

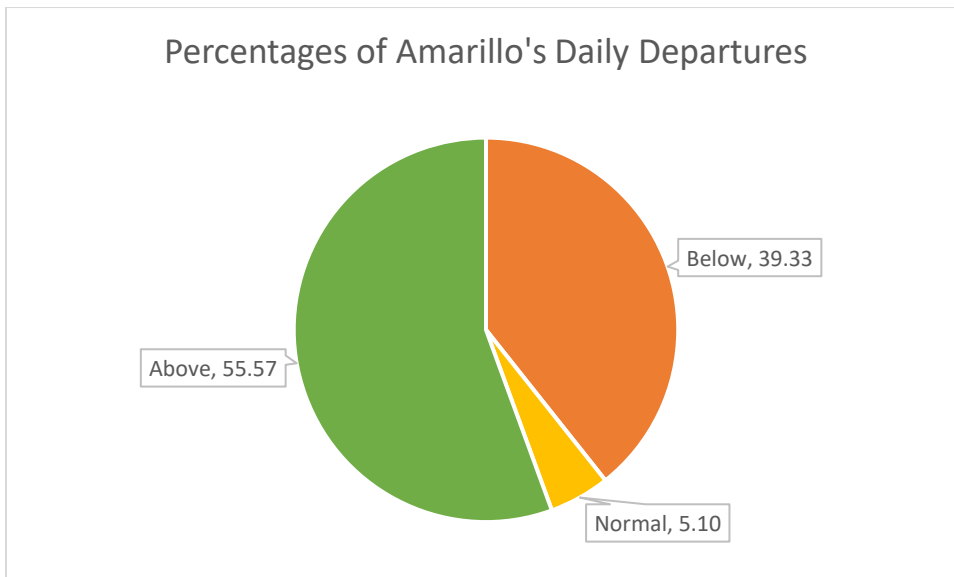
A Look at Amarillo's Daily Average Temperatures

By Robert Ashcraft

On any given day the daily average temperature is either below normal, normal, or above normal. Using Amarillo's daily temperature data back to January 1, 1991, I looked at the occurrences of each category. The results are shown in the following table and pie chart.

Count	Below	Normal	Above
11323	4453	578	6292

Percentage	39.33	5.10	55.57
------------	-------	------	-------



Thus, roughly 39% of the 11,323 days have been below normal, and roughly 61% of the days have been normal or above normal.

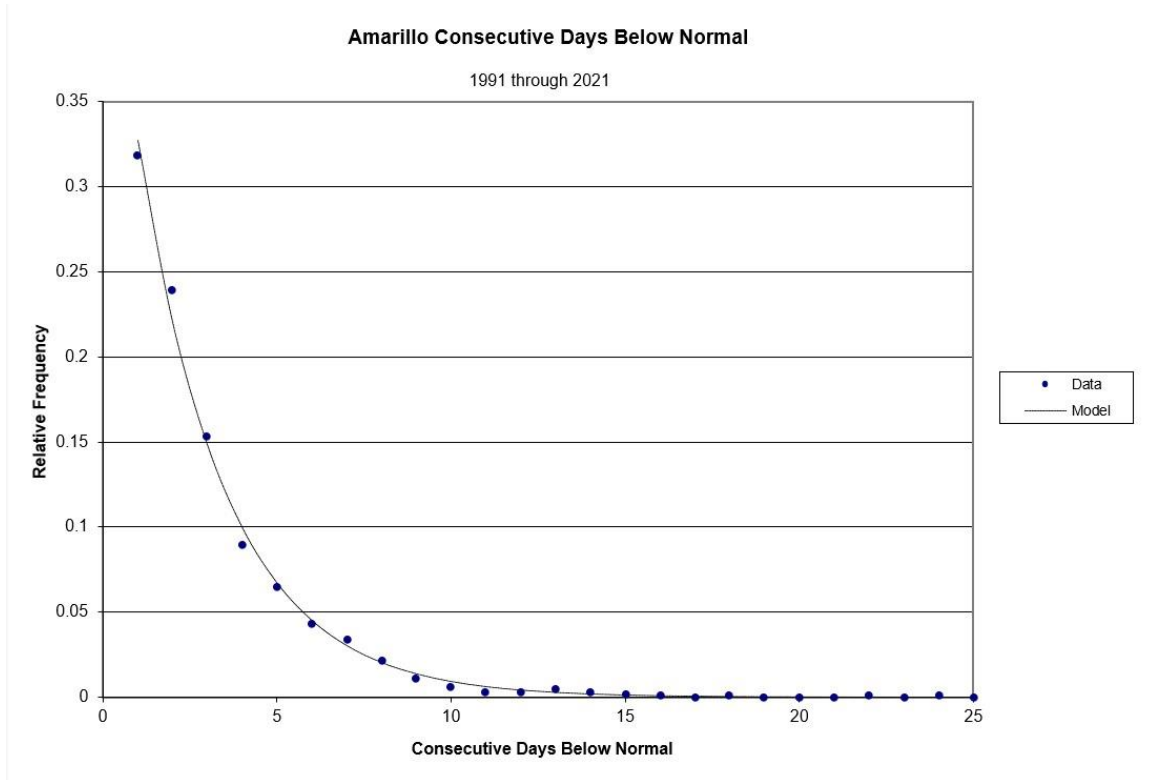
I also looked at streaks (consecutive days with the same category). For example, starting June 22, 2011, we had 50 consecutive days with daily average temperatures normal or above normal. That was followed by one day below normal, followed by 24 more consecutive days of normal or above normal daily average temperatures. I hope we never have streaks like that again!

