ENVIRONMENTAL INFORMATION SUMMARIES C-26

MONTHLY STATION CLIMATE SUMMARIES

Climatography of the United States No.20 1971-2000

INTRODUCTION

The Climatography of the United States No. 20 (CLIM20), Monthly Station Climate Summaries for 1971-2000 are station summaries of particular interest to agriculture, industry, and engineering applications. These summaries contain a variety of statistics for temperature, precipitation, snow, freeze dates, and degree day elements for 4,273 stations. The new CLIM20's were developed after reviewing suggestions from customers and soliciting comments from climate service providers such as state and regional climatologists and the National Climatic Data Center's (NCDC) Climate Services Branch. This product updates and expands on the previous version by adding statistics and thresholds to the temperature, precipitation, and snow climatologies and including 32 degrees Fahrenheit (°F) as a base to the degree days table.

PRODUCT DESCRIPTION

The station summaries are grouped into five tables:

(1) Monthly and annual temperature climatologies (Figure 1).

A. Means of daily maximum, daily minimum, average temperature, and extremes of monthly average temperature and year of occurrence derived from the 1971-2000 monthly normals. Information about the 1971-2000 Monthly Normals is available in the reference section near the end of this document.

B. Highest and lowest daily temperature extremes and date of occurrence derived from the station's full period of record contained in NCDC's Cooperative Summary of Day Dataset. Information about NCDC's Cooperative Daily Dataset is available in the reference section.

C. Heating and cooling degree days computed with a base temperature 65 °F derived from the 1971-2000 monthly normals.

D. Mean number of days for threshold temperatures. Mean number of days when maximum temperature equals or exceeds 100, 90, 50 °F or when maximum temperature is less than or equal to 32 °F. Mean number of days when minimum temperature is less than or equal to 32 °F or when minimum temperature is less than or equal to 0 °F. The mean number of days statistics are computed from a 1971-2000 serially complete daily data set. Information about the Serially Complete Daily Dataset is available in the reference section.

(2) Monthly and annual precipitation climatologies (Figure 2).

A. Means, medians (50^{th} percentile), and extremes of monthly precipitation derived from the 1971-2000 monthly normals.

B. Highest daily precipitation extremes and date of occurrence from the station's available digital record.

C. Mean number of days precipitation totals equal or exceed 0.01, 0.1, 0.5, 1.0 inches. The mean number of days statistics are computed from a 1971-2000 serially complete daily data set.

D. Precipitation probabilities are monthly values of precipitation amounts which correspond to selected levels of probable occurrence. The values represent the probability that the monthly precipitation will be equal to or less than the indicated amount. These values are determined from the incomplete gamma distribution (Crutcher, 1977).

(3) Monthly and annual snow climatologies (Figure 3).

A. Means, medians, and extremes of monthly snowfall and snow depth derived from the Snow Climatology and 1971-2000 daily data. Information about the Snow Climatology Project is available in the reference section.

B. Highest daily snowfall and snow depth extremes and date of occurrence from the 1971-2000 daily data.

C. Mean number of days snowfall equals or exceeds 0.1, 1.0, 3.0, 5.0, 10.0 inches and snow depth equals or exceeds 1.0, 3.0, 5.0, 10.0 inches. The mean number of days statistics are computed from the Snow Climatology and 1971-2000 daily data.

(4) Freeze data (Figure 4).

Freeze data tables are dates of probable first and last occurrence, during the year of selected freeze related temperatures. All freeze dates are based upon the season August 1 through July 31 for each threshold temperature. They are computed from a 1971-2000 serially complete daily data set.

A. Spring freeze dates - The probability of later date of occurrence in spring for 36, 32, 28, 24, 20, and 16 °F.

B. Fall freeze dates - The probability of earlier date of occurrence in fall for 36, 32, 28, 24, 20, and 16 °F.

C. Freeze free period - The probable durations (in days) where the temperature exceeds certain freeze-related values (36, 32, 28, 24, 20, and 16 °F)

(5) Degree days (Figure 5).

Heating and cooling degree days to selected base temperatures are computed from 1971-2000 monthly normal temperatures and standard deviation of the temperature.

