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: HAYES CENTER, NE **COOP ID: 253690**

Climate Division: NE 7 **NWS Call Sign:** **Elevation: 3,051 Feet** **Lat: 40˚31N** **Lon: 101˚01W**

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	37.6	14.1	25.9	75	1951	17	35.9	1986	-21	1984	18	12.1	1979	1214	0	.0	.0	7.0	10.3	30.4	4.8
Feb	43.7	18.6	31.2	80	1970	18	39.6	1976	-19	1951	1	19.2	1989	947	0	.0	.0	10.6	6.9	26.1	2.7
Mar	51.9	25.3	38.6	86+	1986	29	45.1	1986	-17	1960	3	32.2	1996	819	0	.0	.0	17.8	3.3	24.2	.6
Apr	62.4	34.3	48.4	93+	1989	22	55.3	1981	7	1975	2	42.7	1984	500	1	.0	.3	24.4	.3	11.7	.0
May	71.8	45.5	58.7	101	2000	30	63.9	1977	22	1954	3	52.2	1995	229	32	@	.8	30.2	.0	1.1	.0
Jun	82.8	55.3	69.1	109	1952	16	75.8	1988	35	1951	2	63.4	1982	42	163	.8	7.2	29.9	.0	.0	.0
Jul	88.7	60.9	74.8	114	1954	12	78.9	1980	41	1952	8	69.9	1992	2	306	2.6	15.2	31.0	.0	.0	.0
Aug	86.9	58.9	72.9	109	1955	1	78.4	1983	42	1964	23	67.1	1992	13	257	1.2	12.6	31.0	.0	.0	.0
Sep	78.1	49.0	63.6	105	1954	4	71.0	1998	25+	1985	30	57.9	1993	122	78	.3	5.1	29.4	.0	.8	.0
Oct	66.3	37.2	51.8	94+	1997	3	54.7	1979	11+	1997	27	47.1	1976	412	1	.0	.3	27.9	.3	7.8	.0
Nov	49.5	25.0	37.3	85	1980	7	46.3	1999	-7	1955	16	28.3	1985	832	0	.0	.0	15.7	3.5	23.4	.4
Dec	40.4	16.7	28.6	75	1970	1	35.7	1980	-27	1989	22	11.0	1983	1131	0	.0	.0	8.4	8.1	30.0	2.9
Ann	63.3	36.7	50.1	114	Jul 1954	12	78.9	Jul 1980	-27	Dec 1989	22	11.0	Dec 1983	6263	838	4.9	41.5	263.3	32.7	155.5	11.4

\+ 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

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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	1.00	1988	19	1.53	1988	.00	1986
Feb	.60	.28	1.30	1984	17	1.87	1987	.00+	1996
Mar	1.56	1.20	2.67	1983	5	5.46	1983	.09	1994
Apr	2.18	1.89	2.51	1979	25	5.56	1984	.06	1992
May	3.16	3.09	2.16	1962	17	6.39	1996	.39	2000
Jun	3.38	3.40	3.34	1974	9	6.74	1972	.61	1990
Jul	3.22	3.22	5.28	1973	20	7.65	1993	.60	1999
Aug	2.63	1.79	2.65	1952	28	8.33	1992	.13	1991
Sep	1.48	1.24	2.65	1963	21	4.81	1973	.09	1974
Oct	1.45	1.11	2.39	2000	29	3.89	1993	.10	1977
Nov	.93	.76	1.40	1975	19	2.16	1975	.00	1989
Dec	.49	.38	1.10	1982	25	2.03	1982	.00+	1990
Ann	21.59	21.54	5.28	Jul 1973	20	8.33	Aug 1992	.00+	Feb 1996

Mean Number of Days (3)

Month	Daily Precipitation >= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	3.2	1.4	.3	@
Feb	3.7	1.6	.3	.1
Mar	6.3	3.8	1.0	.2
Apr	7.3	4.6	1.3	.5
May	10.5	6.5	2.0	.6
Jun	8.5	5.8	2.2	.8
Jul	8.6	5.6	2.4	.7
Aug	7.1	4.8	1.8	.6
Sep	5.4	3.4	1.0	.2
Oct	5.0	3.1	1.1	.2
Nov	3.7	2.3	.6	.1
Dec	2.9	1.3	.3	@
Ann	72.2	44.2	14.3	4.0

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	.03	.08	.16	.24	.32	.40	.50	.63	.79	1.06	1.33
Feb	.00	.03	.12	.21	.31	.42	.56	.74	.98	1.40	1.81
Mar	.15	.26	.48	.69	.93	1.20	1.51	1.90	2.44	3.34	4.22
Apr	.33	.51	.82	1.12	1.44	1.78	2.17	2.66	3.30	4.36	5.37
May	.94	1.24	1.69	2.08	2.46	2.85	3.28	3.79	4.45	5.48	6.44
Jun	.92	1.24	1.72	2.15	2.57	3.01	3.49	4.07	4.82	5.99	7.09
Jul	1.12	1.43	1.87	2.24	2.60	2.96	3.36	3.83	4.42	5.34	6.18
Aug	.36	.58	.96	1.32	1.70	2.13	2.61	3.21	4.02	5.34	6.61
Sep	.15	.25	.46	.66	.89	1.14	1.44	1.81	2.32	3.16	3.99
Oct	.08	.17	.34	.54	.76	1.02	1.34	1.75	2.32	3.28	4.25
Nov	.05	.14	.29	.42	.57	.73	.91	1.14	1.45	1.96	2.46
Dec	.00	.00	.06	.13	.22	.32	.44	.60	.81	1.19	1.57
Ann	15.76	16.90	18.35	19.44	20.41	21.35	22.31	23.37	24.66	26.52	28.12

