61	1979	5	.0	0	-35+	1980	19	.0	0	0	0	.0	.0	.4	21.6	30.9	12.0
Ann	.0	.0	.0	105	Sep 1978	6	-99.9	0	-40	Jan 1977	8	99.9	0	0	0	.8	12.9	200.6	89.5	190.8	47.0

\+ 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	.37	.37	.60	1949	8	.80	1982	.04	1979
Feb	.29	.24	.74	1951	28	.90	1998	.00	1978
Mar	.39	.33	.50	1949	23	1.07	1982	.11	1981
Apr	1.16	.95	2.20	1964	27	3.48	1974	.00	1977
May	2.04	1.90	1.86	1965	6	4.94	1999	.32	1980
Jun	3.18	3.13	4.15	1966	25	4.92	1998	.66	1974
Jul	2.37	2.28	2.41	1957	17	5.26	1993	.33	1971
Aug	1.78	1.84	3.45	1951	25	3.55	1980	.03	1971
Sep	1.70	1.40	3.31	1978	12	5.00	1977	.41	1993
Oct	1.17	.85	2.00	1971	2	4.50	1971	.11	1987
Nov	.38	.33	1.10	2000	3	1.68	2000	.00	1979
Dec	.26	.24	.90	1967	18	.93	1977	.00	2000
Ann	15.09	14.65	4.15	Jun 1966	25	5.26	Jul 1993	.00+	Dec 2000

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	3.6	1.5	@	.0
Feb	5.7	1.2	.1	.0
Mar	4.6	2.2	.2	.1
Apr	7.3	3.3	.6	.1
May	7.2	3.9	1.2	.4
Jun	12.3	6.5	2.0	.4
Jul	7.7	4.8	1.2	.2
Aug	9.7	4.5	1.0	.2
Sep	6.9	3.2	.8	.2
Oct	5.6	3.0	.8	.2
Nov	5.5	2.0	.2	.1
Dec	4.6	.5	@	.0
Ann	80.7	36.6	8.1	1.9

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	.07	.11	.16	.21	.26	.31	.37	.45	.54	.70	.85
Feb	.06	.10	.14	.18	.22	.26	.30	.35	.41	.52	.61
Mar	.12	.15	.21	.26	.30	.35	.40	.47	.55	.67	.79
Apr	.07	.19	.37	.54	.72	.92	1.15	1.43	1.82	2.45	3.06
May	.55	.75	1.04	1.30	1.55	1.82	2.11	2.46	2.91	3.63	4.29
Jun	1.42	1.70	2.10	2.42	2.71	3.01	3.34	3.70	4.17	4.87	5.51
Jul	.70	.92	1.26	1.55	1.84	2.13	2.46	2.84	3.34	4.12	4.84
Aug	.36	.52	.78	1.02	1.26	1.52	1.81	2.16	2.63	3.37	4.07
Sep	.40	.56	.80	1.03	1.25	1.48	1.74	2.06	2.47	3.12	3.73
Oct	.09	.17	.33	.49	.67	.87	1.11	1.42	1.84	2.55	3.25
Nov	.03	.07	.14	.19	.25	.31	.39	.47	.59	.78	.97
Dec	.01	.04	.07	.11	.15	.20	.26	.32	.42	.57	.72
Ann	10.53	11.41	12.53	13.38	14.15	14.88	15.64	16.49	17.51	19.00	20.29

\+ 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:
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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	16.2	-99.9	5	4
Feb	1.6	-99.9	5	3
Mar	2.3	-99.9	3	2
Apr	.8	.0	1	#
May	.0	.0	0	0
Jun	.0	.0	0	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	.4	.0	0	0
Oct	.9	.0	#	0
Nov	1.6	2.0	1	#
Dec	1.0	-99.9	3	2
Ann	24.8	-9.9	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	1.2	2000	3	16.2	1972	10	1980	31	8+	1980
Feb	4.0	1972	28	6.4	1972	18	1979	28	13+	1980
Mar	5.0	1972	27	9.3	1972	19	1979	7	13	1979
Apr	4.0	1978	2	4.0	1978	9	1975	6	4	1975
May	.5	1979	4	.5	1979	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	5.0	1972	26	5.0	1972	0	0	0	0	0
Oct	3.0	1972	30	7.0	1972	1	1976	26	#	1976
Nov	3.0	1978	13	3.0+	1976	6	1978	30	3	1978
Dec	2.0	1974	13	2.0	1974	9	1977	14	6+	1978
Ann	5.0+	Sep 1972	26	16.2	Jan 1972	19	Mar 1979	7	13+	Feb 1980