Growing degree units are computed from the 1971-2000 serially complete daily dataset. They are monthly and annual values of agriculturally related growing degree day units to selected base temperatures with special values for corn.

A. Heating Degree Days are computed for 65, 60, 57, 55, 50, and 32 °F bases.

B. Cooling Degree Days are computed for 32, 55, 57, 60, 65, and 70 °F bases.

C. Growing Degree Units are computed for 40, 45, 50, 55, 60, and 50/86 °F bases. The 50/86 degrees F truncated base is computed by resetting minimum temperatures below 50 °F to 50 °F and maximum temperatures above 86 °F to 86 °F.

APPLICATIONS

This product has a variety of uses and applications.

(1). A climatological summary which provides means, medians (precipitation, snow), extremes, degree days and mean number of days exceeding specified thresholds.

(2). The precipitation probabilities can be used in several different ways. For example, the chance of having a specified precipitation amount for a given month can be easily determined. Let's say a station has the precipitation probability table as shown below.

August Monthly Precipitation vs. Probability level

5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	95%
0.91"	1.26"	1.81"	2.30"	2.78"	3.29"	3.87"	4.55"	5.44"	6.85"	8.18"

The table shows a precipitation value of 2.30 inches for the probability level 30% in August. This tells us that there is a 30% chance that the precipitation in any given August will not exceed 2.30 inches, or conversely, there is a 70% chance that it will be greater than that amount. Looking at the 70% probability level, the table tells us that there is a 70% chance that the August precipitation will be less than or equal to 4.55 inches, and a 30% chance that it will exceed that amount. Let's further assume, in our hypothetical example, that the station has a normal August precipitation 3.76 inches. A comparison of this normal precipitation with the precipitation probability table shows that there is almost a 60% chance that any given August will have an observed precipitation amount less than or equal to the 30-year mean (i.e., normal) value. Conversely, there is a slightly better than 40% chance that the observed amount will exceed the normal. The table shows that there is a 50-50 chance that the August precipitation will exceed 3.29 inches (or, conversely, a 50-50 chance that it will be less than 3.29 inches); this value is the median.

(3). The freeze data also has many uses. For example, the tables can be used to determine the chance, by a certain date, of the first frost (36 °F shelter temperature -which is a good indicator of frost in the area for most locations), or the first freeze 32 °F, or the first hard freeze 28 °F in the fall. Analogous data is given for the last occurrence in the spring. The chance of having a period of specified duration (in days) for which the temperature exceeds a specified freeze-related temperature is given in the freeze free period part of the table. Frost-free periods are those for which the daily minimum shelter temperature exceeds the threshold value of 36 °F.

(4). Degree days to selected bases offers alternatives to the standard base 65 °F to calculate energy requirements.

(5). Values of average daily growing degree units are computed for six base temperatures (°F): 40, 45, 50, 55, 60, and the truncated base 50/86. The bases correspond to many of the common phenological cycles in the United States. The truncated base 50/86 represents adjustments of the daily maximum and minimum temperatures, which better describe specific growth patterns. Here, minimum temperatures below the lower base are set to the lower base (50°F) and maximum and/or minimum temperatures above the upper base are set to the upper base (86°F). Average daily station values of growing degree units are computed for each base temperature by an equation similar to that used for cooling degree days (compute the average daily temperature from the maximum and minimum, then sum the differences between the average daily temperature minus the base temperature for each day and each year, then divide by the number of years). The base temperature for 50/86 is 50, and the number of years is 30. In this process, when the average daily temperature is less than the base temperature, the value for growing degree units for that day is set to zero, and the average is always rounded up to the nearest degree. The values of daily average growing degree units for each base temperature are then summed to produce the monthly and accumulated monthly totals shown in the CLIM20 tables.

COMPUTATIONAL METHODS

(1). 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.

(2). 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.

(3). Only observed validated values were used to select the extreme daily values.

(4). 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.

(5). Degree Days were derived using the same techniques as the 1971-2000 normals. Compete documentation for the 1971-2000 Normals is available under references.

(6). Mean "number of days statistics" for temperature and precipitation were calculated from a serially complete daily data set.

