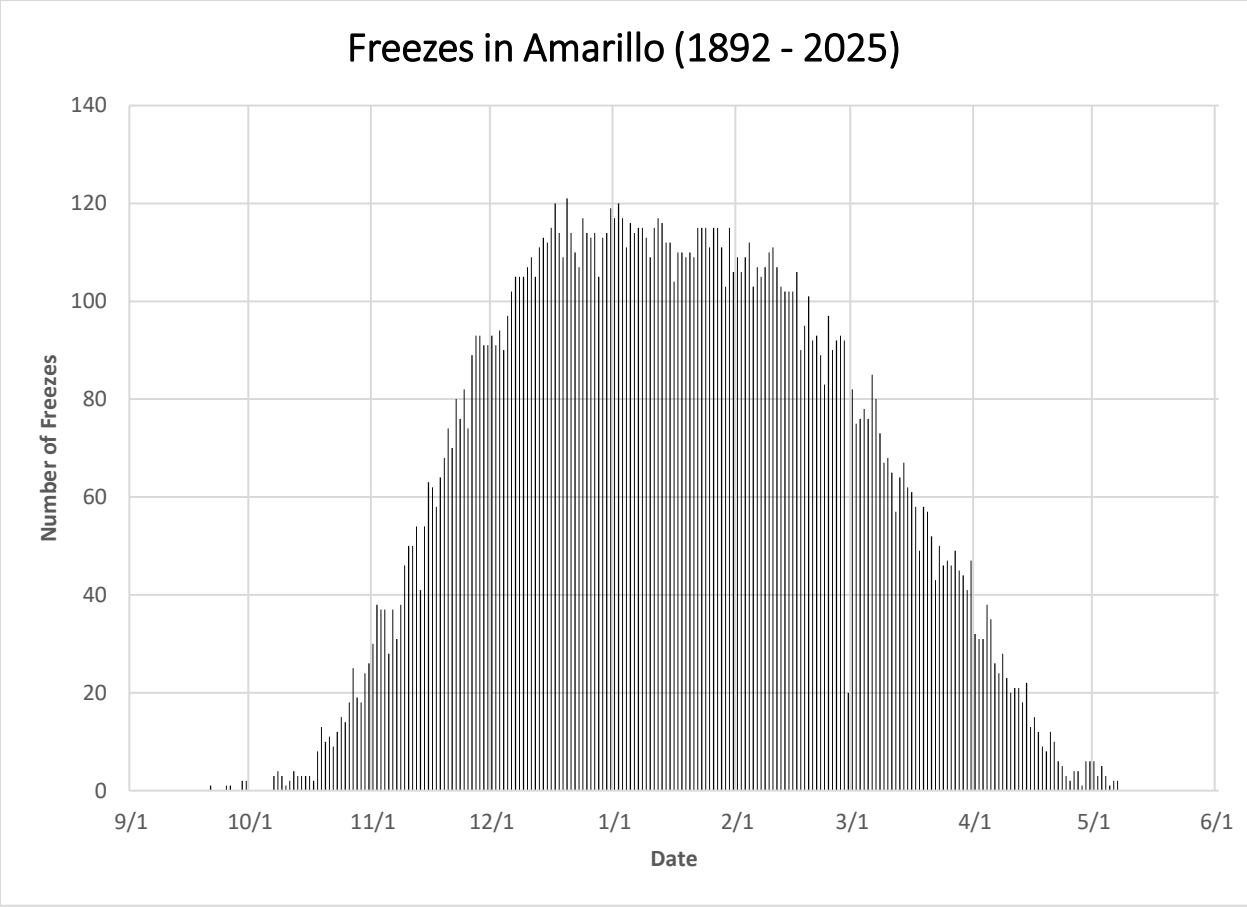
Amarillo's Freezes

By Robert Ashcraft

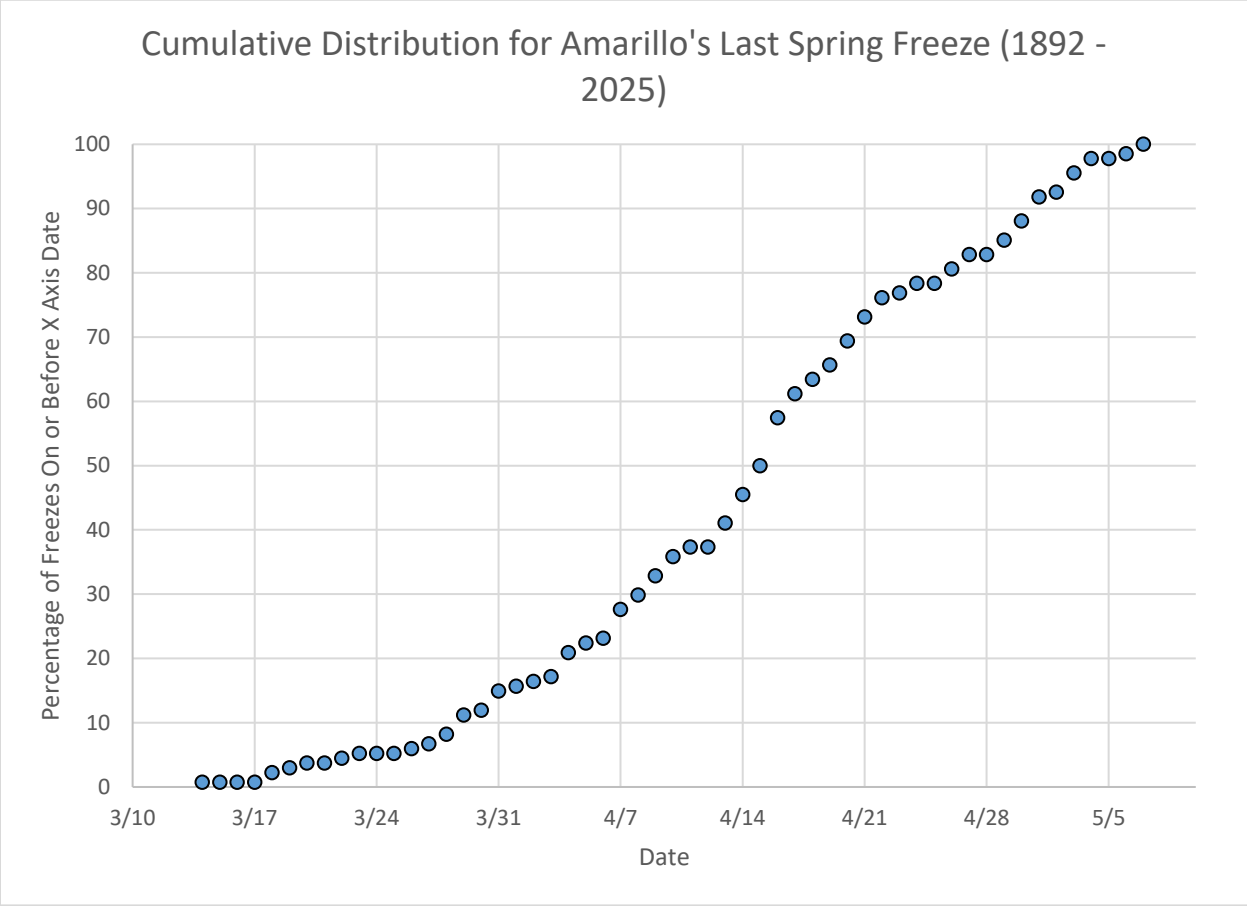
Amarillo's weather station has been reporting temperature data since the beginning of 1892. During that time, the first freeze (temperature of 32° or lower) of fall has occurred as early as September 21 (1983) or as late as November 22 (1965). Similarly, the last freeze of spring has occurred as early as March 14 (1963) or as late as May 7 (1915 and 1917). The last freeze for the spring of 2025 occurred on April 7, and the first freeze of fall occurred on October 30.

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). The growing season for 2025 was 205 days.

