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: FESSENDEN, ND **COOP ID: 322949**

Climate Division: ND 5 **NWS Call Sign:** **Elevation: 1,620 Feet** **Lat: 47˚39N** **Lon: 99˚37W**

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	15.5	-5.7	4.9	52	1990	10	20.2	1990	-39	1936	24	-9.9	1982	1865	0	.0	.0	@	25.1	31.0	17.4
Feb	22.8	1.9	12.4	63	1958	25	25.8	1998	-47	1936	15	-3.8	1979	1475	0	.0	.0	.5	18.0	27.9	11.2
Mar	35.2	15.0	25.1	80	1946	27	34.6	1973	-33	1948	10	15.7	1996	1236	0	.0	.0	4.5	10.0	28.9	3.8
Apr	53.7	29.2	41.5	97	1980	21	51.4	1987	-8	1979	6	31.9	1979	709	2	.0	.1	20.5	1.6	18.3	.2
May	69.1	43.1	56.1	108	1934	31	64.7	1977	5	1951	26	49.2	1979	300	23	.0	.9	30.0	.0	3.6	.0
Jun	76.5	52.6	64.6	107	1936	25	74.6	1988	28	1935	6	58.8	1993	106	93	.1	2.4	30.0	.0	.0	.0
Jul	81.6	56.9	69.3	116	1936	7	75.0	1975	35	1967	3	62.1	1992	47	179	.5	5.5	31.0	.0	.0	.0
Aug	80.9	54.3	67.6	106	1947	4	75.0	1983	30	1934	27	61.9	1977	71	151	.5	5.9	31.0	.0	.1	.0
Sep	70.6	44.2	57.4	106	1978	5	63.2	1978	18+	1965	26	52.2	1984	249	21	.3	1.6	29.2	.0	1.8	.0
Oct	56.0	30.9	43.5	96	1963	4	48.3	1973	-5	1991	31	38.3	1976	668	0	.0	.0	22.7	.8	14.5	.1
Nov	34.2	14.7	24.5	76	1975	5	34.5	1999	-26	1964	29	13.4	1985	1216	0	.0	.0	4.6	12.4	27.6	3.3
Dec	20.4	.4	10.4	67	1939	6	21.8	1997	-37	1967	31	-4.7	1983	1694	0	.0	.0	.2	22.8	30.9	13.1
Ann	51.4	28.1	39.8	116	Jul 1936	7	75.0+	Aug 1983	-47	Feb 1936	15	-9.9	Jan 1982	9636	469	1.4	16.4	204.2	90.7	184.6	49.1

+ 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: 1932-2001

(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	.53	.50	.80	1975	11	1.23	1982	.00	1973
Feb	.43	.28	2.50	1967	5	1.69	1979	.04+	1989
Mar	.67	.57	1.75	1966	4	1.72	1971	.00	1998
Apr	1.12	.84	1.96	1940	29	4.87	1975	.00+	1988
May	2.13	1.91	2.61	1974	19	6.30	1974	.42	1984
Jun	3.47	3.21	4.00	2000	14	6.97	1990	1.05	1989
Jul	2.77	2.45	3.57	1940	28	9.57	1993	.30	1975
Aug	1.93	1.82	3.67	1957	12	7.03	1980	.50	1997
Sep	1.57	1.35	2.91	1947	10	4.29	1977	.00	1993
Oct	1.32	1.13	1.75	1959	8	4.79	1982	.00+	1999
Nov	.67	.60	2.00	2000	2	2.41	2000	.00	1987
Dec	.46	.41	.93	1960	5	1.39	1977	.07	1989
Ann	17.07	17.10	4.00	Jun 2000	14	9.57	Jul 1993	.00+	Oct 1999

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	5.0	1.7	.1	.0
Feb	4.1	1.4	.1	.0
Mar	4.4	2.1	.2	.0
Apr	5.9	3.2	.5	.1
May	7.5	5.1	1.4	.2
Jun	9.9	6.3	2.0	.7
Jul	7.9	5.2	1.7	.6
Aug	7.8	4.9	1.1	.2
Sep	5.7	3.6	1.2	.3
Oct	5.0	2.8	.9	.2
Nov	4.2	2.2	.2	@
Dec	4.5	1.6	.1	.0
Ann	71.9	40.1	9.5	2.3

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	.06	.12	.21	.28	.36	.45	.54	.66	.81	1.05	1.28
Feb	.04	.06	.12	.18	.25	.32	.41	.52	.68	.94	1.20
Mar	.07	.15	.26	.35	.45	.56	.68	.82	1.01	1.32	1.62
Apr	.00	.08	.26	.43	.62	.83	1.08	1.38	1.80	2.51	3.21
May	.45	.64	.95	1.24	1.52	1.83	2.18	2.59	3.14	4.01	4.83
Jun	1.00	1.33	1.83	2.26	2.68	3.11	3.60	4.16	4.90	6.06	7.13
Jul	.56	.81	1.22	1.59	1.97	2.37	2.82	3.37	4.09	5.25	6.35
Aug	.44	.62	.91	1.16	1.41	1.68	1.98	2.34	2.81	3.56	4.26
Sep	.15	.33	.58	.81	1.05	1.30	1.59	1.94	2.41	3.17	3.89
Oct	.00	.04	.20	.38	.60	.86	1.18	1.59	2.18	3.19	4.20
Nov	.06	.14	.25	.34	.44	.55	.68	.83	1.03	1.36	1.67
Dec	.11	.16	.22	.28	.34	.40	.47	.56	.67	.84	1.00
Ann	10.70	11.87	13.40	14.59	15.66	16.70	17.79	19.01	20.50	22.70	24.63

