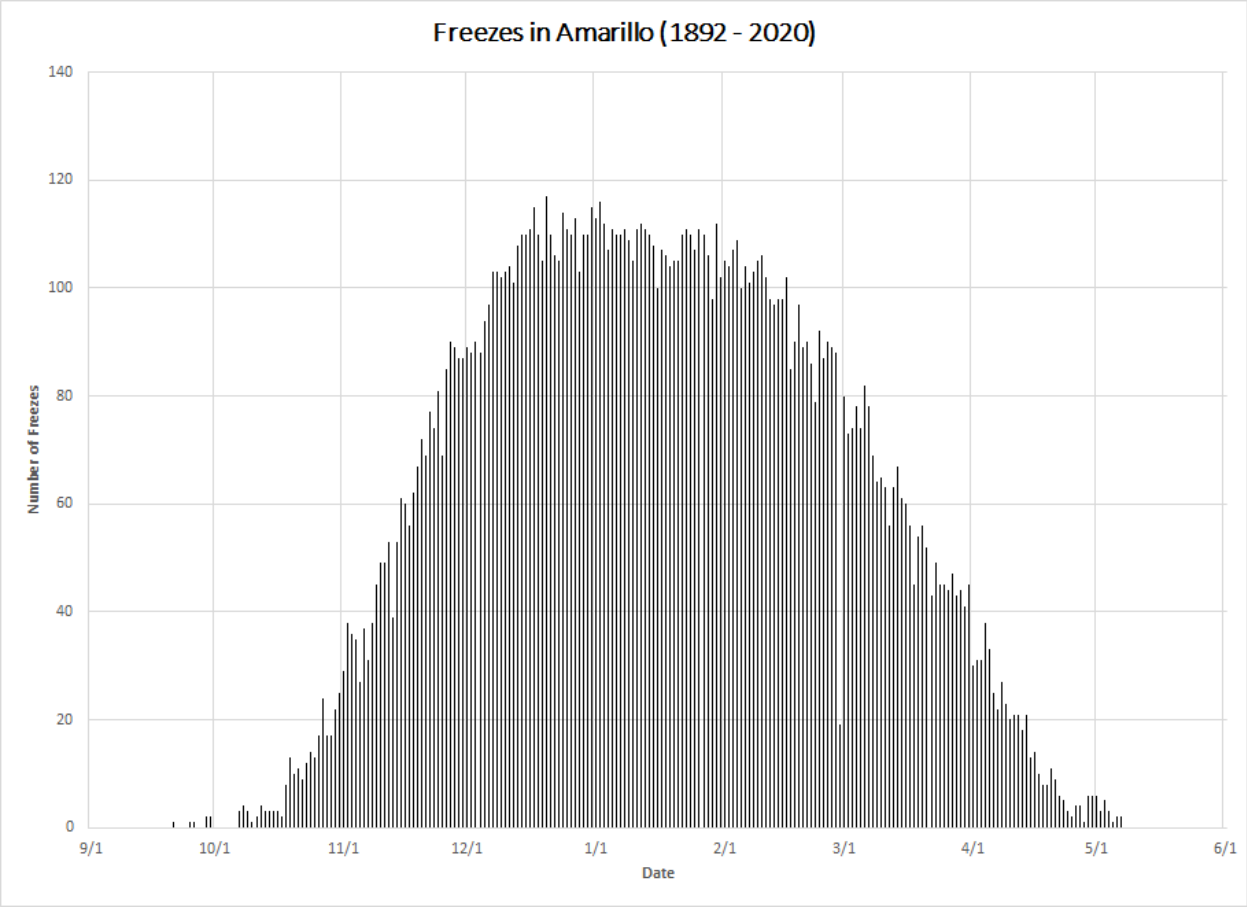
Amarillo's Freezes

By Robert Ashcraft

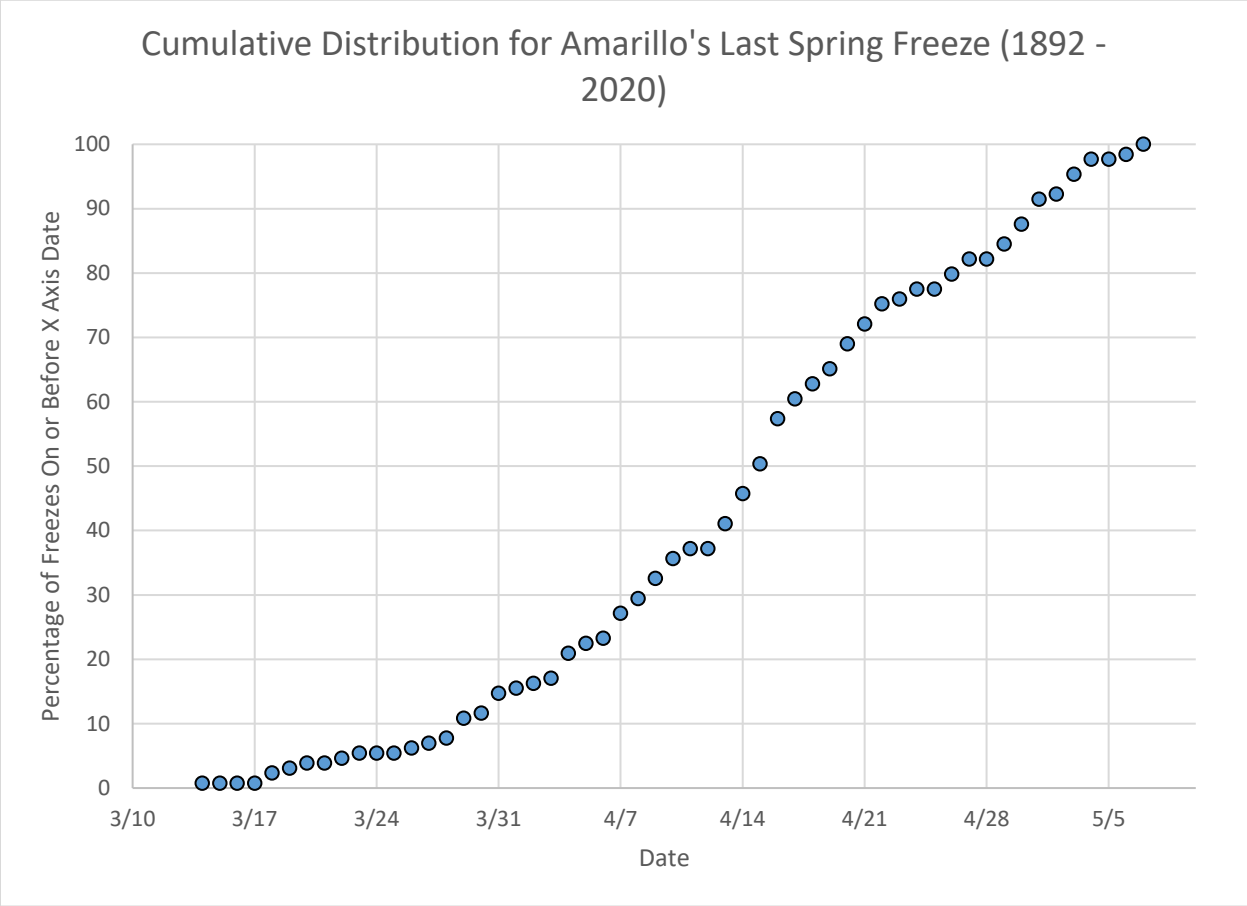
Amarillo's weather station has been reporting temperature data since the beginning of 1892. During that time, the first freeze (temperature of 32° or lower) of fall has occurred as early as September 21 (1983) or as late as November 22 (1965). Similarly, the last freeze of spring has occurred as early as March 14 (1963) or as late as May 7 (1915 and 1917). The last freeze for the spring of 2020 occurred on April 17.

Amarillo's growing season (the days between the last freeze of spring and the first freeze of fall) has ranged from 151 days (1984) to 242 days (1963).

This plot shows, for each day of the year, the number of times a freeze has occurred. As expected, the distribution is a bell-shaped curve with maximum values in December and January. Of course, there aren't as many values for February 29.

