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: AMHERST, MA **COOP ID: 190120**

Climate Division: MA 2 **NWS Call Sign:** **Elevation: 150 Feet** **Lat: 42˚23N** **Lon: 72˚32W**

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	33.4	11.2	22.3	66	1932	14	30.7	1990	-30	1961	22	13.4	1994	1325	0	.0	.0	2.0	12.7	29.6	5.2
Feb	36.1	13.2	24.7	70	1985	25	34.9	1981	-27	1961	2	14.3	1979	1131	0	.0	.0	3.5	8.0	26.1	3.7
Mar	45.7	23.8	34.8	85	1945	29	40.5	1977	-17	1967	19	27.6	1984	938	0	.0	.0	11.1	2.2	24.6	.3
Apr	57.6	33.8	45.7	93+	1976	19	50.3	1991	11	1970	1	41.1	1972	580	0	.0	.1	24.8	.1	13.1	.0
May	69.8	45.0	57.4	94+	1979	10	61.9	1991	24+	1966	3	52.4	1984	250	14	.0	.6	30.7	.0	2.3	.0
Jun	78.1	54.2	66.2	98+	1952	26	71.2	1976	32	1986	3	61.8	1980	50	86	.0	2.2	30.0	.0	@	.0
Jul	83.2	59.1	71.2	100	1926	22	74.1	1988	40+	1978	3	67.1	1992	5	196	.0	5.2	31.0	.0	.0	.0
Aug	80.9	57.0	69.0	100	1948	26	72.9	1973	32+	1965	30	66.4	1994	16	138	.0	2.6	31.0	.0	.0	.0
Sep	73.1	48.7	60.9	99	1953	2	65.6	1971	25	1963	24	58.1	1984	142	18	.0	.5	30.0	.0	1.1	.0
Oct	61.8	36.4	49.1	89+	1927	2	56.3	1971	12	1974	28	44.8	1988	494	0	.0	.0	29.3	.0	10.5	.0
Nov	49.4	28.3	38.9	82	1950	2	44.3	1999	-4	1938	26	35.1	1976	785	0	.0	.0	15.1	.4	19.4	@
Dec	38.1	18.4	28.3	72	1998	8	34.7	1998	-20+	1933	30	15.2	1989	1140	0	.0	.0	3.8	6.8	27.9	1.5
Ann	58.9	35.8	47.4	100+	Aug 1948	26	74.1	Jul 1988	-30	Jan 1961	22	13.4	Jan 1994	6856	452	.0	11.2	242.3	30.2	154.6	10.7

\+ 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: 1926-2001

(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	3.76	3.61	2.60	1986	26	11.01	1979	.49	1981
Feb	2.85	2.57	2.45	1983	3	7.58	1981	.08	1987
Mar	3.59	3.57	2.84	1987	31	6.42	1980	.24	1981
Apr	3.83	3.76	2.83	1945	25	8.99	1983	.87	1999
May	4.11	3.70	2.80	1989	24	11.95	1984	.88	1993
Jun	3.81	3.37	3.72	1961	10	10.25	1972	.77	1979
Jul	3.95	3.55	3.46+	1946	23	10.56	1975	1.39	1991
Aug	4.10	4.34	4.14	1955	18	9.06	1991	.70	1996
Sep	4.06	2.96	6.08	1933	16	13.19	1999	.97	1978
Oct	3.96	3.55	4.10	1959	24	10.93	1995	1.13	1994
Nov	3.93	3.86	3.43	1927	3	7.05	1983	.71	1976
Dec	3.62	3.72	3.36	1973	21	8.77	1973	.91	1980
Ann	45.57	44.76	6.08	Sep 1933	16	13.19	Sep 1999	.08	Feb 1987

Mean Number of Days (3)

Month	Daily Precipitation >= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	10.0	7.1	2.5	.8
Feb	8.4	5.4	2.0	.7
Mar	10.6	6.8	2.5	.9
Apr	11.0	6.9	2.6	.8
May	12.1	7.4	2.8	1.0
Jun	11.2	6.8	2.2	1.0
Jul	10.1	6.6	2.5	1.1
Aug	10.3	6.3	2.6	1.5
Sep	9.3	6.7	2.6	1.2
Oct	8.9	5.9	2.6	1.4
Nov	10.4	7.0	2.8	1.0
Dec	10.3	6.8	2.5	.8
Ann	122.6	79.7	30.2	12.2

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	.79	1.14	1.69	2.19	2.69	3.23	3.84	4.57	5.53	7.06	8.52
Feb	.69	.96	1.37	1.74	2.11	2.50	2.93	3.45	4.13	5.20	6.20
Mar	1.22	1.56	2.05	2.47	2.88	3.29	3.75	4.28	4.96	6.02	6.99
Apr	1.29	1.65	2.18	2.63	3.06	3.51	4.00	4.57	5.30	6.43	7.48
May	1.24	1.63	2.21	2.72	3.21	3.71	4.28	4.93	5.79	7.12	8.35
Jun	.98	1.34	1.89	2.38	2.86	3.37	3.93	4.60	5.47	6.84	8.13
Jul	1.19	1.57	2.13	2.61	3.08	3.57	4.11	4.74	5.56	6.83	8.02
Aug	1.06	1.45	2.04	2.57	3.09	3.63	4.24	4.96	5.90	7.38	8.77
Sep	.79	1.15	1.75	2.30	2.85	3.45	4.13	4.94	6.03	7.76	9.41
Oct	1.28	1.65	2.21	2.68	3.14	3.61	4.13	4.74	5.52	6.73	7.85
Nov	1.59	1.95	2.46	2.88	3.28	3.68	4.12	4.62	5.26	6.24	7.13
Dec	1.03	1.37	1.89	2.35	2.79	3.25	3.76	4.36	5.14	6.36	7.50
Ann	33.12	35.56	38.66	41.01	43.10	45.11	47.18	49.46	52.23	56.23	59.69