(7). Snowfall and snow depth statistics were derived from the Snow Climatology, Summary of Day (SOD) data. A station's snow statistics may appear inconsistent because of the different data sources, periods of record and quality control applied.

(8). The monthly normal values of heating and cooling degree days are computed from the monthly normal temperature and the standard deviation of the temperature using methods developed by Thom (1952, 1954, 1966). The daily temperature data used in the construction of the Freeze Data and Growing Degree Units tables are extracted from a validated serially-complete database of maximum/minimum temperature observations. As a result, there are small differences between the base 55 and 60 growing degree units and cooling degree days which are estimated values.

(9). The estimation of freeze probabilities is based upon the work of Thom and Shaw (1958) and Thom (1959) which was later modified by Vestal (1971). The selected probabilities are 0.1 through 0.9 in increments of 0.1. A date associated with each of the pre-selected probability levels is computed for the last spring and first fall freeze seasons. Similarly, the number of days associated with the freeze-free period is computed for each probability level.

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. These inconsistencies are often the result of data sources having different periods of record. Daily extremes are derived from the station's entire period of record while the serial data and normals data 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.

(1). Temperature/ Precipitation Tables
- A. 1971-2000 Monthly Normals
- B. National Weather Service station records
- D. 1971-2000 serially complete daily data

(2). Degree Day Tables

A. Monthly and Annual Heating and Cooling Degree Days Normals to Selected Bases derived from 1971-2000 Monthly Normals

B. Daily Normal Growing Degree Units to Selected Base Temperatures derived from 1971-2000 serially complete daily data

(3). Snow Tables
- A. Snow Climatology
- B. Cooperative Summary of the Day

(4). Freeze Data Tables

1971-2000 serially complete daily data

References

U.S. Climate Normals 1971-2000,
http://www.ncdc.noaa.gov/normals.html

U.S. Climate Normals 1971-2000-Products Clim20,
http://www.ncdc.noaa.gov/oa/climate/normals/usnormalsprods.html

Snow Climatology Project Description,
http://www.ncdc.noaa.gov/oa/climate/monitoring/snowclim/mainpage.html

NCDC Cooperative Summary of the Day Dataset,
http://www1.ncdc.noaa.gov/pub/data/documentlibrary/tddoc/td3200.pdf

Baker, D.G., 1975: Effect of observation time on mean temperature calculation. Journal of Applied Meteorology, vol. 14, pp. 471-476.

Crutcher, H.L., G.F. McKay, and D.C. Fulbright, 1977: "A Note on a Gamma Distribution Computer Program and Computer Produced Graphs", NOAA Technical Report EDS 24, Washington, U.S. Government Printing Office.

Crutcher, H.L. and R.L. Joiner, 1978: "Gamma Distribution Bias and Confidence Limits", NOAA Technical Report EDIS 30, Washington, U.S. Government Printing Office.

Thom, H.C.S., 1952: "Seasonal degree-day statistics for the United States," Monthly Weather Review, Vol. 80, pp. 143-149.

Thom, H.C.S., 1954: "The rational relationship between heating degree days and temperature," Monthly Weather Review, Vol. 82, pp. 1-6.

Thom, H.C.S., 1959: "The distribution of freeze-date and freeze-free period for climatological series with freezeless years," Monthly Weather Review, Vol. 87, pp. 136-144.

Thom, H.C.S., 1966: "Normal degree days above any base by the universal truncation coefficient," Monthly Weather Review, Vol. 94, pp. 461-46.

Thom, H.C.S. and R.H. Shaw, 1958: "Climatological analysis of freeze data for Iowa," Monthly Weather Review, Vol. 86, pp. 251-257.

Vestal, C.K., 1971: "First and last occurrences of low temperatures during the cold season," Monthly Weather Review, Vol. 99, pp. 650-652.

