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: WILLISTON SLOULIN AP, ND **COOP ID: 329425**

Climate Division: ND 1 **NWS Call Sign: ISN** **Elevation: 1,902 Feet** **Lat: 48˚10N** **Lon: 103˚38W**

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	19.4	-3.3	8.0	53	1981	23	22.3	1990	-40	1966	29	-7.7	1982	1751	0	.0	.0	.1	22.7	30.9	16.3
Feb	27.6	5.9	16.8	66	1992	27	30.8	1998	-41	1962	28	-.1	1979	1336	0	.0	.0	1.6	15.4	27.7	9.5
Mar	40.1	17.2	28.7	78	1978	30	38.8	1986	-28+	1998	11	18.8	1996	1109	0	.0	.0	8.9	8.1	28.5	3.4
Apr	56.0	29.1	42.5	92+	1980	21	50.6	1987	-15	1975	2	32.9	1979	660	1	.0	.1	21.1	1.1	17.4	.1
May	68.2	40.9	54.6	106	1980	22	60.9	1977	17	1980	11	47.5	1979	327	20	.1	.9	29.8	.0	4.2	.0
Jun	77.3	50.1	63.7	106	1988	20	76.4	1988	26	1998	4	57.9	1985	103	79	.4	3.2	30.0	.0	.2	.0
Jul	83.4	55.2	69.3	109	1980	10	75.5	1989	34	1967	3	62.0	1993	27	176	1.0	7.7	31.0	.0	.0	.0
Aug	82.8	53.8	68.3	108	1949	7	76.4	1983	34+	1994	31	60.7	1977	46	164	1.1	8.9	31.0	.0	.0	.0
Sep	70.0	42.2	56.1	104	1983	1	63.1	1998	17	1974	30	49.7	1984	274	23	.3	1.9	28.7	.0	2.9	.0
Oct	57.0	30.2	43.6	93	1963	4	46.3	1973	-3	1991	30	38.5	1972	648	0	.0	.1	22.8	.9	16.4	.1
Nov	36.2	14.9	25.6	76	1999	7	37.4	1999	-27	1996	24	12.2	1985	1167	0	.0	.0	5.4	10.9	28.5	3.5
Dec	24.0	2.1	13.0	58	1979	4	26.1	1999	-50	1983	23	-6.3	1983	1596	0	.0	.0	.5	19.9	30.9	12.0
Ann	53.5	28.2	40.9	109	Jul 1980	10	76.4+	Jun 1988	-50	Dec 1983	23	-7.7	Jan 1982	9044	463	2.9	22.8	210.9	79.0	187.6	44.9

\+ 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/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	.54	.41	.62	1995	16	1.76	1999	.03	1973
Feb	.39	.26	.70	1961	22	1.75	1998	.04	1990
Mar	.74	.69	.69	1983	6	2.26	1975	.02	1977
Apr	1.05	.89	1.90	1967	20	2.81	1975	.03	1983
May	1.88	1.81	1.73	1953	9	4.17	1978	.15	1980
Jun	2.36	2.10	2.53	1956	18	6.16	1991	.46	1997
Jul	2.28	1.76	4.93	1963	10	6.62	1997	.31	1994
Aug	1.48	1.26	3.04	1993	21	4.66	1993	.07	1971
Sep	1.35	1.20	1.60+	1973	3	3.11	1986	.15	1997
Oct	.87	.50	1.82	1971	2	3.56	1971	.09	1993
Nov	.65	.50	1.98	2000	1	3.31	2000	.01	1999
Dec	.57	.51	.88	1982	2	1.43	1982	.02	1997
Ann	14.16	13.47	4.93	Jul 1963	10	6.62	Jul 1997	.01	Nov 1999

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	8.0	1.7	.1	.0
Feb	6.1	1.2	@	.0
Mar	7.8	2.5	.2	.0
Apr	8.1	2.8	.4	.1
May	10.0	5.0	.9	.3
Jun	10.6	5.4	1.5	.3
Jul	9.0	4.9	1.1	.3
Aug	8.0	3.4	.8	.2
Sep	7.4	3.1	.8	.2
Oct	5.6	2.1	.5	.1
Nov	6.7	2.0	.1	@
Dec	8.7	1.5	.1	.0
Ann	96.0	35.6	6.5	1.5

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	.19	.26	.34	.43	.53	.65	.82	1.10	1.37
Feb	.04	.07	.13	.18	.24	.30	.38	.48	.60	.82	1.02
Mar	.12	.19	.30	.40	.50	.62	.75	.91	1.12	1.46	1.79
Apr	.10	.18	.32	.47	.63	.81	1.02	1.28	1.64	2.24	2.82
May	.34	.50	.78	1.03	1.30	1.58	1.90	2.30	2.82	3.66	4.46
Jun	.73	.95	1.29	1.57	1.85	2.14	2.46	2.83	3.31	4.06	4.75
Jul	.34	.53	.86	1.17	1.50	1.86	2.28	2.78	3.46	4.58	5.64
Aug	.23	.35	.57	.77	.98	1.22	1.48	1.80	2.24	2.94	3.62
Sep	.19	.30	.50	.68	.88	1.09	1.34	1.65	2.06	2.73	3.37
Oct	.06	.11	.22	.34	.47	.63	.82	1.06	1.39	1.96	2.52
Nov	.04	.08	.17	.26	.35	.47	.61	.79	1.03	1.45	1.86
Dec	.08	.12	.20	.28	.37	.46	.56	.69	.87	1.16	1.44
Ann	8.85	9.82	11.10	12.09	12.98	13.85	14.76	15.78	17.03	18.86	20.47