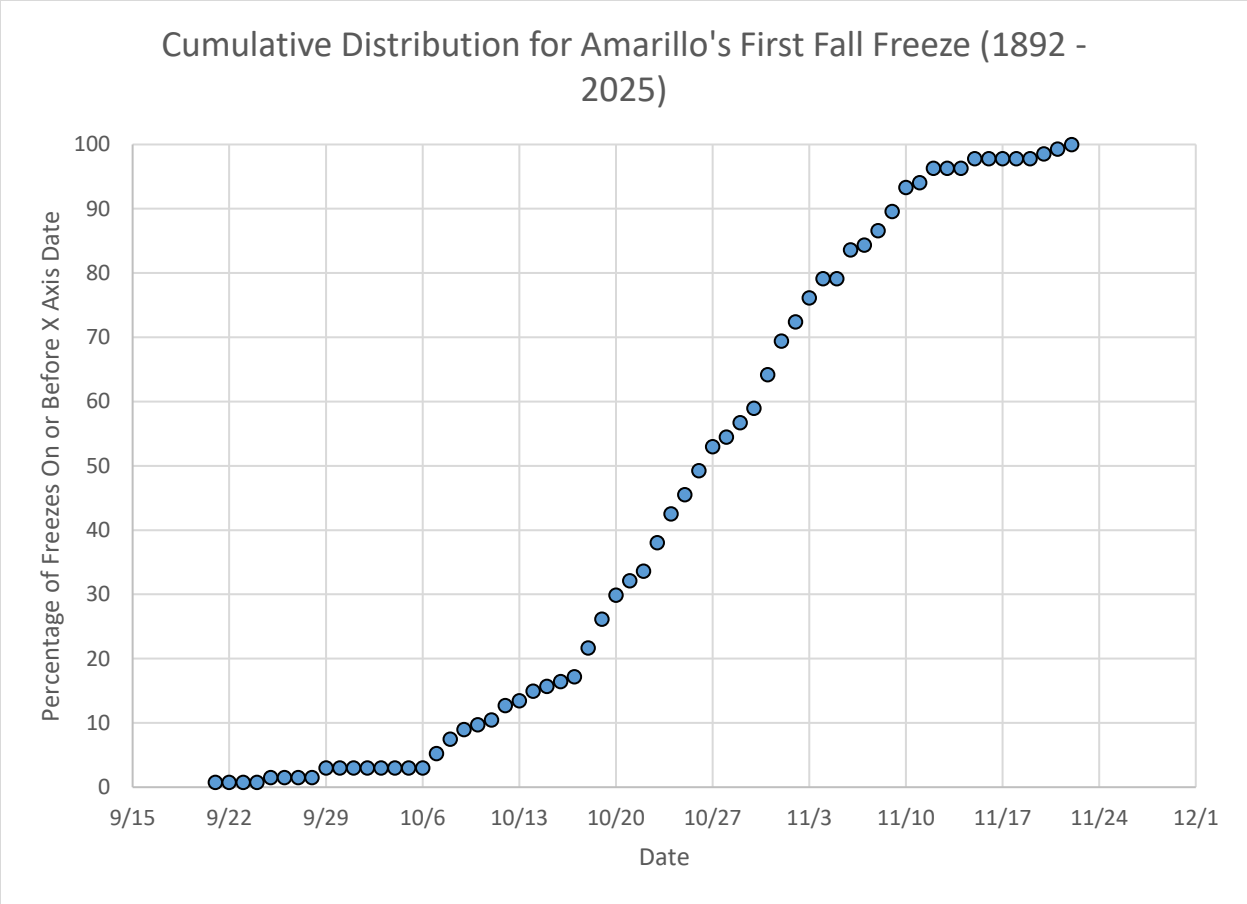
This plot shows, for each day of the year, the number of times a freeze has occurred. As expected, the distribution is a bell-shaped curve with maximum values in December and January. Of course, there aren't as many values for February 29. The plot won't be complete until next spring.



