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: READING, MA **COOP ID: 196783**

Climate Division: MA 2 **NWS Call Sign:** **Elevation: 90 Feet** **Lat: 42˚31N** **Lon: 71˚08W**

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	35.2	15.7	25.5	66+	1974	27	32.9	1990	-21	1961	22	16.8	1981	1226	0	.0	.0	2.9	12.8	28.8	3.5
Feb	38.1	18.0	28.1	72	1997	22	34.6	1981	-15+	1961	2	20.1	1979	1035	0	.0	.0	3.8	8.5	25.6	1.7
Mar	46.7	26.2	36.5	92	1998	31	42.2	2000	-9	1967	19	30.8	1984	885	0	.0	@	11.1	2.1	23.8	.1
Apr	57.7	35.1	46.4	93+	1976	18	50.1	1976	13	1964	1	41.6	1972	558	0	.0	.1	23.3	.1	11.8	.0
May	68.8	45.1	57.0	94+	1962	19	62.1	1991	25	1966	3	52.8	1974	257	7	.0	.7	30.2	.0	1.3	.0
Jun	77.0	54.6	65.8	96+	1964	30	70.8	1999	33	1964	6	61.1	1982	59	82	.0	1.9	30.0	.0	.0	.0
Jul	82.5	60.4	71.5	99+	1963	2	75.1	1999	41+	1962	3	67.0	1992	5	204	.0	4.2	31.0	.0	.0	.0
Aug	80.5	59.0	69.8	105	1975	2	73.3	1988	32	1965	31	66.4	1982	10	157	@	2.8	31.0	.0	.0	.0
Sep	72.4	50.4	61.4	95+	1969	1	65.8	1999	26	1965	28	58.8	1978	131	22	.0	.6	30.0	.0	.3	.0
Oct	61.8	39.1	50.5	89	1963	7	55.8	1971	16	1966	31	46.2	1974	453	0	.0	.0	29.1	.0	8.1	.0
Nov	50.9	31.2	41.1	80	1994	5	46.2	1975	-2	1989	24	36.7	1976	719	0	.0	.0	15.3	.6	18.2	@
Dec	39.8	21.6	30.7	78	1998	7	36.9	1990	-14	1980	26	17.9	1989	1063	0	.0	.0	5.1	6.6	27.5	.7
Ann	59.3	38.0	48.7	105	Aug 1975	2	75.1	Jul 1999	-21	Jan 1961	22	16.8	Jan 1981	6401	472	@	10.3	242.8	30.7	145.4	6.0

\+ 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: 1960-2001

(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	4.36	4.15	3.90	1979	25	13.00	1979	.60	1980
Feb	3.57	3.32	2.45	1981	25	7.67	1984	.33	1987
Mar	4.37	3.92	4.83	2001	22	10.80	1983	.82	1981
Apr	4.17	3.64	2.60	1991	21	10.11	1987	.91	1999
May	3.85	3.66	3.51	1984	31	9.70	1984	1.25	1993
Jun	3.64	2.98	5.62	1998	13	11.77	1982	.11	1999
Jul	3.66	3.68	3.80	1996	13	8.82	1988	1.00	1987
Aug	3.50	3.19	3.83	1990	11	8.09	1990	.91+	1995
Sep	3.82	3.17	5.00	1994	23	9.31	1999	.64	1978
Oct	4.37	3.68	7.67	1996	20	12.58	1996	.49	1994
Nov	4.64	4.04	3.40	1985	5	11.02	1983	.81	1976
Dec	4.36	4.11	3.47	1969	26	8.81	1986	1.13	1982
Ann	48.31	46.30	7.67	Oct 1996	20	13.00	Jan 1979	.11	Jun 1999

Mean Number of Days (3)

Month	Daily Precipitation >= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	12.0	7.7	3.1	1.1
Feb	10.2	6.2	2.5	1.0
Mar	12.4	7.7	2.8	1.2
Apr	12.1	7.3	2.8	1.1
May	13.0	8.0	2.6	.8
Jun	11.7	6.6	1.9	.8
Jul	10.6	6.0	2.4	.8
Aug	10.6	6.1	2.3	.9
Sep	10.0	5.9	2.3	1.0
Oct	9.6	6.7	2.9	1.2
Nov	11.0	7.0	3.0	1.4
Dec	12.2	7.2	3.1	1.3
Ann	135.4	82.4	31.7	12.6

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	.93	1.33	1.97	2.55	3.13	3.76	4.46	5.30	6.41	8.19	9.87
Feb	1.10	1.44	1.94	2.38	2.80	3.24	3.72	4.28	5.01	6.15	7.20
Mar	1.54	1.95	2.55	3.06	3.54	4.03	4.57	5.19	5.99	7.23	8.37
Apr	1.49	1.88	2.45	2.93	3.38	3.85	4.36	4.95	5.70	6.87	7.94
May	1.33	1.69	2.22	2.67	3.10	3.54	4.02	4.58	5.30	6.41	7.44
Jun	.38	.65	1.16	1.66	2.21	2.82	3.54	4.44	5.66	7.69	9.67
Jul	1.31	1.65	2.15	2.57	2.97	3.38	3.82	4.34	5.00	6.02	6.96
Aug	.81	1.13	1.65	2.10	2.56	3.05	3.59	4.24	5.09	6.44	7.72
Sep	.83	1.18	1.74	2.25	2.76	3.30	3.91	4.63	5.59	7.12	8.57
Oct	1.38	1.79	2.41	2.93	3.44	3.97	4.55	5.23	6.10	7.46	8.72
Nov	1.45	1.89	2.54	3.10	3.64	4.21	4.83	5.55	6.49	7.94	9.29
Dec	1.07	1.48	2.12	2.68	3.24	3.83	4.49	5.27	6.29	7.92	9.43
Ann	36.73	39.03	41.94	44.13	46.05	47.91	49.81	51.90	54.42	58.04	61.15

