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: ROLLA 3 NW, ND **COOP ID: 327664**

Climate Division: ND 2 **NWS Call Sign:** **Elevation: 1,950 Feet** **Lat: 48˚54N** **Lon: 99˚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	13.1	-4.9	4.1	53	1973	25	16.8	1990	-40	1950	26	-11.5	1982	1890	0	.0	.0	.2	26.7	30.9	19.4
Feb	19.9	1.3	10.6	57	1988	28	23.6	1984	-43	1996	2	-6.1	1979	1524	0	.0	.0	.3	21.7	28.1	13.0
Mar	30.1	12.9	21.5	71	1963	23	31.7	2000	-31	1962	1	12.3	1974	1348	0	.0	.0	1.8	16.1	30.1	5.5
Apr	47.9	27.2	37.6	94	1980	22	46.1	1987	-20	1975	12	27.0	1979	825	1	.0	.1	13.8	4.2	20.7	.9
May	63.5	39.7	51.6	94	1980	23	61.3	1977	11	1967	3	43.1	1974	433	18	.0	.2	27.2	.2	5.7	.0
Jun	70.8	49.4	60.1	97+	1988	28	71.4	1988	29	1964	1	53.6	1985	195	48	.0	.7	29.7	.0	.1	.0
Jul	75.3	54.8	65.1	100+	1988	29	70.5	1989	36	1967	3	59.0	1992	88	90	@	.8	31.0	.0	.0	.0
Aug	74.7	53.2	64.0	101	1949	7	70.5	1983	33+	1968	14	57.8	1977	128	96	@	1.4	31.0	.0	.0	.0
Sep	63.3	42.8	53.1	98	1976	7	58.6	1998	17	1965	26	47.9	1985	368	9	.0	.3	27.0	.0	2.6	.0
Oct	50.5	31.2	40.9	90	1958	13	46.4	1973	-1	1991	31	35.0	1991	749	0	.0	.0	16.5	2.1	16.9	@
Nov	30.6	15.2	22.9	71	1975	5	34.1	1999	-34	1985	27	11.4	1985	1263	0	.0	.0	2.5	16.6	28.3	3.6
Dec	17.5	.9	9.2	53	1969	1	23.6	1997	-37+	1983	23	-3.6	1983	1730	0	.0	.0	.1	25.5	30.9	15.0
Ann	46.4	27.0	36.7	101	Aug 1949	7	71.4	Jun 1988	-43	Feb 1996	2	-11.5	Jan 1982	10541	262	.0	3.5	181.1	113.1	194.3	57.4

\+ 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: 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	.51	.38	1.08	1989	7	2.32	1989	.02	1973
Feb	.52	.40	.83	1974	28	2.14	1972	.00	1971
Mar	.76	.75	2.02	1971	14	2.91	1971	.03	1977
Apr	1.13	.85	2.37	1991	28	4.22	1991	.03	1980
May	2.30	2.13	2.60	1981	23	6.76	1999	.23	1980
Jun	3.41	3.32	3.29	1954	7	6.80	1993	.87	1974
Jul	2.87	2.79	3.59	1965	21	7.97	1993	.10	1985
Aug	2.55	2.14	3.29	1968	24	7.40	1980	.70	1971
Sep	1.95	1.86	2.57	1980	12	5.25	1980	.39	1998
Oct	1.25	.80	2.14	1994	7	5.30	1994	.06	1976
Nov	.80	.73	1.50	2000	2	3.13	2000	.04	1976
Dec	.53	.44	.96	1982	2	1.39	1977	.18	1986
Ann	18.58	18.57	3.59	Jul 1965	21	7.97	Jul 1993	.00	Feb 1971

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	7.1	1.7	@	@
Feb	5.8	1.5	@	.0
Mar	5.7	2.1	.2	.1
Apr	5.8	2.8	.7	.2
May	8.9	5.2	1.4	.5
Jun	11.4	7.1	2.4	.6
Jul	10.1	5.8	2.0	.5
Aug	9.0	5.4	1.3	.5
Sep	8.2	4.7	1.1	.3
Oct	6.2	3.3	.7	.2
Nov	6.4	2.5	.3	@
Dec	6.3	1.7	.1	.0
Ann	90.9	43.8	10.2	2.9

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	.12	.19	.26	.33	.41	.51	.62	.78	1.03	1.27
Feb	.03	.08	.16	.24	.32	.41	.51	.64	.81	1.10	1.37
Mar	.08	.14	.25	.35	.47	.59	.74	.93	1.18	1.60	2.01
Apr	.05	.11	.24	.39	.57	.77	1.03	1.36	1.82	2.63	3.43
May	.48	.69	1.02	1.33	1.64	1.97	2.35	2.80	3.39	4.34	5.24
Jun	1.23	1.55	2.01	2.40	2.77	3.15	3.56	4.04	4.65	5.60	6.47
Jul	.43	.67	1.09	1.49	1.90	2.35	2.87	3.51	4.37	5.76	7.10
Aug	.67	.91	1.28	1.60	1.92	2.26	2.64	3.08	3.66	4.57	5.43
Sep	.48	.66	.95	1.20	1.45	1.72	2.01	2.36	2.82	3.55	4.23
Oct	.07	.14	.29	.46	.65	.88	1.16	1.51	2.01	2.87	3.72
Nov	.04	.09	.19	.29	.42	.56	.74	.96	1.28	1.82	2.35
Dec	.14	.19	.26	.33	.40	.47	.55	.64	.76	.95	1.13
Ann	13.06	14.12	15.49	16.53	17.45	18.35	19.27	20.30	21.54	23.34	24.90