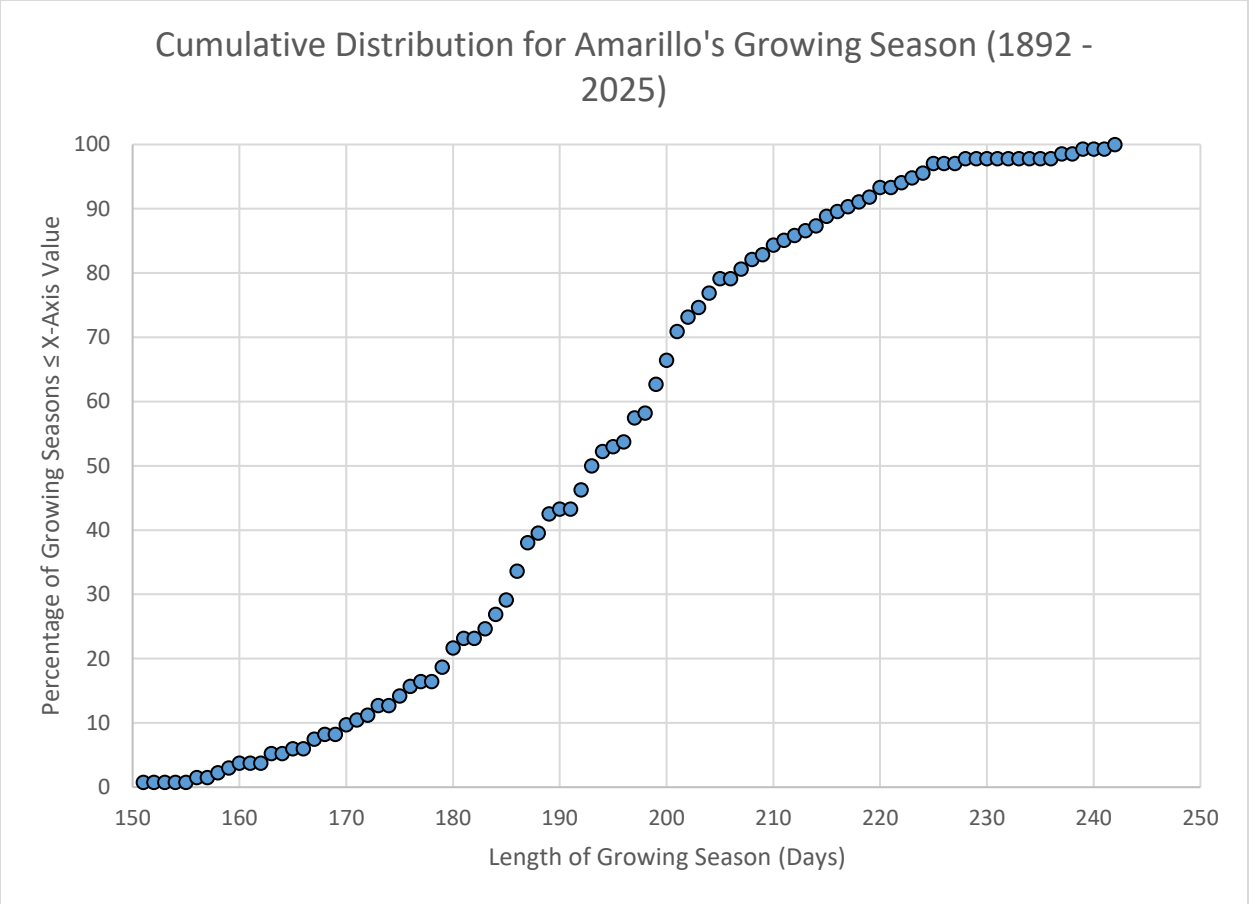
The following plot shows the cumulative distribution for Amarillo's last freezes of spring. As mentioned earlier, all of them have occurred on or before May 7. As the spring progresses, we are more likely to see that last freeze. As examples, 50% of the last freezes of spring have occurred on or before April 15, and 85% have occurred on or before April 29.



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, 49% of the first freezes of fall have occurred on or before October 26, and 90% have occurred on or before November 9.



