

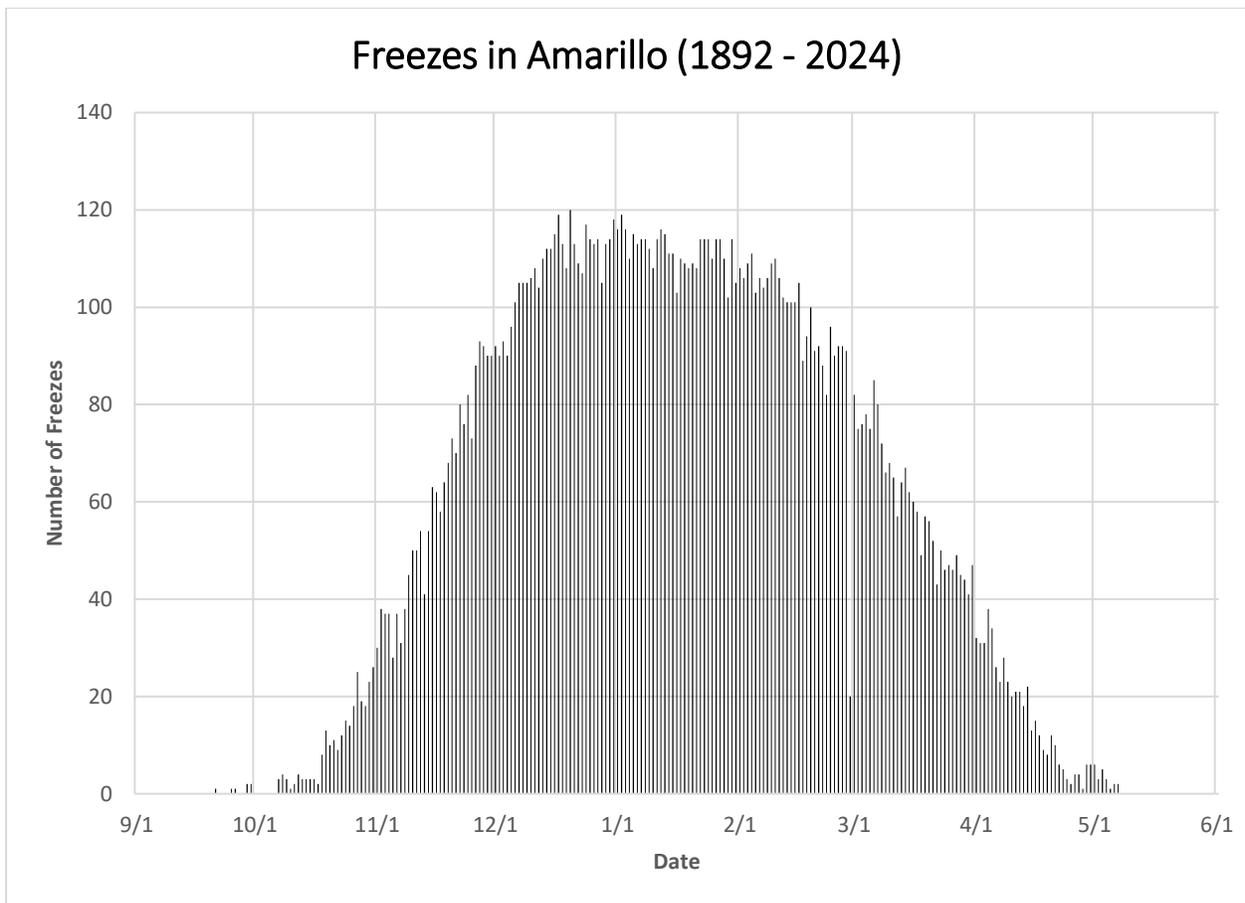
Amarillo's Freezes

By Robert Ashcraft

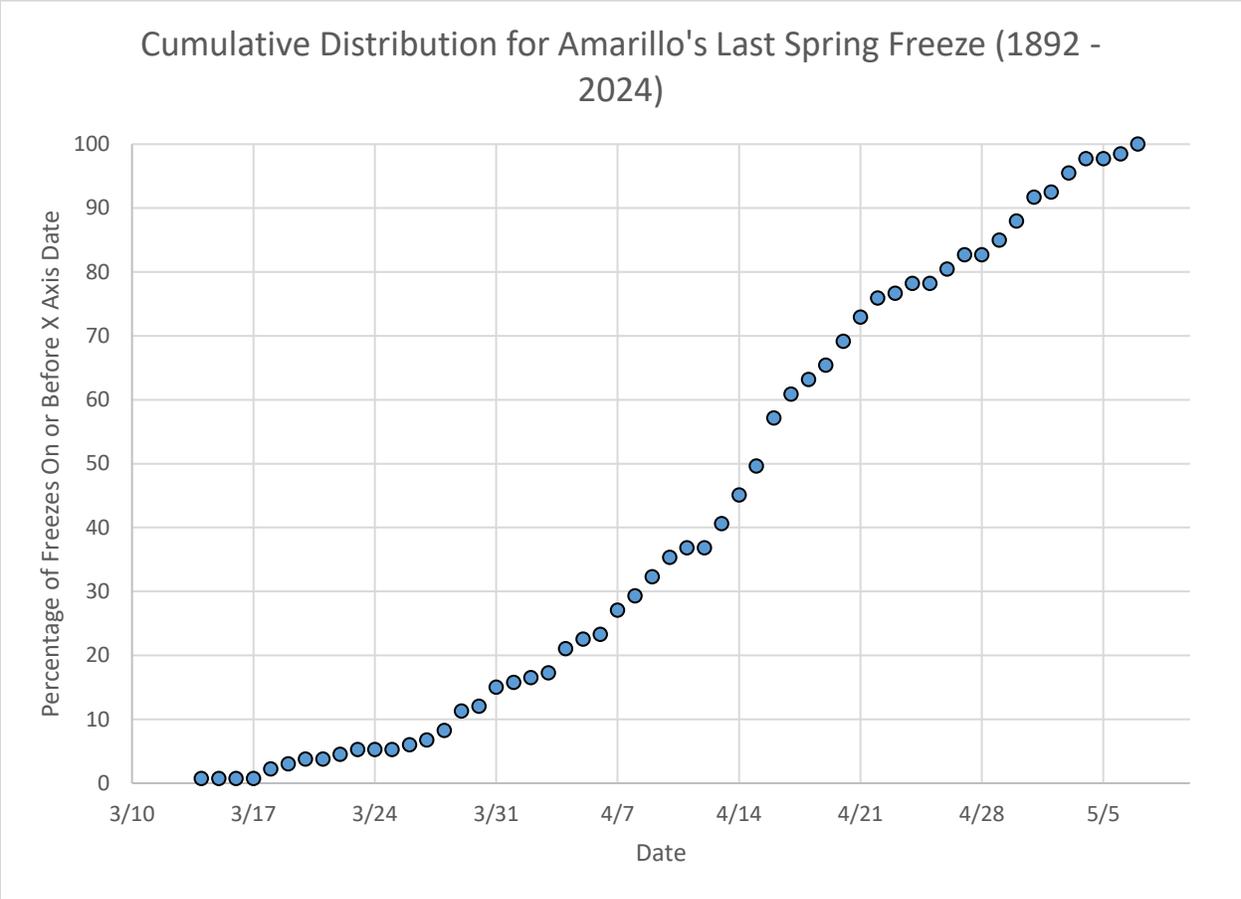
Amarillo's weather station has been reporting temperature data since the beginning of 1892. During that time, the first freeze (temperature of 32° or lower) of fall has occurred as early as September 21 (1983) or as late as November 22 (1965). Similarly, the last freeze of spring has occurred as early as March 14 (1963) or as late as May 7 (1915 and 1917). The last freeze for the spring of 2024 occurred on March 28.

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 2023 was 194 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.