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	-9.9	-9.9	-9.9	-9.9	-9.9
Feb	-9.9	-9.9	-9.9	-9.9	-9.9
Mar	-9.9	-9.9	-9.9	-9.9	-9.9
Apr	.7	.4	.2	.0	.0
May	.1	.0	.0	.0	.0
Jun	.0	.0	.0	.0	.0
Jul	.0	.0	.0	.0	.0
Aug	.0	.0	.0	.0	.0
Sep	.1	.1	.1	.1	.0
Oct	.4	.4	.2	.0	.0
Nov	-9.9	-9.9	-9.9	-9.9	-9.9
Dec	-9.9	-9.9	-9.9	-9.9	-9.9
Ann	-9.9	-9.9	-9.9	-9.9	-9.9

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	-9.9	-9.9	-9.9	-9.9
May	-9.9	-9.9	-9.9	-9.9
Jun	-9.9	-9.9	-9.9	-9.9
Jul	-9.9	-9.9	-9.9	-9.9
Aug	-9.9	-9.9	-9.9	-9.9
Sep	-9.9	-9.9	-9.9	-9.9
Oct	-9.9	-9.9	-9.9	-9.9
Nov	-9.9	-9.9	-9.9	-9.9
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

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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	5/31	5/26	5/23	5/20	5/18	5/15	5/13	5/10	5/05
32	5/22	5/18	5/15	5/13	5/11	5/08	5/06	5/03	4/29
28	5/13	5/09	5/05	5/02	4/30	4/27	4/24	4/21	4/16
24	5/06	5/01	4/28	4/25	4/22	4/19	4/16	4/12	4/07
20	4/26	4/21	4/17	4/13	4/10	4/07	4/04	3/31	3/25
16	4/18	4/12	4/08	4/05	4/02	3/30	3/26	3/22	3/17

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

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	136	130	126	122	119	115	111	107	101
32	156	149	144	140	136	132	127	122	116
28	173	166	161	157	153	149	145	140	133
24	188	181	177	173	170	166	162	158	152
20	215	207	202	197	192	187	182	176	168
16	238	228	221	215	209	204	198	190	181

***** 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	0	0	0	0	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0	0	0	0	0
57	0	0	0	0	0	0	0	0	0	0	0	0	0
55	0	0	0	0	0	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0	0	0	0	0	0

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	0	0	0	0	0	0	0	0	0	0	0	0	0
55	0	0	0	0	0	0	0	0	0	0	0	0	0
57	0	0	0	0	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0	0	0	0	0
65	0	0	0	0	0	0	0	0	0	0	0	0	0
70	0	0	0	0	0	0	0	0	0	0	0	0	0

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	14	140	455	714	903	864	506	193	18	0	0	0	14	154	609	1323	2226	3090	3596	3789	3807	3807
45	0	0	3	71	314	564	748	709	367	105	8	0	0	0	3	74	388	952	1700	2409	2776	2881	2889	2889
50	0	0	0	29	188	414	593	554	241	44	0	0	0	0	0	29	217	631	1224	1778	2019	2063	2063	2063
55	0	0	0	13	97	271	438	402	138	11	0	0	0	0	0	13	110	381	819	1221	1359	1370	1370	1370
60	0	0	0	2	37	155	285	255	66	2	0	0	0	0	0	2	39	194	479	734	800	802	802	802
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	1	16	109	282	432	580	543	306	137	20	0	0	1	17	126	408	840	1420	1963	2269	2406	2426	2426

(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