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.



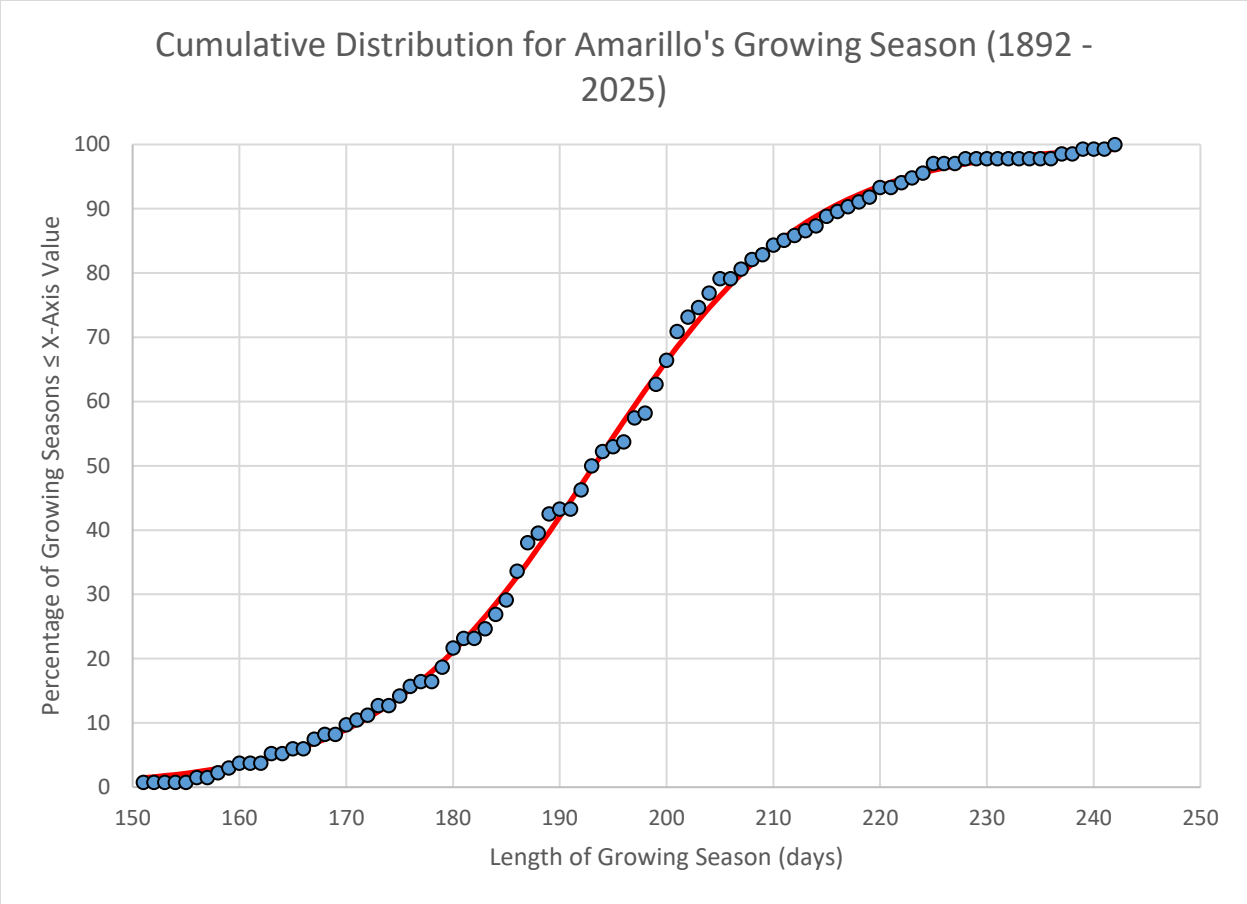
This distribution is very close to being sigmoidal, i.e.,