\+ 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	8.3	6.4	5	4
Feb	5.6	3.4	3	3
Mar	7.5	6.2	2	2
Apr	3.7	1.9	#	1
May	.9	.0	#	1
Jun	#	.0	#	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	.3	.0	#	0
Oct	1.7	.3	#	0
Nov	6.7	4.6	1	1
Dec	8.2	8.1	3	2
Ann	42.9	30.9	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	10.3	1995	16	28.3	1999	18	1997	1	11+	1999
Feb	6.9	1998	25	21.7	1994	20	1979	23	13	1979
Mar	7.3	1975	27	30.9	1975	22	1975	29	11	1979
Apr	15.0	1986	13	17.6	1986	17	1975	1	4	1975
May	11.8	1983	12	15.5	1983	12	1983	13	1	1983
Jun	#	1998	2	#	1998	0	0	0	#	1990
Jul	.0	0	0	.0	0	0	0	0	0	0
Aug	.0	0	0	.0	0	0	0	0	0	0
Sep	3.0	1972	25	4.0	1984	2+	1984	25	#	1984
Oct	10.5	1985	7	14.2	1985	4+	1991	29	#	1996
Nov	7.1	1993	23	21.2	2000	13+	2000	17	8	2000
Dec	8.3	1995	11	19.8	1996	19+	1996	31	12	1996
Ann	15.0	Apr 1986	13	30.9	Mar 1975	22	Mar 1975	29	13	Feb 1979

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	8.8	2.3	.7	.3	@
Feb	6.2	1.8	.5	.1	.0
Mar	6.1	2.3	.7	.3	.0
Apr	2.7	1.0	.4	.1	.1
May	.5	.2	.1	@	@
Jun	.0	.0	.0	.0	.0
Jul	.0	.0	.0	.0	.0
Aug	.0	.0	.0	.0	.0
Sep	.2	.1	@	.0	.0
Oct	1.2	.5	.2	@	@
Nov	5.9	2.0	.5	.3	.0
Dec	8.8	2.7	.5	.2	.0
Ann	40.4	12.9	3.6	1.3	.1

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	26.3	20.7	14.4	5.3
Feb	17.9	12.9	9.5	2.1
Mar	11.5	7.1	5.6	2.3
Apr	2.4	1.2	.7	.3
May	.1	.1	.1	@
Jun	.0	.0	.0	.0
Jul	.0	.0	.0	.0
Aug	.0	.0	.0	.0
Sep	.1	.0	.0	.0
Oct	.9	.3	.0	.0
Nov	10.2	5.0	2.8	.7
Dec	20.9	13.5	6.7	.9
Ann	90.3	60.8	39.8	11.6

+ 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	6/14	6/07	6/03	5/30	5/26	5/22	5/18	5/13	5/07
32	5/30	5/25	5/21	5/18	5/15	5/13	5/09	5/06	5/01
28	5/19	5/15	5/11	5/08	5/05	5/03	4/30	4/26	4/22
24	5/10	5/05	5/01	4/28	4/25	4/22	4/18	4/15	4/09
20	4/27	4/22	4/18	4/15	4/12	4/09	4/06	4/02	3/28
16	4/18	4/13	4/09	4/06	4/04	4/01	3/29	3/26	3/21

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	9/05	9/08	9/10	9/11	9/13	9/15	9/18	9/21
32	9/09	9/13	9/17	9/19	9/22	9/24	9/27	9/30	10/04
28	9/15	9/20	9/23	9/26	9/29	10/01	10/04	10/08	10/12
24	9/20	9/26	9/30	10/03	10/06	10/09	10/13	10/17	10/22
20	9/28	10/05	10/09	10/13	10/17	10/20	10/24	10/29	11/04
16	10/08	10/14	10/19	10/22	10/26	10/29	11/02	11/06	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	128	121	116	112	108	104	100	95	88
32	149	142	137	133	128	124	120	115	107
28	166	159	154	150	146	142	137	132	125
24	183	177	172	168	164	160	156	151	144
20	211	203	197	192	187	182	177	171	163
16	230	221	215	209	204	199	194	188	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

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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	1751	1336	1109	660	327	103	27	46	274	648	1167	1596	9044
60	1611	1210	972	528	215	63	15	37	186	509	1033	1456	7835
57	1518	1126	879	445	154	35	7	21	130	417	943	1363	7038
55	1456	1070	817	391	120	23	2	14	99	356	883	1301	6532
50	1301	942	674	269	55	6	0	4	41	216	733	1146	5387
32	782	502	243	30	0	0	0	0	0	8	284	633	2482

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	5	27	114	367	728	978	1180	1146	742	399	71	9	5766
55	0	0	0	16	116	296	467	435	134	13	0	0	1477
57	0	0	0	10	86	243	405	376	103	8	0	0	1231
60	0	0	0	5	52	170	315	290	65	3	0	0	900
65	0	0	0	1	20	79	176	164	23	0	0	0	463
70	0	0	0	0	6	30	80	77	7	0	0	0	200

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	1	27	181	491	745	941	905	515	205	17	0	0	1	28	209	700	1445	2386	3291	3806	4011	4028	4028
45	0	0	7	100	348	595	786	750	371	109	4	0	0	0	7	107	455	1050	1836	2586	2957	3066	3070	3070
50	0	0	0	48	222	447	631	595	245	51	1	0	0	0	0	48	270	717	1348	1943	2188	2239	2240	2240
55	0	0	0	16	119	305	477	441	141	12	0	0	0	0	0	16	135	440	917	1358	1499	1511	1511	1511
60	0	0	0	3	54	177	322	301	67	2	0	0	0	0	0	3	57	234	556	857	924	926	926	926
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	2	34	141	309	467	601	568	324	155	20	0	0	2	36	177	486	953	1554	2122	2446	2601	2621	2621

(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