\+ 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	9.2	7.4	11	11
Feb	6.9	4.7	13	15
Mar	9.1	4.6	10	7
Apr	3.3	.8	2	0
May	.8	.0	#	0
Jun	.0	.0	0	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	.1	.0	0	0
Oct	1.5	.0	#	0
Nov	5.9	5.4	1	#
Dec	7.4	7.5	6	4
Ann	44.2	30.4	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	16.0	1989	7	35.5	1989	21	1974	31	17+	1978
Feb	8.0	1976	29	16.6	1972	26	1976	29	22	1974
Mar	15.6	1971	14	27.4	1971	32	1976	13	27	1976
Apr	6.0	1979	12	21.0	1979	35	1979	14	24	1979
May	12.0	1991	4	12.0	1991	#+	1999	31	#+	1999
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	1972	26	2.0	1972	0	0	0	0	0
Oct	5.0	1991	29	11.0	1991	2	1971	16	#+	1999
Nov	6.1	1984	26	13.4	1977	13	1977	30	5	1978
Dec	9.0	1974	23	15.5	1977	25	1977	19	20	1996
Ann	16.0	Jan 1989	7	35.5	Jan 1989	35	Apr 1979	14	27	Mar 1976

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	7.2	2.9	.9	.2	.1
Feb	5.3	2.3	.6	.2	.0
Mar	4.3	2.3	.9	.4	.2
Apr	2.2	1.0	.4	.1	.0
May	.2	.1	.1	@	@
Jun	.0	.0	.0	.0	.0
Jul	.0	.0	.0	.0	.0
Aug	.0	.0	.0	.0	.0
Sep	@	@	.0	.0	.0
Oct	.6	.5	.2	@	.0
Nov	4.1	1.6	.6	.2	.0
Dec	5.8	2.5	.7	.3	.0
Ann	29.7	13.2	4.4	1.4	.3

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	.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	-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	6/11	6/07	6/04	6/01	5/29	5/27	5/24	5/21	5/16
32	5/27	5/23	5/21	5/18	5/16	5/14	5/11	5/08	5/05
28	5/16	5/12	5/09	5/07	5/04	5/02	4/30	4/27	4/23
24	5/09	5/05	5/02	4/29	4/26	4/23	4/21	4/17	4/13
20	5/07	5/01	4/27	4/23	4/20	4/16	4/13	4/08	4/03
16	4/20	4/16	4/13	4/10	4/08	4/05	4/03	3/31	3/26

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

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	133	125	120	115	111	107	102	97	89
32	148	142	138	134	131	127	123	119	113
28	171	165	160	156	153	149	145	140	134
24	191	184	179	175	171	167	162	157	150
20	207	199	194	189	184	180	175	170	162
16	226	219	213	209	205	201	197	192	185

***** 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	1890	1524	1348	825	433	195	88	128	368	749	1263	1730	10541
60	1735	1384	1193	680	305	109	28	59	238	594	1113	1575	9013
57	1642	1300	1100	595	240	69	12	33	172	501	1023	1482	8169
55	1580	1244	1038	541	201	48	7	21	133	440	963	1420	7636
50	1425	1104	885	412	121	17	0	5	59	293	813	1265	6399
32	890	629	390	95	5	0	0	0	0	21	340	735	3105

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	23	29	64	261	613	843	1025	991	631	295	67	28	4870
55	0	0	0	16	96	201	319	299	74	1	0	0	1006
57	0	0	0	11	73	162	262	248	53	0	0	0	809
60	0	0	0	6	45	112	185	182	29	0	0	0	559
65	0	0	0	1	18	48	90	96	9	0	0	0	262
70	0	0	0	0	5	16	29	38	2	0	0	0	90

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	4	107	404	630	800	761	413	143	12	0	0	0	4	111	515	1145	1945	2706	3119	3262	3274	3274
45	0	0	0	59	274	482	645	606	278	76	1	0	0	0	0	59	333	815	1460	2066	2344	2420	2421	2421
50	0	0	0	27	168	342	490	451	164	29	0	0	0	0	0	27	195	537	1027	1478	1642	1671	1671	1671
55	0	0	0	8	87	208	337	305	84	7	0	0	0	0	0	8	95	303	640	945	1029	1036	1036	1036
60	0	0	0	1	41	109	196	174	36	2	0	0	0	0	0	1	42	151	347	521	557	559	559	559
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	0	1	75	244	369	492	464	229	91	6	0	0	0	1	76	320	689	1181	1645	1874	1965	1971	1971

(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