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: LIBERTY, TX **COOP ID: 415196**

Climate Division: TX 8 **NWS Call Sign:** **Elevation: 35 Feet** **Lat: 30˚04N** **Lon: 94˚48W**

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	61.1	40.3	50.7	87	1910	2	58.0	1998	8	1930	18	41.5	1978	458	10	.0	.0	26.1	.0	6.6	.0
Feb	65.0	43.5	54.3	91	1940	28	62.0	2000	10	1951	2	44.6	1978	317	17	.0	.0	25.6	.1	3.7	.0
Mar	71.8	49.3	60.6	95	1946	30	67.8	2000	18	1923	20	54.9	1978	173	35	.0	.1	30.5	.0	1.0	.0
Apr	77.4	56.1	66.8	97	1920	16	72.8	1999	30+	1940	13	62.0	1973	55	107	.0	.5	30.0	.0	.1	.0
May	83.9	64.2	74.1	100	1906	27	79.3	1996	40	1925	1	69.8	1976	7	287	.0	4.6	31.0	.0	.0	.0
Jun	89.1	70.3	79.7	105	1930	27	84.1	1998	51+	1917	17	76.4	1973	0	441	@	20.6	30.0	.0	.0	.0
Jul	92.2	72.7	82.5	108	1913	20	86.8	1998	58	1967	16	77.3	1972	0	541	.6	27.6	31.0	.0	.0	.0
Aug	92.8	72.3	82.6	107+	2000	31	86.4	1999	55	1940	21	78.9	1971	0	543	1.0	26.9	31.0	.0	.0	.0
Sep	88.5	67.3	77.9	107+	2000	6	82.2	1998	40+	1909	29	73.0	1974	0	387	.3	16.7	30.0	.0	.0	.0
Oct	81.0	56.9	69.0	98+	1952	3	73.1	1984	27+	1917	31	59.8	1976	43	166	.0	3.3	31.0	.0	.1	.0
Nov	70.8	48.4	59.6	92	1927	2	65.3	1994	16	1911	30	49.1	1976	222	60	.0	.1	29.3	.0	1.7	.0
Dec	63.3	42.2	52.8	89+	1941	19	61.7	1984	7	1989	24	44.2	1989	394	14	.0	.0	27.9	.2	5.5	.0
Ann	78.1	57.0	67.6	108	Jul 1913	20	86.8	Jul 1998	7	Dec 1989	24	41.5	Jan 1978	1669	2608	1.9	100.4	353.4	.3	18.7	.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: 1904-2001

(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	4.91	3.78	7.50	1939	11	10.16	1998	.48	1971
Feb	3.74	2.97	6.27	1961	18	9.77	1992	.83	1976
Mar	3.84	3.29	5.40	1937	14	9.01	1997	.87	1996
Apr	4.01	2.90	6.70	1908	15	13.85	1979	.02	1987
May	5.80	5.55	10.60	1989	18	17.82	1989	.00	1998
Jun	6.88	5.55	8.99	1989	27	18.46	1981	1.10	1974
Jul	4.46	3.57	10.22	1943	28	14.26	1983	.00	1993
Aug	4.34	3.72	9.10	1915	19	13.16	1983	.00	1990
Sep	5.92	5.15	9.30	1961	12	17.00	1998	.73	1989
Oct	5.77	4.95	18.50	1994	18	29.59	1994	.09	1987
Nov	5.84	4.80	11.30	1977	22	17.70	1977	.45	1988
Dec	5.01	4.23	6.50	1935	7	12.89	1982	1.04	1989
Ann	60.52	61.70	18.50	Oct 1994	18	29.59	Oct 1994	.00+	May 1998

Mean Number of Days (3)

Daily Precipitation

Month	>= 0.01	>= 0.10	>= 0.50	>= 1.00
Jan	10.5	7.2	3.1	1.5
Feb	9.0	5.8	2.5	1.1
Mar	8.9	5.5	2.3	1.3
Apr	6.7	4.5	2.4	1.4
May	7.4	5.8	3.5	2.0
Jun	9.5	7.6	3.4	2.2
Jul	8.6	6.8	2.9	1.2
Aug	9.6	6.8	2.9	1.2
Sep	9.4	7.1	3.2	1.7
Oct	7.4	5.3	2.9	1.6
Nov	8.5	6.1	3.4	1.9
Dec	9.5	6.7	3.2	1.8
Ann	105.0	75.2	35.7	18.9

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	.85	1.28	2.00	2.67	3.36	4.11	4.96	5.99	7.37	9.59	11.71
Feb	.83	1.18	1.72	2.22	2.71	3.24	3.83	4.53	5.46	6.95	8.34
Mar	.90	1.26	1.82	2.32	2.82	3.35	3.94	4.65	5.57	7.04	8.43
Apr	.19	.39	.85	1.38	2.00	2.73	3.64	4.81	6.47	9.32	12.18
May	.60	1.29	2.25	3.09	3.95	4.87	5.90	7.16	8.83	11.51	14.07
Jun	1.45	2.08	3.08	4.00	4.93	5.91	7.03	8.36	10.13	12.95	15.61
Jul	.65	1.23	1.99	2.61	3.23	3.89	4.62	5.49	6.62	8.43	10.13
Aug	.95	1.56	2.29	2.86	3.41	3.97	4.58	5.30	6.22	7.65	8.97
Sep	1.02	1.53	2.40	3.21	4.04	4.94	5.97	7.22	8.89	11.59	14.16
Oct	.38	.74	1.46	2.25	3.13	4.16	5.41	6.99	9.20	12.93	16.63
Nov	.83	1.31	2.15	2.96	3.81	4.74	5.81	7.13	8.90	11.80	14.59
Dec	1.58	2.06	2.76	3.37	3.95	4.55	5.22	6.00	7.00	8.56	10.01
Ann	39.79	43.68	48.73	52.61	56.08	59.46	62.98	66.89	71.67	78.66	84.75

