

# Climatology of the United States

## No. 20

National Climatic Data Center  
Federal Building  
151 Patton Avenue  
Asheville, North Carolina 28801  
www.ncdc.noaa.gov

**Station: WATFORD CITY 14 S, ND**

**1971-2000**

**COOP ID: 329246**

**Climate Division: ND 4**

**NWS Call Sign:**

**Elevation: 1,945 Feet Lat: 47° 36N**

**Lon: 103° 16W**

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	25.1	2.1	13.6	61	1974	16	26.5	1990	-49	1959	31	-3.7	1982	1593	0	.0	.0	1.3	18.9	30.7	14.0
Feb	32.9	10.2	21.6	67	1992	29	32.6	1984	-42	1996	3	5.5	1979	1217	0	.0	.0	4.5	12.1	27.2	7.5
Mar	44.2	19.8	32.0	78+	1986	28	40.5	1986	-32	1998	11	21.0	1996	1023	0	.0	.0	12.8	6.3	27.7	2.4
Apr	58.7	30.8	44.8	94+	1980	21	53.4	1987	-11+	1975	2	35.0	1975	609	2	.0	.2	23.0	.9	16.9	.2
May	70.8	42.3	56.6	102	1980	23	65.2	1977	17	1954	3	51.1	1996	288	26	.1	1.2	30.0	.0	4.3	.0
Jun	79.2	51.2	65.2	109+	1988	21	77.9	1988	24	1998	3	59.9	1998	109	116	.5	4.2	30.0	.0	.2	.0
Jul	86.0	55.6	70.8	110+	1988	27	77.3	1989	34	1995	1	63.0	1993	43	222	2.2	11.8	31.0	.0	.0	.0
Aug	86.2	54.1	70.2	110	1984	13	76.5	1983	31+	1994	31	63.4	1977	55	213	1.9	12.7	31.0	.0	.1	.0
Sep	74.1	43.1	58.6	107	1978	5	65.0+	1998	15	1965	26	51.6	1984	238	46	.4	3.5	29.1	.0	4.0	.0
Oct	60.7	32.4	46.6	98	1963	4	50.3	1973	-10	1991	30	42.8	1991	572	0	.0	.2	25.3	.4	15.1	@
Nov	40.3	18.4	29.4	80	1999	7	39.7	1999	-27	1985	29	16.6	1985	1070	0	.0	.0	8.6	7.8	27.1	2.7
Dec	29.0	6.7	17.9	65	1979	4	27.7	1999	-45	1983	23	-.7	1983	1461	0	.0	.0	1.9	15.8	30.5	10.1
Ann	57.3	30.6	43.9	110+	Jul 1988	27	77.9	Jun 1988	-49	Jan 1959	31	-3.7	Jan 1982	8278	625	5.1	33.8	228.5	62.2	183.8	36.9

+ 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/normal/usnormals.html](http://www.ncdc.noaa.gov/oa/climate/normal/usnormals.html)

Issue Date: February 2004

(1) From the 1971-2000 Monthly Normals

(2) Derived from station's available digital record: 1951-2001

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

091-A

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**Lon: 103°16W**

Precipitation (inches)																								
	Precipitation Totals									Mean Number of Days (3)				Precipitation Probabilities (1) Probability that the monthly/annual precipitation will be equal to or less than the indicated amount										
	Means/ Medians(1)		Extremes							Daily Precipitation				Monthly/Annual Precipitation vs Probability Levels These values were determined from the incomplete gamma distribution										
Month	Mean	Med-ian	Highest Daily(2)	Year	Day	Highest Monthly(1)	Year	Lowest Monthly(1)	Year	>= 0.01	>= 0.10	>= 0.50	>= 1.00	.05	.10	.20	.30	.40	.50	.60	.70	.80	.90	.95
Jan	.36	.32	.39	1967	13	1.13	1971	.02+	1990	5.0	1.1	.0	.0	.03	.05	.10	.15	.20	.26	.34	.43	.56	.78	.99
Feb	.37	.29	.80	1998	25	1.74	1998	.00	1990	4.6	1.2	.1	.0	.02	.05	.10	.16	.21	.28	.36	.45	.58	.80	1.02
Mar	.62	.58	.65	1962	28	1.51	1975	.00	1981	5.7	2.2	.1	.0	.04	.11	.21	.30	.39	.49	.61	.76	.96	1.28	1.59
Apr	1.30	1.13	1.86	1955	20	4.16	1975	.08	1988	7.4	3.3	.6	.2	.13	.22	.40	.58	.77	.99	1.25	1.58	2.03	2.77	3.50
May	2.15	1.92	3.28	1965	25	6.78	1978	.21	1984	9.7	5.2	1.3	.4	.37	.56	.87	1.17	1.47	1.79	2.17	2.62	3.23	4.21	5.14
Jun	2.89	2.67	3.25	1975	9	6.83	1994	.96	1979	11.4	6.7	1.6	.5	1.13	1.40	1.78	2.09	2.39	2.69	3.02	3.40	3.89	4.63	5.30
Jul	2.17	1.77	2.65	1993	27	7.58	1993	.47	1984	8.1	4.9	1.3	.5	.47	.67	.98	1.27	1.56	1.87	2.22	2.63	3.18	4.06	4.89
Aug	1.70	1.51	2.14	1964	29	5.74	1995	.05	1971	7.2	3.7	.9	.2	.21	.35	.58	.82	1.07	1.35	1.67	2.07	2.61	3.50	4.36
Sep	1.66	1.21	2.90	1971	5	4.96	1991	.18	1997	7.0	3.6	.8	.4	.18	.31	.54	.77	1.02	1.29	1.62	2.03	2.58	3.50	4.39
Oct	1.35	.72	2.50	1971	2	6.10	1982	.00	1973	5.1	2.6	.9	.3	.02	.10	.26	.45	.66	.92	1.23	1.63	2.19	3.16	4.13
Nov	.55	.40	1.81	2000	1	2.91	2000	.02	1987	5.0	1.7	.1	@	.04	.08	.15	.23	.31	.41	.52	.67	.87	1.21	1.55
Dec	.37	.37	.45	2001	5	.94	1972	.02	1997	5.0	1.1	.0	.0	.06	.09	.14	.19	.24	.30	.37	.45	.55	.73	.90
Ann	15.49	15.47	3.28	May 1965	25	7.58	Jul 1993	.00+	Feb 1990	81.2	37.3	7.7	2.5	9.61	10.68	12.09	13.18	14.16	15.13	16.13	17.25	18.63	20.66	22.44