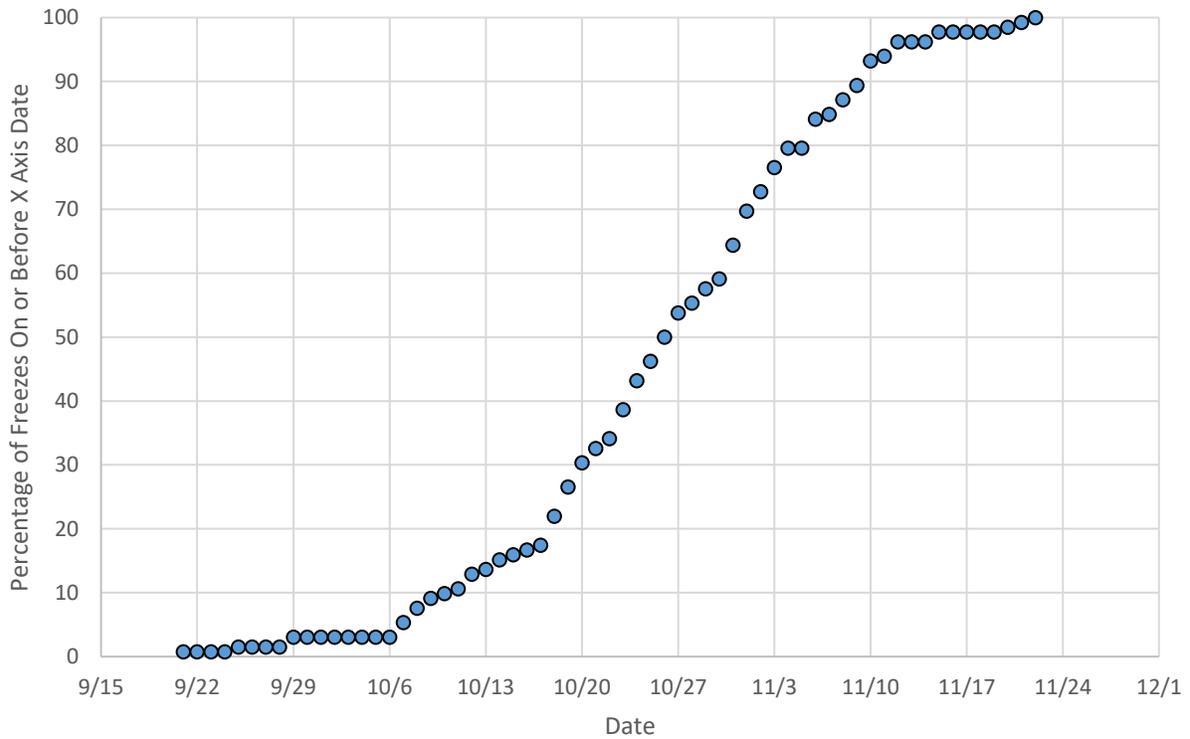
The following plot shows the cumulative distribution for Amarillo's last freezes of spring. As mentioned earlier, all of them have occurred on or before May 7. As the spring progresses, we are more likely to see that last freeze. As examples, 50% of the last freezes of spring have occurred on or before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



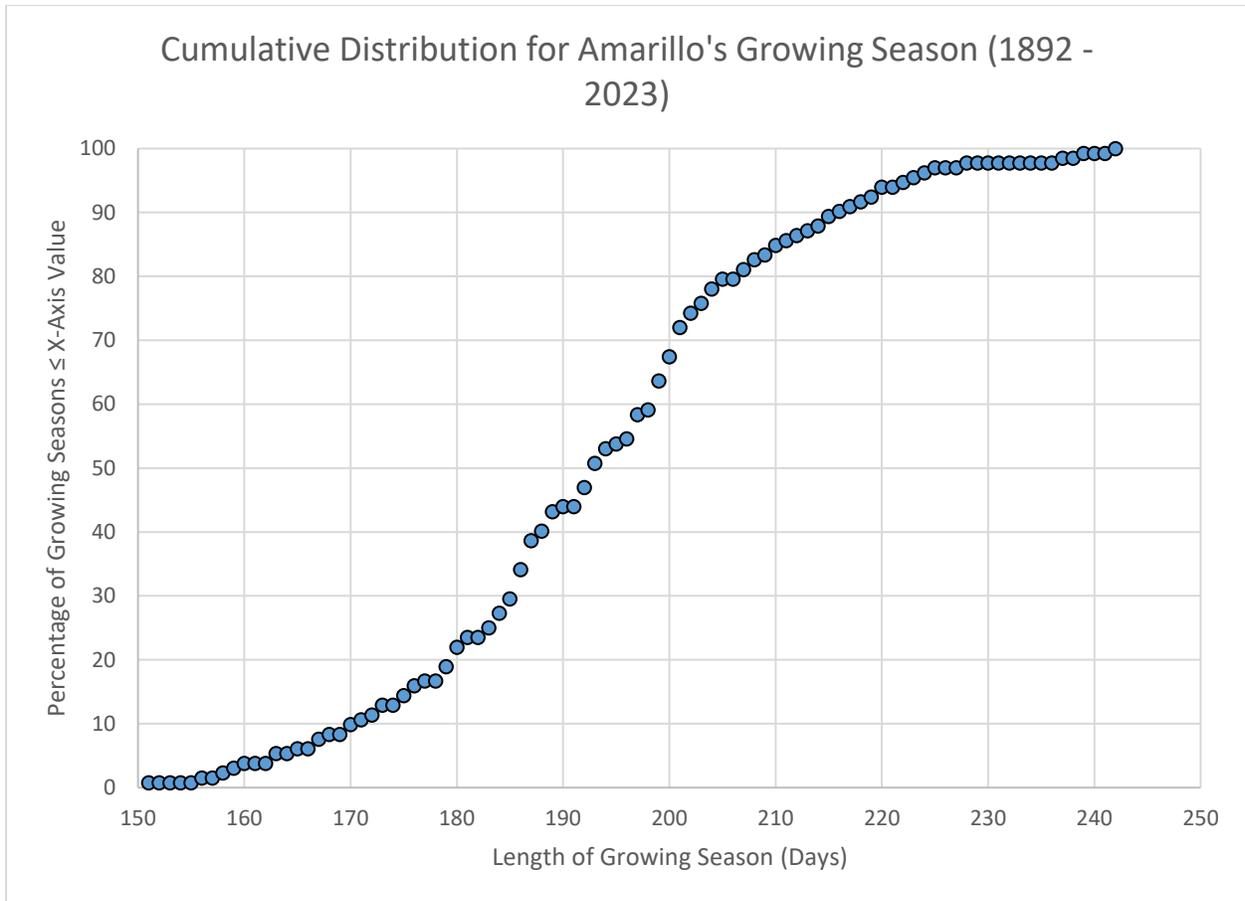
Now let's look at the cumulative distribution for the first freezes of fall. The plot shows that, as the fall progresses, we are more likely to see that first freeze. As examples, 50% of the first freezes of fall have occurred on or before October 26, and 90% have occurred on or before November 9. The first freeze for the fall of 2023 was on October 28.