+ 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: 1904-2001
(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	.3	.0	#	0
Feb	#	.0	#	0
Mar	.0	.0	0	0
Apr	.0	.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	.0	.0	0	0
Nov	.0	.0	0	0
Dec	.0	.0	0	0
Ann	.3	.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	3.0	1973	12	3.0	1973	3	1973	12	#	1973
Feb	#	1988	8	#+	1988	#+	1988	6	#+	1988
Mar	.0	0	0	.0	0	0	0	0	0	0
Apr	.0	0	0	.0	0	0	0	0	0	0
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	.0	0	0	.0	0	0	0	0	0	0
Nov	.0	0	0	.0	0	0	0	0	0	0
Dec	.0	0	0	.0	0	0	0	0	0	0
Ann	3.0	Jan 1973	12	3.0	Jan 1973	3	Jan 1973	12	#+	Feb 1988

Mean Number of Days (1)

Snow Fall >= Thresholds

Month	0.1	1.0	3.0	5.0	10.0
Jan	.1	.1	.1	.0	.0
Feb	.0	.0	.0	.0	.0
Mar	.0	.0	.0	.0	.0
Apr	.0	.0	.0	.0	.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	.0	.0
Oct	.0	.0	.0	.0	.0
Nov	.0	.0	.0	.0	.0
Dec	.0	.0	.0	.0	.0
Ann	.1	.1	.1	.0	.0

Snow Depth >= Thresholds

Month	1	3	5	10
Jan	@	@	.0	.0
Feb	.0	.0	.0	.0
Mar	.0	.0	.0	.0
Apr	.0	.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	.0	.0	.0	.0
Nov	.0	.0	.0	.0
Dec	.0	.0	.0	.0
Ann	@	@	.0	.0

+ 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	4/01	3/24	3/18	3/13	3/08	3/03	2/26	2/20	2/12
32	3/23	3/12	3/04	2/25	2/18	2/11	2/04	1/27	1/16
28	3/06	2/21	2/12	2/04	1/27	1/19	1/10	12/28	0/00
24	2/16	2/03	1/24	1/15	1/05	12/21	0/00	0/00	0/00
20	1/24	1/13	12/31	0/00	0/00	0/00	0/00	0/00	0/00
16	12/27	0/00	0/00	0/00	0/00	0/00	0/00	0/00	0/00

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	10/26	11/02	11/06	11/10	11/14	11/18	11/22	11/27	12/03
32	11/09	11/17	11/22	11/26	12/01	12/05	12/09	12/14	12/22
28	11/21	12/01	12/08	12/14	12/20	12/26	1/02	1/11	0/00
24	12/11	12/20	12/28	1/04	1/12	1/26	0/00	0/00	0/00
20	12/24	1/07	1/22	0/00	0/00	0/00	0/00	0/00	0/00
16	1/09	0/00	0/00	0/00	0/00	0/00	0/00	0/00	0/00

Freeze Free Period

Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	283	272	264	257	251	244	237	229	218
32	327	313	302	293	285	276	267	257	242
28	>365	>365	351	335	324	315	306	295	282
24	>365	>365	>365	>365	>365	353	337	325	312
20	>365	>365	>365	>365	>365	>365	>365	>365	>365
16	>365	>365	>365	>365	>365	>365	>365	>365	>365

***** 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	458	317	173	55	7	0	0	0	0	43	222	394	1669
60	325	206	83	14	0	0	0	0	0	13	135	264	1040
57	256	154	46	4	0	0	0	0	0	6	93	199	758
55	216	124	29	2	0	0	0	0	0	3	70	163	607
50	133	62	7	0	0	0	0	0	0	0	30	86	318
32	6	0	0	0	0	0	0	0	0	0	0	0	6

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	586	624	886	1042	1304	1431	1564	1566	1377	1145	829	643	12997
55	84	104	202	353	591	741	851	853	687	435	208	93	5202
57	61	78	157	296	529	681	789	791	627	376	172	68	4625
60	37	46	101	216	436	591	696	698	537	290	123	39	3810
65	10	17	35	107	287	441	541	543	387	166	60	14	2608
70	4	6	8	38	158	292	386	388	243	73	24	2	1622

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	374	453	683	835	1093	1225	1351	1342	1159	930	614	431	374	827	1510	2345	3438	4663	6014	7356	8515	9445	10059	10490
45	250	320	532	685	938	1075	1196	1187	1009	775	468	295	250	570	1102	1787	2725	3800	4996	6183	7192	7967	8435	8730
50	151	206	380	535	783	925	1041	1032	859	620	332	183	151	357	737	1272	2055	2980	4021	5053	5912	6532	6864	7047
55	79	115	244	393	628	775	886	877	709	466	216	103	79	194	438	831	1459	2234	3120	3997	4706	5172	5388	5491
60	35	50	133	252	473	625	731	722	559	320	122	51	35	85	218	470	943	1568	2299	3021	3580	3900	4022	4073
Base	**Growing Degree Units for Corn (Monthly)**												**Growing Degree Units for Corn (Accumulated Monthly)**											
50/86	224	274	426	551	763	853	927	913	798	622	389	263	224	498	924	1475	2238	3091	4018	4931	5729	6351	6740	7003

(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