+ 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: 1960-2001
(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	16.6	15.1	5	4
Feb	13.1	10.9	5	3
Mar	10.3	6.0	2	1
Apr	3.3	1.1	#	#
May	.3	.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
Nov	3.1	1.7	#	#
Dec	11.0	9.2	2	1
Ann	57.8	44.0	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	18.2	1977	7	43.0	1987	28	1996	8	21	1977
Feb	20.4	1978	7	37.3	1983	30	1978	7	18	1978
Mar	13.3	1993	24	41.7	1993	23	1978	4	12	1978
Apr	18.0	1982	6	20.4	1982	21	1997	1	2	1997
May	5.5	1977	10	7.5	1977	2	1977	10	#	1977
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	.0	0	0	.0	0	0	0	0	0	0
Oct	3.0	1979	10	3.0	1979	3	1979	10	#+	2000
Nov	8.0	1980	18	11.1	1986	6	1986	19	1+	1997
Dec	17.0	1976	29	30.6	1981	20	1976	29	8	1995
Ann	20.4	Feb 1978	7	43.0	Jan 1987	30	Feb 1978	7	21	Jan 1977

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	7.4	4.4	1.9	1.1	.2
Feb	5.7	3.0	1.3	.8	.2
Mar	5.0	2.8	1.2	.6	.3
Apr	1.3	.8	.3	.2	.1
May	.1	.1	@	@	.0
Jun	.0	.0	.0	.0	.0
Jul	.0	.0	.0	.0	.0
Aug	.0	.0	.0	.0	.0
Sep	.0	.0	.0	.0	.0
Oct	.1	@	@	.0	.0
Nov	1.6	.9	.4	.2	.0
Dec	5.8	2.9	1.2	.6	.1
Ann	27.0	14.9	6.3	3.5	.9

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	18.9	15.2	11.3	4.8
Feb	17.5	12.5	9.8	4.9
Mar	10.3	6.3	4.6	2.3
Apr	1.0	.5	.3	.2
May	.1	.0	.0	.0
Jun	.0	.0	.0	.0
Jul	.0	.0	.0	.0
Aug	.0	.0	.0	.0
Sep	.0	.0	.0	.0
Oct	@	@	.0	.0
Nov	2.6	1.0	.3	.0
Dec	10.9	6.1	4.0	1.1
Ann	61.3	41.6	30.3	13.3

+ 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	5/28	5/24	5/21	5/18	5/16	5/14	5/11	5/08	5/04
32	5/17	5/13	5/10	5/07	5/04	5/02	4/29	4/26	4/22
28	5/03	4/28	4/25	4/23	4/21	4/18	4/16	4/13	4/08
24	4/18	4/13	4/10	4/07	4/04	4/01	3/29	3/26	3/21
20	4/04	3/31	3/29	3/26	3/24	3/22	3/20	3/17	3/14
16	3/29	3/25	3/21	3/19	3/16	3/13	3/10	3/07	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	9/16	9/20	9/22	9/24	9/26	9/28	9/30	10/03	10/06
32	9/24	9/28	10/02	10/05	10/08	10/11	10/14	10/17	10/22
28	10/07	10/11	10/15	10/18	10/21	10/24	10/27	10/30	11/04
24	10/16	10/22	10/27	10/30	11/03	11/07	11/10	11/15	11/21
20	10/30	11/05	11/10	11/14	11/18	11/21	11/25	11/30	12/07
16	11/15	11/20	11/24	11/27	11/30	12/03	12/06	12/10	12/15

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	147	142	138	135	133	130	127	123	118
32	173	167	163	159	156	152	148	144	138
28	204	197	191	187	183	178	174	168	161
24	236	228	222	217	212	208	203	197	188
20	262	254	248	242	238	233	227	221	213
16	277	271	266	262	258	255	251	246	239

***** 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)

Base — Heating Degree Days (1)

Below	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
65	1226	1035	885	558	257	59	5	10	131	453	719	1063	6401
60	1071	895	730	408	132	14	0	0	46	303	569	908	5076
57	978	811	637	320	76	4	0	0	20	222	479	815	4362
55	916	755	575	264	49	2	0	0	10	173	419	753	3916
50	761	615	422	141	11	0	0	0	1	79	279	601	2910
32	268	177	49	1	0	0	0	0	0	0	14	165	674

Base — Cooling Degree Days (1)

Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	65	67	187	432	773	1013	1222	1170	881	571	285	125	6791
55	0	0	0	6	109	325	509	457	201	31	1	0	1639
57	0	0	0	2	74	268	447	395	151	17	0	0	1354
60	0	0	0	0	37	187	354	302	87	6	0	0	973
65	0	0	0	0	7	82	204	157	22	0	0	0	472
70	0	0	0	0	1	23	82	52	2	0	0	0	160

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	11	13	67	217	535	782	980	929	649	338	126	31	11	24	91	308	843	1625	2605	3534	4183	4521	4647	4678
45	2	1	29	117	382	632	825	774	499	204	62	9	2	3	32	149	531	1163	1988	2762	3261	3465	3527	3536
50	0	0	11	57	238	482	670	619	354	110	28	2	0	0	11	68	306	788	1458	2077	2431	2541	2569	2571
55	0	0	4	22	130	336	515	464	218	51	10	0	0	0	4	26	156	492	1007	1471	1689	1740	1750	1750
60	0	0	3	10	65	206	361	312	114	14	2	0	0	0	3	13	78	284	645	957	1071	1085	1087	1087
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	7	12	51	141	317	491	652	615	398	200	75	19	7	19	70	211	528	1019	1671	2286	2684	2884	2959	2978

(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