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,
http://www1.ncdc.noaa.gov/pub/data/special/serialcomplete_jam_0900.pdf

Contact Information

National Climatic Data Center
Climate Services Branch
Federal Building
151 Patton Avenue,
Asheville, NC 28801-5001

Phone number: (828) 271-4800
Fax number: (828) 271-4876
TDD: (828) 271-4010

CLIM20s can be ordered for individual stations or state collections. They are available online at the following url: http://www5.ncdc.noaa.gov/cgi-bin/climatenormals/climatenormals.pl
For complete order information, contact NCDC at 828-271-4800 or e-mail: ncdc.info@noaa.gov
Internet address: http://www.ncdc.noaa.gov

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	54.4	31.6	43.0	80	1975	30	54.2	1974	-6	1985	21	32.0	1977	686	0	0	.0	22.0	8	18.2	.1
Feb	59.3	33.8	46.6	81+	1996	27	52.9	1990	5	1996	5	39.0	1978	516	0	.0	0	22.3	.3	13.5	.0
Mar	67.6	40.9	54.3	89	1995	24	60.6	1997	12	1980	3	47.5	1971	344	11	0	0	29.5	.1	5.6	.0
Apr	74.9	47.2	61.1	92+	1987	23	65.8	1999	27	1987	1	55.7	1983	150	33	0	.3	29.9	.0	1.1	.0
May	81.3	56.5	68.9	96	1996	25	73.6	1998	35	1971	4	63.3	1976	42	162	0	2.5	31.0	0	.0	.0
Jun	87.5	64.5	76.0	102+	1985	7	80.5	1998	42	1984	1	71.9	1983	1	331	.2	13.3	30.0	0	.0	.0
Jul	90.6	68.4	79.5	104+	1980	14	82.9	1993	55	1970	6	76.5	1975	0	450	.8	20.4	31.0	.0	.0	.0
Aug	89.7	67.4	78.6	102+	2000	19	81.9	1995	54	1992	29	75.7	1992	0	419	.7	18.0	31.0	.0	.0	.0
Sep	85.0	61.8	73.4	99	1980	17	77.1	1980	38	1983	22	69.8	1975	7	258	.0	8.3	30.0	.0	.0	.0
Oct	76.0	49.5	62.8	93	1983	4	69.2	1984	26	1976	29	57.1	1976	136	65	.0	.5	31.0	.0	.5	.0
Nov	66.2	41.1	53.7	86	2000	1	61.6	1985	14	1970	25	45.6	1976	353	11	.0	.0	28.7	.0	7.2	.0
Dec	57.2	34.1	45.7	81	1971	17	54.0	1971	-1	1983	25	38.0	2000	600	1	0	.0	24.6	.3	15.1	@
Ann	74.1	49.7	62.0	104+	Jul 1980	14	82.9	Jul 1993	-6	Jan 1985	21	32.0	Jan 1977	2835	1741	1.7	63.3	341.0	1.5	61.2	.1

Figure 1. Monthly and annual temperature climatologies.