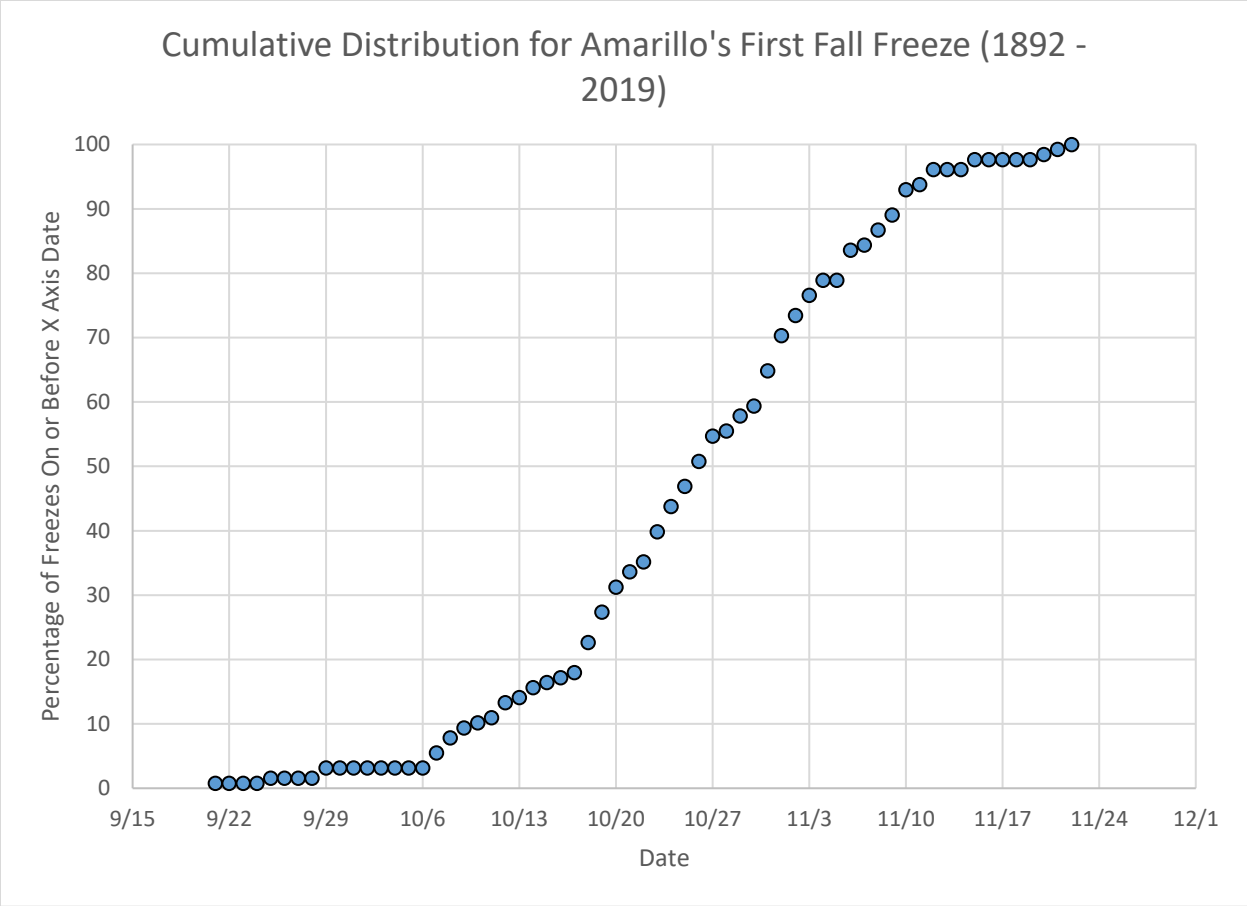


The following plot shows the cumulative distribution for Amarillo's last freezes of spring. As mentioned earlier, all of them have occurred on or before May 7. As the spring progresses, we are more likely to see that last freeze. As examples, 50% of the last freezes of spring have occurred on or before April 15, and 90% have occurred on or before May 1.