\+ 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: 1926-2001
(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	12.0	11.0	5	3
Feb	8.7	8.0	4	4
Mar	5.1	3.8	2	1
Apr	1.6	.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	.0	.0	#	0
Nov	2.6	.6	#	#
Dec	8.8	7.0	2	1
Ann	38.8	30.4	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	14.0	1973	29	28.8	1987	22	1996	13	13	1971
Feb	12.0	1972	19	26.3	1972	18+	1994	13	13	1971
Mar	10.0	1972	15	15.9	1996	17	1994	4	8	1994
Apr	10.5	1997	1	14.0	1982	14	1982	7	1	1997
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	.0	0	0	.0	0	0	0	0	0	0
Oct	.5	2000	30	.5	2000	#	2000	30	#	2000
Nov	12.0	1971	25	12.2	1971	12	1971	25	1	1997
Dec	7.0	1983	22	19.3	1995	11	1995	20	7	1995
Ann	14.0	Jan 1973	29	28.8	Jan 1987	22	Jan 1996	13	13+	Feb 1971

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	5.2	3.9	1.8	.8	@
Feb	3.5	2.6	.9	.5	.1
Mar	2.7	2.1	.8	.2	@
Apr	.4	.4	.2	.1	@
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	.0	.0
Oct	@	.0	.0	.0	.0
Nov	1.1	.7	.3	.2	@
Dec	3.8	2.9	1.1	.5	.0
Ann	16.7	12.6	5.1	2.3	.1

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	19.8	13.8	9.8	5.6
Feb	18.1	15.3	10.9	3.6
Mar	7.8	5.1	3.3	.5
Apr	.5	.2	.2	.1
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	.0	.0	.0	.0
Nov	1.7	.7	.3	@
Dec	11.5	6.3	2.8	.5
Ann	59.4	41.4	27.3	10.3

+ 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	6/08	6/02	5/29	5/26	5/23	5/19	5/16	5/12	5/06
32	5/24	5/19	5/16	5/13	5/10	5/07	5/04	5/01	4/26
28	5/09	5/06	5/03	5/01	4/28	4/26	4/24	4/21	4/17
24	5/04	4/28	4/24	4/20	4/17	4/13	4/10	4/05	3/31
20	4/18	4/12	4/08	4/04	4/01	3/28	3/24	3/20	3/14
16	3/30	3/27	3/24	3/22	3/21	3/19	3/17	3/14	3/11

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	9/01	9/06	9/10	9/13	9/16	9/19	9/22	9/26	10/01
32	9/17	9/21	9/23	9/26	9/28	9/30	10/02	10/05	10/09
28	9/27	10/03	10/07	10/10	10/13	10/16	10/20	10/24	10/29
24	10/07	10/13	10/17	10/21	10/24	10/27	10/31	11/04	11/09
20	10/17	10/24	10/29	11/02	11/06	11/10	11/14	11/19	11/26
16	11/03	11/10	11/15	11/19	11/23	11/27	12/01	12/06	12/12

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	140	132	126	120	116	111	106	100	91
32	155	150	146	143	140	137	134	130	125
28	186	180	175	171	167	163	160	155	148
24	212	204	199	194	189	185	180	175	167
20	248	238	231	225	219	213	207	200	190
16	268	261	255	251	247	242	238	232	225

***** 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	1325	1131	938	580	250	50	5	16	142	494	785	1140	6856
60	1170	991	783	431	134	11	0	1	52	346	635	985	5539
57	1077	907	690	344	82	3	0	0	24	264	545	892	4828
55	1015	851	628	288	56	1	0	0	13	214	485	830	4381
50	860	711	476	166	16	0	0	0	2	113	338	675	3357
32	347	257	80	2	0	0	0	0	0	0	21	212	919

Base — Cooling Degree Days (1)

Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	45	50	165	412	787	1026	1213	1145	866	530	226	95	6560
55	0	0	0	8	131	337	500	432	189	31	0	0	1628
57	0	0	0	4	95	279	438	370	140	18	0	0	1344
60	0	0	0	1	54	196	345	278	78	7	0	0	959
65	0	0	0	0	14	86	196	138	18	0	0	0	452
70	0	0	0	0	2	22	77	44	1	0	0	0	146

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	4	10	63	230	569	810	980	924	650	336	111	22	4	14	77	307	876	1686	2666	3590	4240	4576	4687	4709
45	0	0	31	127	416	660	825	769	500	206	55	3	0	0	31	158	574	1234	2059	2828	3328	3534	3589	3592
50	0	0	9	60	273	510	670	614	354	108	21	0	0	0	9	69	342	852	1522	2136	2490	2598	2619	2619
55	0	0	4	24	151	361	515	459	223	49	5	0	0	0	4	28	179	540	1055	1514	1737	1786	1791	1791
60	0	0	0	10	70	226	360	306	122	16	0	0	0	0	0	10	80	306	666	972	1094	1110	1110	1110
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	0	9	52	158	352	527	659	614	417	222	65	9	0	9	61	219	571	1098	1757	2371	2788	3010	3075	3084

(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