Precipitation (inches)																							
	Precipitation Totals									Mean Number of Days (3)				Precipitation Probabilities (1) Probability that the monthly/annual precipitation will be equal to or less than the indicated amount									
	Means/ Median(1)		Extremes							Daily Precipitation				Monthly/Annual Precipitation vs Probability Levels These values were determined from the incomplete gamma distribution									
Month	Mean	Median	Highest Daily(2)	Year	Day	Highest Monthly(1)	Year	Lowest Monthly(1)	Year	>= 0.01	>= 0.10	>= 0.50	>= 1.00	.05	.10	.20	.30	.40	.50	.60	.70	.80	.90	.95
Jan	6.01	6.59	3.57	1972	10	12.13	1972	1.01	1986	11.1	8.8	4.1	1.9	2.29	2.85	3.65	4.31	4.94	5.59	6.28	7.09	8.12	9.71	11.15
Feb	5.23	4.63	3.50	1981	11	9.12	1975	1.70	1976	8.8	6.7	3.9	1.8	2.11	2.59	3.27	3.83	4.36	4.90	5.48	6.15	6.99	8.29	9.47
Mar	6.56	5.63	4.16	1970	20	15.00	1980	1.97	1982	10.0	8.3	4.5	2.4	2.03	2.65	3.58	4.38	5.15	5.95	6.83	7.86	9.19	11.27	13.19
Apr	4.60	3.90	4.50	1975	3	11.65	1979	.37	1986	8.0	6.1	3.1	1.7	1.07	1.59	2.17	2.77	3.37	4.01	4.72	5.57	6.69	8.46	10.12
May	4.31	3.82	3.36	1973	28	12.29	1973	1.24	1992	8.9	6.7	3.4	1.3	1.49	1.90	2.49	2.99	3.47	3.96	4.50	5.12	5.93	7.17	8.31
Jun	4.48	3.94	3.55	1989	19	14.67	1989	.49	1988	8.9	6.8	3.4	1.5	.84	1.24	1.90	2.50	3.12	3.79	4.54	5.45	6.66	8.61	10.46
Jul	5.37	5.43	2.90	1994	28	9.87	1975	1.25	1993	11.2	9.0	3.8	1.5	1.82	2.33	3.08	3.71	4.31	4.93	5.61	6.40	7.42	8.99	10.44
Aug	4.05	3.66	3.40	1984	2	7.83	1984	1.20	1988	9.7	7.1	3.1	1.1	1.60	1.98	2.51	2.95	3.36	3.78	4.24	4.77	5.44	6.46	7.39
Sep	4.05	3.51	3.62	1980	18	9.61	1988	.80	1981	7.9	5.7	2.6	1.3	.76	1.12	1.72	2.27	2.83	3.43	4.11	4.94	6.04	7.80	9.48
Oct	2.84	2.80	3.20	1970	14	6.67	1995	.23	1991	5.5	3.8	1.8	.8	.52	.77	1.19	1.57	1.97	2.39	2.87	3.46	4.24	5.49	6.68
Nov	4.56	4.13	3.02	1983	24	11.70	1992	.69	1981	8.5	6.8	3.3	1.6	1.52	1.95	2.58	3.12	3.64	4.17	4.76	5.44	6.32	7.68	8.93
Dec	5.07	5.02	4.17	1983	3	12.50	1983	1.04	1980	9.5	6.9	3.3	1.5	1.80	2.28	2.97	3.55	4.10	4.67	5.29	6.01	6.94	8.36	9.67
Ann	57.13	55.46	4.50	Apr 1975	3	15.00	Mar 1980	.22	Oct 1991	108.0	82.7	40.3	18.4	42.03	44.99	48.76	51.61	54.13	56.55	59.05	61.81	65.14	69.95	74.09

Figure 2. Monthly and annual precipitation climatologies.

Snow (Inches)																					
Snow Totals														Mean Number of Days (1)							
Means/Medians (1)					Extremes (2)									Snow Fall >= Thresholds					Snow Depth >= Thresholds			
Month	Snow Fall Mean	Snow Fall Median	Snow Depth Mean	Snow Depth Median	Highest Daily Snow Fall	Year	Day	Highest Monthly Snow Fall	Year	Highest Daily Snow Depth	Year	Day	Highest Monthly Mean Snow Depth	Year	0.1	1.0	3.0	5.0	10.0	1	3	5	10
Jan	2	.0	#	0	5.0	1992	19	5.0	1992	#+	2000	28	#	2000	.1	@	@	@	.0	.0	0	.0	.0
Feb	#	0	#	0	#	1981	12	#+	1981	#	1971	13	#	1971	.0	0	.0	.0	0	0	0	.0	.0
Mar	.3	.0	#	0	6.5	1993	13	6.5	1993	7	1993	13	#+	1993	@	@	@	@	.0	@	@	@	.0
Apr	.0	0	0	0	.7	1987	3	.7	1987	0	0	0	0	0	@	0	0	.0	.0	.0	0	.0	.0
May	.0	.0	0	0	.0	0	0	0	0	0	0	0	0	0	.0	0	.0	.0	0	.0	.0	.0	.0
Jun	0	0	0	0	.0	0	0	0	0	0	0	0	0	0	.0	.0	.0	.0	0	.0	.0	0	.0
Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.0	0	0	.0	0	.0	.0	0	.0
Aug	.0	0	0	0	0	0	0	.0	0	0	0	0	0	0	.0	.0	0	.0	.0	.0	.0	.0	.0
Sep	.0	.0	0	0	.0	0	0	0	0	0	0	0	0	0	.0	.0	.0	.0	0	.0	0	0	.0
Oct	.0	.0	0	0	0	0	0	0	0	0	0	0	0	0	.0	.0	0	.0	0	.0	.0	0	.0
Nov	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	0	.0	0
Dec	2	0	#	0	2.0	1996	19	2.0	1996	#+	2000	20	#+	2000	.1	1	.0	0	.0	.0	0	0	.0
Ann	7	.0	#	0	6.5	Mar 1993	13	6.5	Mar 1993	7	Mar 1993	13	#+	Dec 2000	.2	.1	@	@	0	@	@	@	0