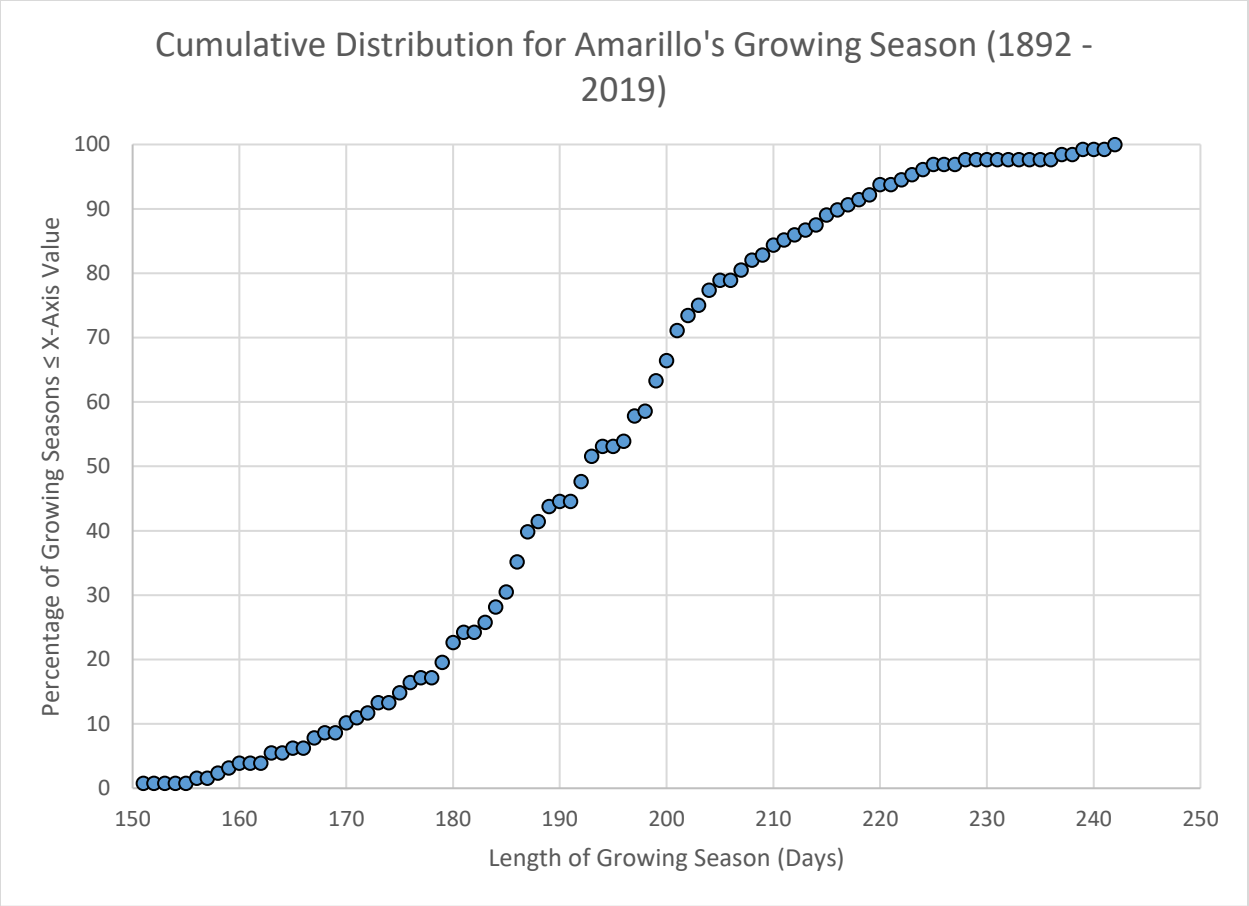


Now let's look at the cumulative distribution for the first freezes of fall. The plot shows that, as the fall progresses, we are more likely to see that first freeze. As examples, 50% of the first freezes of fall have occurred on or before October 26, and 90% have occurred on or before November 9. The curve really accelerates after October 17.

The plot will be complete when we have our first freeze this fall.



Finally, the following plot shows the cumulative distribution for the lengths of Amarillo's growing seasons. As examples, 50% of the growing seasons have been less than or equal to 193 days, and 90% have been less than or equal to 217 days. The plot will be complete when we have our first freeze this fall. Then we will know how long the 2020 growing season was.