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

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

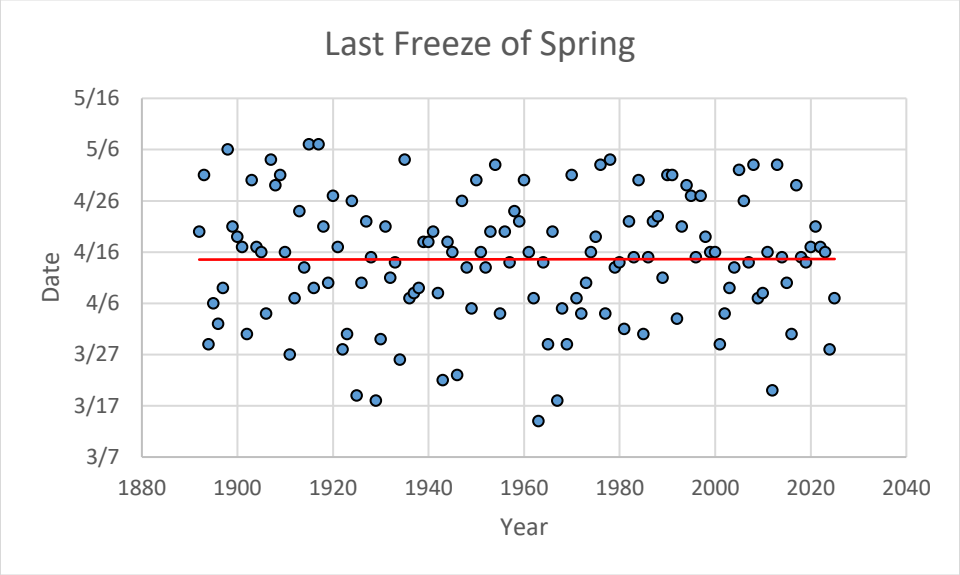
a = 100
b = 193.2135
c = 10.01984

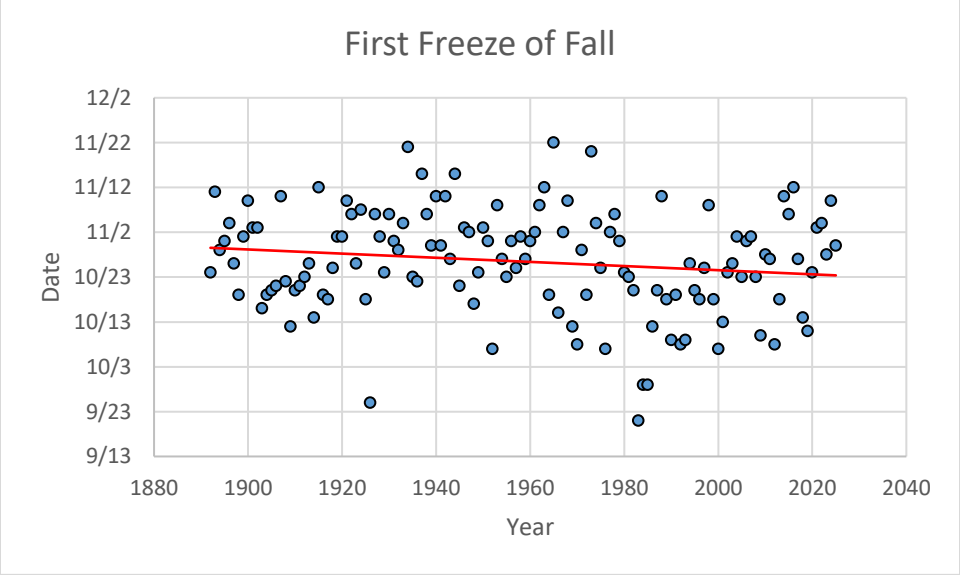
The R^2 value for the fit is 0.998994.