\+ 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: 1932-2001
(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	8.0	5	5
Feb	5.8	4.0	5	2
Mar	3.7	1.5	2	#
Apr	1.1	.0	#	0
May	.0	.0	0	0
Jun	.0	.0	0	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	.1	.0	0	0
Oct	.5	.0	#	0
Nov	4.5	3.5	1	#
Dec	4.7	4.6	2	1
Ann	29.6	21.6	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	12.0	1996	18	28.4	1999	26	1971	29	14	1971
Feb	5.0	1976	2	18.0	1979	30	1971	4	21	1971
Mar	7.0	1971	14	12.0+	1979	25	1979	3	16	1979
Apr	8.0	1979	12	13.3	1979	21	1979	13	9	1979
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	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	6.0	1972	29	6.0	1972	6	1980	23	1	1980
Nov	7.5	1993	24	12.0	1993	11	1973	25	4	1978
Dec	5.7	1998	28	13.9	1995	11	1978	28	7	1977
Ann	12.0	Jan 1996	18	28.4	Jan 1999	30	Feb 1971	4	21	Feb 1971

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	3.7	2.8	1.2	.6	.1
Feb	3.0	2.4	.7	.1	.0
Mar	1.8	1.4	.6	.2	.0
Apr	.3	.2	.1	@	.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
Oct	.1	.1	.1	@	.0
Nov	1.6	1.2	.5	.2	.0
Dec	2.4	1.9	.4	.2	.0
Ann	12.9	10.0	3.6	1.3	.1

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	.1	.0	.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	.3	.3	.2	.0
Nov	5.2	3.2	2.3	.3
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	6/02	5/29	5/25	5/22	5/20	5/17	5/14	5/11	5/06
32	5/22	5/18	5/15	5/13	5/10	5/08	5/06	5/03	4/29
28	5/15	5/11	5/07	5/04	5/02	4/29	4/26	4/23	4/19
24	5/10	5/04	4/30	4/27	4/24	4/21	4/18	4/14	4/09
20	4/29	4/23	4/19	4/15	4/12	4/09	4/06	4/02	3/27
16	4/17	4/12	4/09	4/06	4/04	4/01	3/29	3/26	3/22

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	8/30	9/04	9/08	9/11	9/14	9/17	9/20	9/23	9/28
32	9/09	9/14	9/17	9/20	9/23	9/26	9/29	10/03	10/08
28	9/21	9/25	9/28	10/01	10/04	10/06	10/09	10/12	10/17
24	9/27	10/01	10/05	10/08	10/10	10/13	10/16	10/19	10/24
20	10/05	10/11	10/15	10/18	10/22	10/25	10/28	11/02	11/07
16	10/14	10/19	10/23	10/27	10/30	11/03	11/06	11/10	11/16

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	138	131	125	121	116	112	108	102	95
32	154	147	143	139	135	132	128	123	117
28	173	167	162	158	154	150	146	142	135
24	189	182	177	172	168	164	160	155	147
20	218	209	202	197	192	187	181	175	166
16	231	224	218	213	209	205	200	194	187

***** 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	1865	1475	1236	709	300	106	47	71	249	668	1216	1694	9636
60	1710	1335	1081	565	186	43	14	25	139	513	1066	1539	8216
57	1617	1251	988	483	132	21	7	12	88	422	976	1446	7443
55	1555	1195	926	430	102	13	1	7	61	363	916	1384	6953
50	1400	1055	774	311	47	2	0	0	19	229	767	1229	5833
32	868	591	301	50	0	0	0	0	0	14	304	701	2829

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	27	40	87	334	747	977	1156	1103	762	369	77	30	5709
55	0	0	0	24	136	300	444	396	133	5	0	0	1438
57	0	0	0	16	104	248	387	340	100	2	0	0	1197
60	0	0	0	9	65	180	302	260	61	0	0	0	877
65	0	0	0	2	23	93	179	151	21	0	0	0	469
70	0	0	0	0	6	35	93	74	5	0	0	0	213

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	12	176	532	764	932	885	549	223	21	0	0	0	12	188	720	1484	2416	3301	3850	4073	4094	4094
45	0	0	2	96	387	614	777	730	406	126	8	0	0	0	2	98	485	1099	1876	2606	3012	3138	3146	3146
50	0	0	0	48	255	464	622	575	269	56	0	0	0	0	0	48	303	767	1389	1964	2233	2289	2289	2289
55	0	0	0	18	149	315	467	421	162	19	0	0	0	0	0	18	167	482	949	1370	1532	1551	1551	1551
60	0	0	0	8	78	188	312	275	80	4	0	0	0	0	0	8	86	274	586	861	941	945	945	945
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	0	9	135	338	478	601	568	339	152	14	0	0	0	9	144	482	960	1561	2129	2468	2620	2634	2634

(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