Figure 3. Monthly and annual snow climatologies.

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	4/22	4/18	4/15	4/12	4/10	4/07	4/05	4/01	3/28
32	4/17	4/11	4/06	4/03	3/30	3/27	3/23	3/19	3/13
28	3/24	3/19	3/15	3/11	3/08	3/05	3/01	2/25	2/20
24	3/18	3/09	3/03	2/26	2/21	2/16	2/10	2/04	1/27
20	3/11	3/02	2/24	2/18	2/13	2/08	2/03	1/27	1/18
16	3/07	2/25	2/17	2/10	2/03	1/27	1/18	1/02	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	10/07	10/13	10/16	10/19	10/22	10/25	10/29	11/01	11/07
32	10/24	10/29	11/02	11/05	11/08	11/11	11/14	11/17	11/22
28	11/04	11/09	11/13	11/16	11/19	11/22	11/26	11/29	12/05
24	11/20	11/28	12/03	12/08	12/12	12/16	12/21	12/27	1/03
20	12/03	12/12	12/19	12/24	12/30	1/04	1/09	1/16	1/25
16	12/07	12/20	12/30	1/08	1/17	1/27	2/08	3/02	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	211	205	201	198	195	192	188	185	179
32	245	237	231	226	222	217	212	206	199
28	280	271	265	260	255	250	245	239	231
24	323	313	306	300	294	288	282	274	264
20	>365	345	334	325	317	310	302	293	280
16	>365	>365	>365	>365	>365	335	319	306	290

Figure 4. Freeze data.

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	686	516	344	150	42	1	0	0	7	136	353	600	2835
60	542	379	216	64	11	0	0	0	1	62	227	458	1960
57	457	301	154	32	4	0	0	0	0	34	165	375	1522
55	404	251	119	18	1	0	0	0	0	21	131	323	1268
50	285	146	52	3	0	0	0	0	0	5	62	213	766
32	37	3	0	0	0	0	0	0	0	0	0	16	56

Cooling Degree Days (1)

Base Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	377	410	690	873	1143	1320	1473	1442	1241	953	648	439	11009
55	31	15	96	201	432	630	760	729	551	260	89	33	3827
57	22	9	69	155	372	570	698	667	491	211	64	23	3351
60	14	2	38	97	286	480	605	574	402	146	35	13	2692
65	0	0	11	33	162	331	450	419	258	65	11	1	1741
70	0	0	2	7	74	191	295	265	135	21	1	0	991

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	186	240	471	655	918	1101	1244	1213	1017	717	430	237	186	426	897	1552	2470	3571	4815	6028	7045	7762	8192	8429
45	103	144	331	506	763	951	1089	1058	867	562	295	133	103	247	578	1084	1847	2798	3887	4945	5812	6374	6669	6802
50	49	77	209	359	608	801	934	903	717	408	179	73	49	126	335	694	1302	2103	3037	3940	4657	5065	5244	5317
55	23	34	112	232	454	651	779	748	568	269	94	32	23	57	169	401	855	1506	2285	3033	3601	3870	3964	3996
60	1	8	46	124	306	501	624	593	419	151	42	8	1	9	55	179	485	986	1610	2203	2622	2773	2815	2823
Base	Growing Degree Units for Corn (Monthly)												Growing Degree Units for Corn (Accumulated Monthly)											
50/86	122	164	308	424	610	754	854	835	689	471	283	160	122	286	594	1018	1628	2382	3236	4071	4760	5231	5514	5674

Figure 5. Degree days.