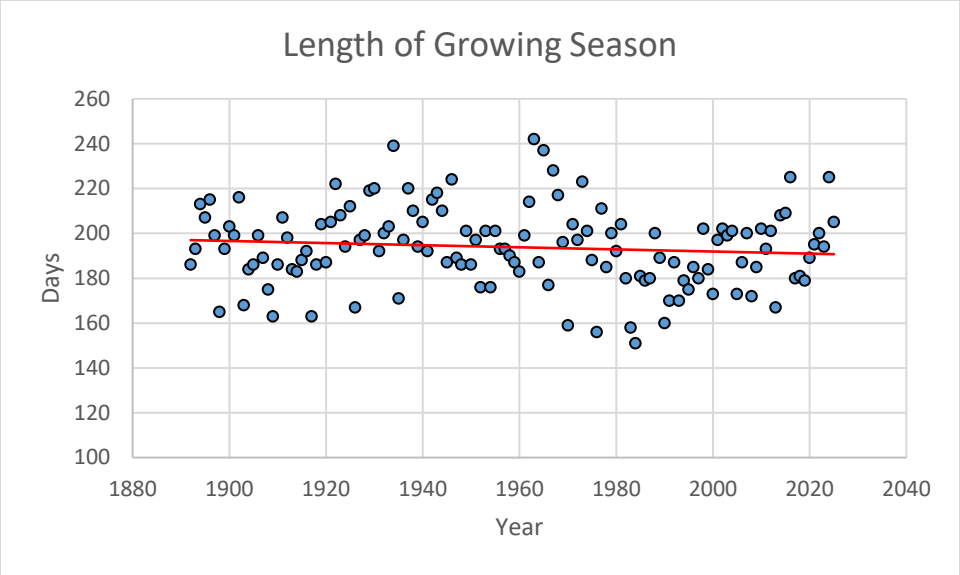
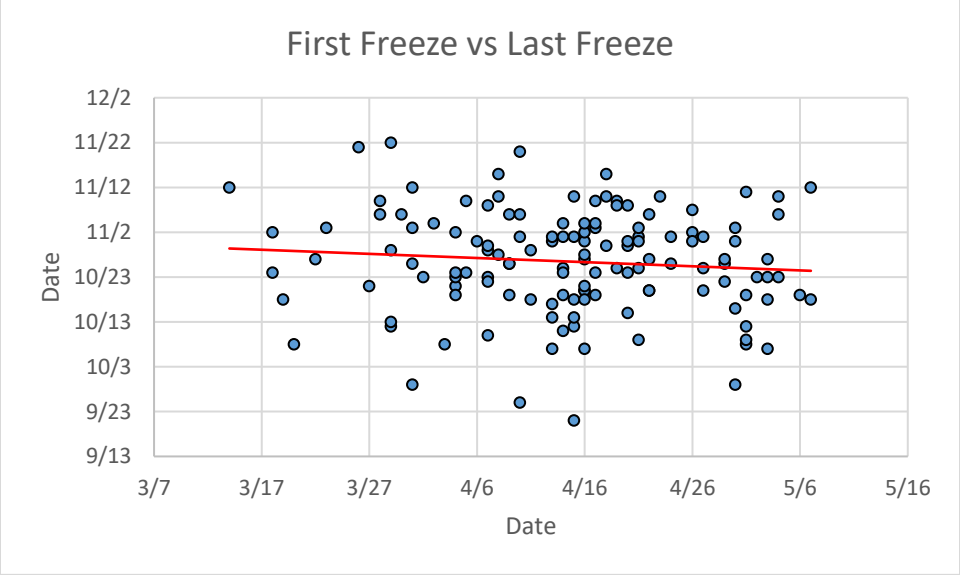

Cumulative Distribution for Amarillo's Growing Season (1892 - 2025)
Percentage of Growing Seasons ≤ X-Axis Value
100
90
80
70
60
50
40
30
20
10
0
150
160
170
180
190
200
210
220
230
240
250
Length of Growing Season (days)

APPENDIX

The following three time series plots show that, for the period of record, there have been no significant trends in the dates of the last freezes of spring, the dates of the first freezes of fall, or the lengths of the growing seasons in Amarillo. Note how the trend lines are close to being horizontal.







Finally, is there any correlation between the date of the first freeze in the fall and the date of the last freeze in the previous spring? If so, we could predict the first freeze knowing when the last freeze occurred in the previous spring. This plot shows that there is no correlation.