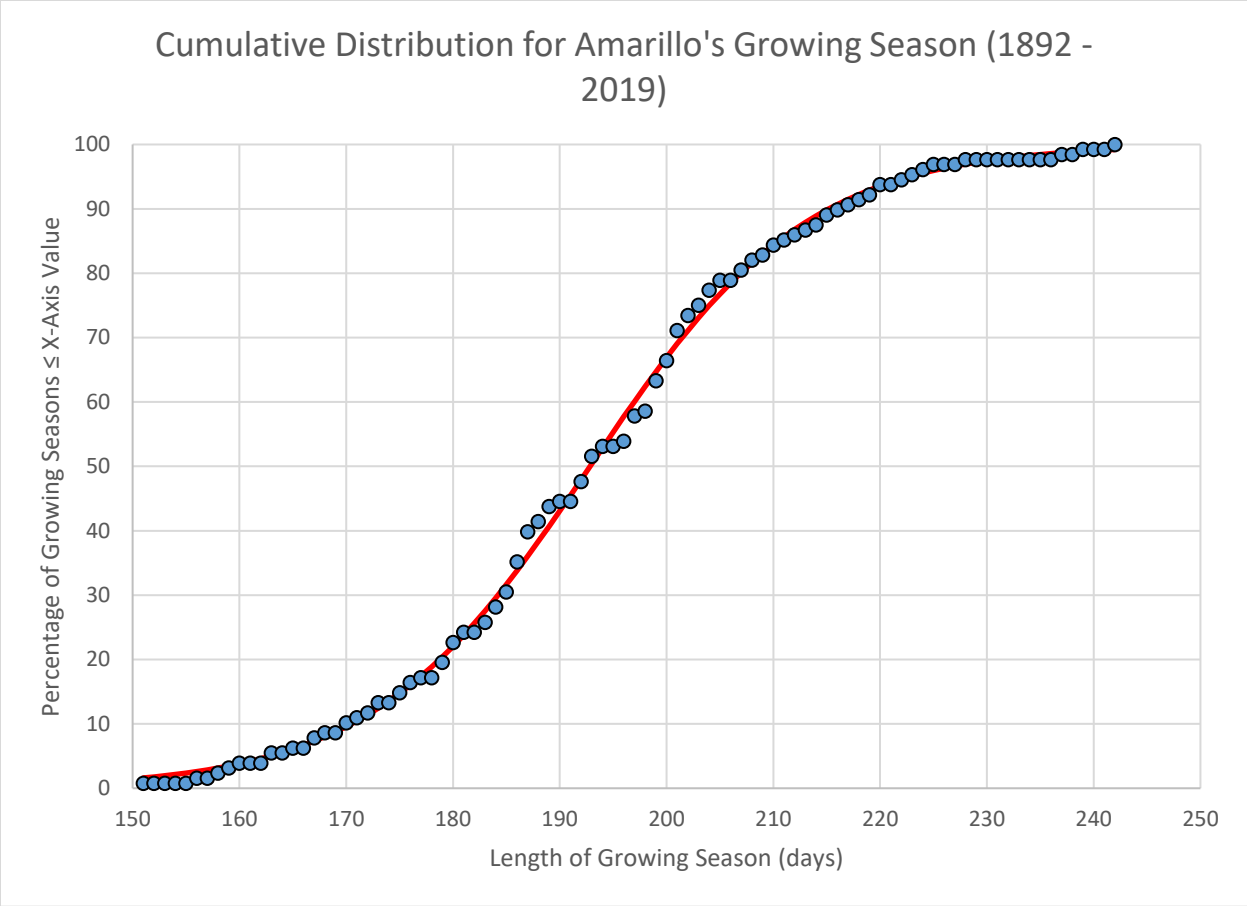


This distribution is very close to being sigmoidal, i.e.,

$$y = \frac{a}{1 + exp\left(-\frac{x-b}{c}\right)}$$

The following plot shows the data with the best fit sigmoid curve. The values of the parameters are

a = 100
b = 192.8405
c = 10.17252


Cumulative Distribution for Amarillo's Growing Season (1892 - 2019)
Percentage of Growing Seasons ≤ X-Axis Value
100
90
80
70
60
50
40
30
20
10
0
150
160
170
180
190
200
210
220
230
240
250
Length of Growing Season (days)