+ 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: 1951-2001

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

Complete documentation available from:  
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**Climate Division: ND 4**

**NWS Call Sign:**

**Elevation: 1,945 Feet**

**Lat: 47°36N**

**Lon: 103°16W**

Snow (inches)																							
Snow Totals															Mean Number of Days (1)								
Means/Medians (1)					Extremes (2)										Snow Fall >= Thresholds					Snow Depth >= Thresholds			
Month	Snow Fall Mean	Snow Fall Median	Snow Depth Mean	Snow Depth Median	Highest Daily Snow Fall	Year	Day	Highest Monthly Snow Fall	Year	Highest Daily Snow Depth	Year	Day	Highest Monthly Mean Snow Depth	Year	0.1	1.0	3.0	5.0	10.0	1	3	5	10
Jan	5.2	3.3	5	3	7.0	1982	22	20.5	1982	21	1982	30	13	1979	4.1	2.4	.6	.1	.0	20.3	15.0	8.8	2.8
Feb	5.0	3.6	4	2	6.0	1972	29	15.0	1998	22	1979	24	17	1979	3.6	1.9	.5	.1	.0	11.3	2.6	.6	.0
Mar	5.2	4.0	2	#	7.0	1990	15	19.0	1975	21	1979	2	12	1979	3.1	2.2	.5	.2	.0	7.4	4.7	3.5	1.9
Apr	3.0	1.1	#	#	13.0	1984	27	15.5	1986	20	1984	26	4	1975	1.1	.9	.3	.2	.1	1.9	1.2	.8	.2
May	.5	.0	#	0	6.5	1983	12	8.5	1983	6	1983	12	#+	1996	.2	.2	@	@	.0	@	@	@	.0
Jun	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Jul	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Aug	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Sep	.0	.0	#	0	1.0	1972	25	1.0	1972	3	1984	24	#+	1995	@	@	.0	.0	.0	@	.0	.0	.0
Oct	1.4	.0	#	0	7.0	1985	8	10.0	1985	6+	1996	21	1	1991	.7	.6	.1	.1	.0	.7	.2	.1	.0
Nov	4.8	3.0	1	#	8.5	1998	18	14.7	1998	18	1993	26	8	1993	2.6	1.6	.5	.2	.0	5.7	2.7	1.7	.1
Dec	6.2	5.5	2	1	6.0	1994	4	15.6	1978	16	1978	30	8	1996	4.2	2.6	.5	.1	.0	13.3	8.4	5.5	.2
Ann	31.3	20.5	N/A	N/A	13.0	Apr 1984	27	20.5	Jan 1982	22	Feb 1979	24	17	Feb 1979	19.6	12.4	3.0	1.0	.1	60.6	34.8	21.0	5.2

+ 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

Complete documentation available from:

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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	6/17	6/11	6/06	6/02	5/30	5/26	5/22	5/18	5/12
32	5/31	5/26	5/22	5/18	5/15	5/12	5/08	5/05	4/29
28	5/22	5/17	5/14	5/11	5/08	5/05	5/02	4/29	4/24
24	5/15	5/10	5/06	5/02	4/29	4/26	4/23	4/19	4/14
20	4/27	4/23	4/20	4/17	4/15	4/13	4/10	4/08	4/04
16	4/18	4/14	4/11	4/08	4/05	4/03	3/31	3/28	3/23
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	8/18	8/24	8/28	8/31	9/03	9/06	9/09	9/13	9/18
32	8/31	9/04	9/07	9/10	9/12	9/15	9/17	9/20	9/25
28	9/14	9/17	9/20	9/22	9/25	9/27	9/29	10/02	10/06
24	9/18	9/24	9/28	10/02	10/05	10/08	10/12	10/16	10/22
20	9/24	10/01	10/07	10/11	10/15	10/19	10/24	10/29	11/05
16	10/08	10/15	10/19	10/23	10/26	10/30	11/02	11/07	11/13
Freeze Free Period									
Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	119	111	105	100	95	91	86	80	72
32	142	134	129	124	119	115	110	105	97
28	159	152	147	143	139	135	130	125	118
24	182	174	168	163	158	153	148	142	134
20	208	199	193	187	182	177	172	165	156
16	227	219	213	208	203	198	193	187	179

\* 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

Complete documentation available from:

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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	1593	1217	1023	609	288	109	43	55	238	572	1070	1461	8278
60	1438	1077	868	467	176	48	14	21	139	418	920	1306	6892
57	1345	993	776	386	123	26	7	11	93	327	830	1213	6130
55	1284	945	716	335	94	16	2	5	68	270	770	1151	5656
50	1138	814	573	223	40	4	0	1	25	146	631	997	4592
32	640	396	171	19	0	0	0	0	0	4	218	501	1949

Base	Cooling Degree Days (1)												
Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	70	103	171	401	762	997	1203	1182	798	455	138	63	6343
55	1	8	3	28	143	323	492	474	176	8	0	0	1656
57	0	0	0	19	110	272	435	418	141	4	0	0	1399
60	0	0	0	9	70	204	349	334	97	1	0	0	1064
65	0	0	0	2	26	116	222	213	46	0	0	0	625
70	0	0	0	0	7	52	129	122	18	0	0	0	328

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	6	50	220	530	776	974	953	582	261	38	1	0	6	56	276	806	1582	2556	3509	4091	4352	4390	4391
45	0	0	13	126	384	626	819	798	440	153	14	0	0	0	13	139	523	1149	1968	2766	3206	3359	3373	3373
50	0	0	5	65	254	476	664	643	302	77	3	0	0	0	5	70	324	800	1464	2107	2409	2486	2489	2489
55	0	0	0	28	147	331	509	490	188	27	0	0	0	0	0	28	175	506	1015	1505	1693	1720	1720	1720
60	0	0	0	7	68	202	356	342	103	7	0	0	0	0	0	7	75	277	633	975	1078	1085	1085	1085
Base	Growing Degree Units for Corn (Monthly)												Growing Degree Units for Corn (Accumulated Monthly)											
50/86	0	13	56	173	350	488	621	605	384	205	37	2	0	13	69	242	592	1080	1701	2306	2690	2895	2932	2934

(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/normal/usnormals.html](http://www.ncdc.noaa.gov/oa/climate/normal/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.  
Complete documentation for the 1971-2000 Normals is available on the internet from:  
[www.ncdc.noaa.gov/oa/climate/normal/usnormals.html](http://www.ncdc.noaa.gov/oa/climate/normal/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 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.

- |   |   |
|---|---|
| <ol style="list-style-type: none"><li>a. Temperature/ Precipitation Tables<ol style="list-style-type: none"><li>1. 1971-2000 Monthly Normals</li><li>2. Cooperative Summary of the Day</li><li>3. National Weather Service station records</li><li>4. 1971-2000 serially complete daily data</li></ol></li><li>b. Degree Day Table<ol style="list-style-type: none"><li>1. Monthly and Annual Heating and Cooling Degree Days Normals to Selected Bases derived from 1971-2000 Monthly Normals</li><li>2. Daily Normal Growing Degree Units to Selected Base Temperatures derived from 1971-2000 serially complete daily data</li></ol></li></ol> | <ol style="list-style-type: none"><li>c. Snow Tables<ol style="list-style-type: none"><li>1. Snow Climatology</li><li>2. Cooperative Summary of the Day</li></ol></li><li>d. Freeze Data Table<br/>1971-2000 serially complete daily data</li></ol> |
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## References

U.S. Climate Normals 1971-2000, [www.ncdc.noaa.gov/normal.html](http://www.ncdc.noaa.gov/normal.html)  
U.S. Climate Normals 1971-2000-Products Clim20, [www.ncdc.noaa.gov/oa/climate/normal/usnormalsprods.html](http://www.ncdc.noaa.gov/oa/climate/normal/usnormalsprods.html)  
Snow Climatology Project Description, [www.ncdc.noaa.gov/oa/climate/monitoring/snowclim/mainpage.html](http://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](http://www1.ncdc.noaa.gov/pub/data/special/serialcomplete_jam_0900.pdf)