+ 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

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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	6.6	4.0	2	1
Feb	5.6	4.0	2	1
Mar	7.8	6.0	1	#
Apr	4.1	1.0	#	#
May	#	.0	#	0
Jun	.0	.0	0	0
Jul	.0	.0	0	0
Aug	.0	.0	0	0
Sep	.1	.0	#	0
Oct	1.7	.0	#	0
Nov	5.0	4.1	1	#
Dec	4.4	4.0	1	1
Ann	35.3	23.1	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	11.0	1990	20	19.0	1988	17	1983	1	7	1993
Feb	13.0	1984	17	17.0	1984	14+	1993	23	8	1993
Mar	18.0	1980	28	31.0	1980	25	1980	29	3	1980
Apr	8.0	1980	1	21.0	1984	18	1980	1	3	1980
May	#	1997	3	#+	1997	3	1984	1	#+	1997
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	2000	25	2.5	2000	6	1985	29	#+	2000
Oct	8.0	1997	26	11.9	1997	12	1997	26	1	1997
Nov	9.0	2000	12	16.0+	1983	16	1975	30	5	1975
Dec	9.5	1982	25	16.5	1982	17	1982	31	9	1983
Ann	18.0	Mar 1980	28	31.0	Mar 1980	25	Mar 1980	29	9	Dec 1983

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	2.8	2.5	.8	.4	.1
Feb	2.5	2.3	.8	.3	.1
Mar	2.7	2.6	.9	.5	.1
Apr	1.3	1.3	.7	.3	.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	.1	@	.0	.0	.0
Oct	.5	.5	.2	.1	.0
Nov	1.9	1.8	.8	.2	.0
Dec	2.2	1.8	.7	.2	.0
Ann	14.0	12.8	4.9	2.0	.3

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	13.0	8.6	5.5	1.6
Feb	9.5	6.1	3.5	.4
Mar	5.2	2.6	1.4	.3
Apr	1.7	1.0	.7	.1
May	@	@	.0	.0
Jun	.0	.0	.0	.0
Jul	.0	.0	.0	.0
Aug	.0	.0	.0	.0
Sep	.0	.0	.0	.0
Oct	.7	.3	.2	.1
Nov	4.9	2.3	1.2	.5
Dec	7.4	5.1	3.0	.9
Ann	42.4	26.0	15.5	3.9

+ 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	5/19	5/16	5/13	5/11	5/09	5/07	5/05	5/03	4/29
32	5/14	5/10	5/07	5/04	5/01	4/29	4/26	4/23	4/19
28	5/03	4/29	4/26	4/23	4/21	4/18	4/16	4/13	4/09
24	4/20	4/16	4/13	4/10	4/07	4/05	4/02	3/30	3/26
20	4/10	4/06	4/02	3/31	3/28	3/25	3/23	3/19	3/15
16	4/03	3/29	3/25	3/21	3/18	3/15	3/12	3/08	3/02

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

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	154	149	145	142	139	136	132	128	123
32	174	169	165	161	158	155	152	148	142
28	196	190	185	181	178	175	171	166	160
24	221	214	209	205	201	197	192	187	180
20	241	234	229	225	222	218	214	209	203
16	265	257	251	246	241	236	231	225	217

***** 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	1214	947	819	500	229	42	2	13	122	412	832	1131	6263
60	1059	807	664	357	126	12	0	2	52	264	682	976	5001
57	966	727	571	276	80	5	0	1	26	184	592	883	4311
55	904	675	509	227	57	2	0	0	15	139	536	821	3885
50	752	544	364	125	19	0	0	0	2	56	398	675	2935
32	282	181	40	1	0	0	0	0	0	0	72	233	809

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	90	158	245	491	827	1111	1327	1267	946	612	230	125	7429
55	0	8	1	28	170	423	614	554	271	37	3	0	2109
57	0	3	0	17	132	365	552	492	222	21	0	0	1804
60	0	0	0	7	84	282	459	401	158	7	0	0	1398
65	0	0	0	1	32	163	306	257	78	1	0	0	838
70	0	0	0	0	8	76	168	138	30	0	0	0	420

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	15	50	126	303	591	884	1092	1037	727	396	104	24	15	65	191	494	1085	1969	3061	4098	4825	5221	5325	5349
45	0	19	62	190	440	734	937	882	580	267	54	4	0	19	81	271	711	1445	2382	3264	3844	4111	4165	4169
50	0	3	25	108	301	586	782	727	435	157	21	0	0	3	28	136	437	1023	1805	2532	2967	3124	3145	3145
55	0	1	7	52	180	439	627	573	303	77	3	0	0	1	8	60	240	679	1306	1879	2182	2259	2262	2262
60	0	0	0	20	89	296	473	420	189	27	0	0	0	0	0	20	109	405	878	1298	1487	1514	1514	1514
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	23	63	114	214	365	561	704	671	457	276	91	34	23	86	200	414	779	1340	2044	2715	3172	3448	3539	3573

(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:
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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