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

Cumulative Distribution for Amarillo's First Fall Freeze (1892 - 2023)



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 214 days. The plot will be complete when we have our first freeze this fall. Then we will know how long the 2024 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

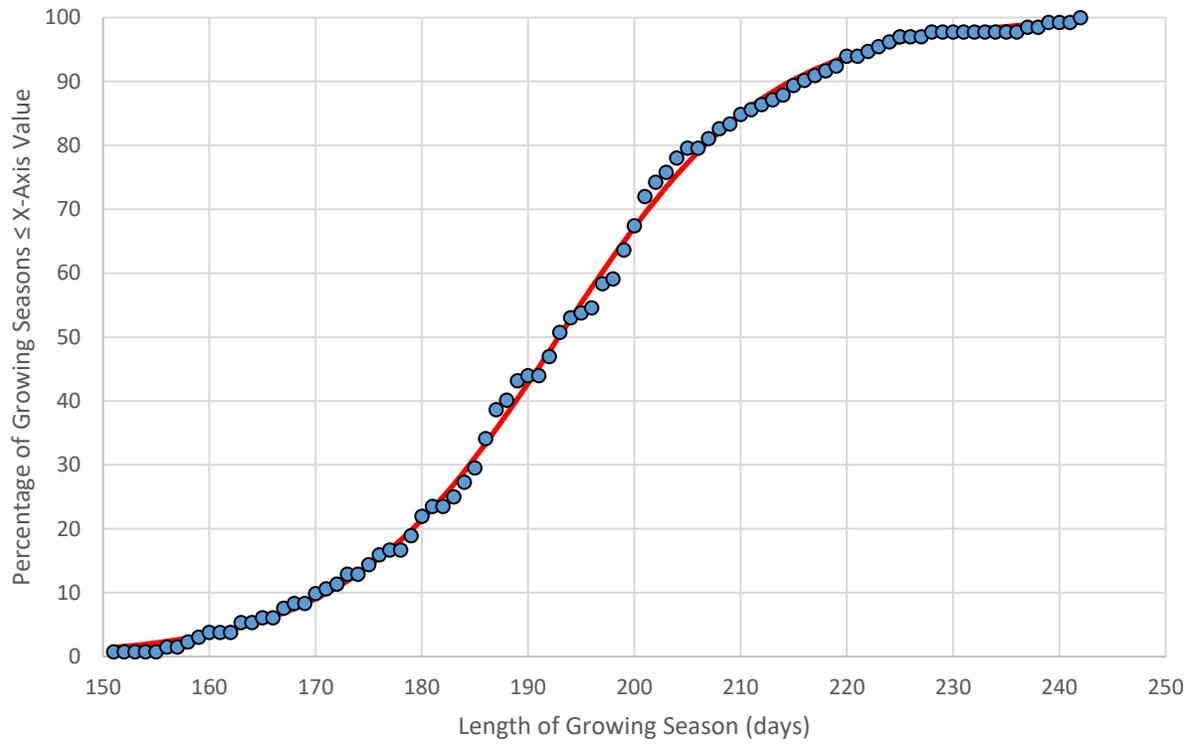
a = 100

b = 192.8902

c = 9.920587

The R² value for the fit is 0.998995.

Cumulative Distribution for Amarillo's Growing Season (1892 - 2023)



APPENDIX

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.