Since longer streaks are less likely to occur than short streaks, data of this type should follow a geometric distribution. The probability density function is given by

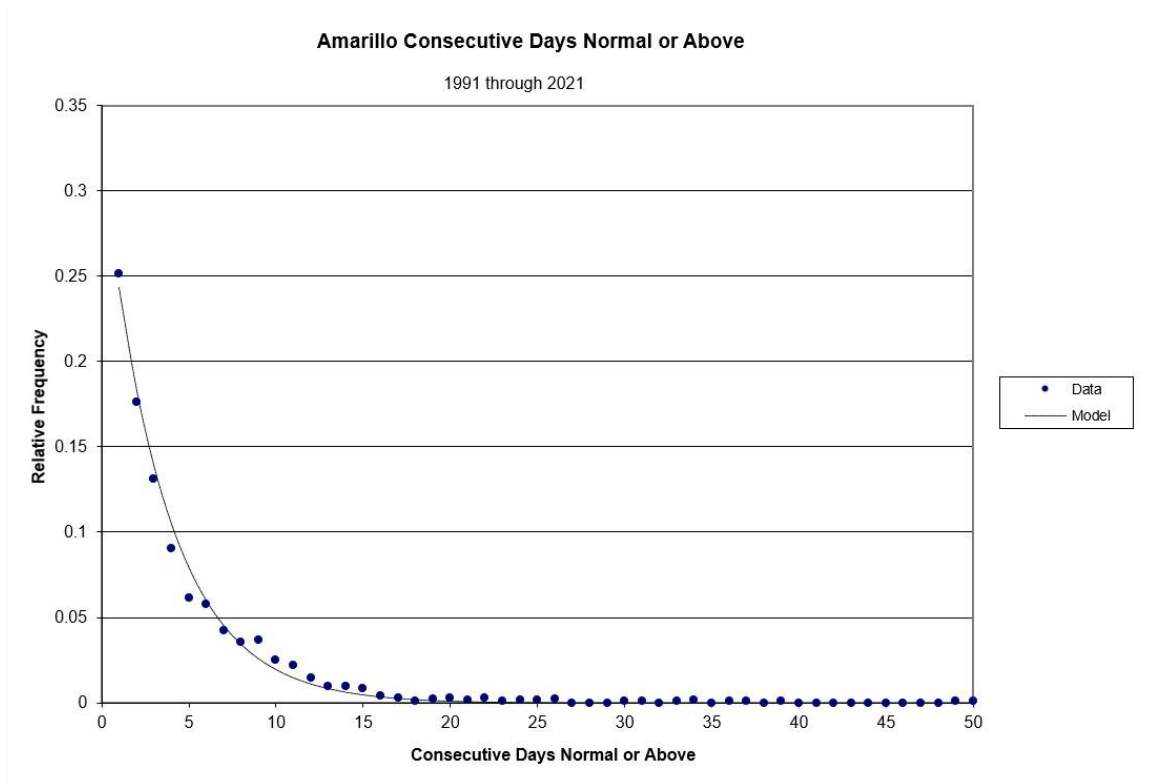
$$p(n) = \left(1 - \frac{1}{\mu}\right)^{n-1} \left(\frac{1}{\mu}\right)$$

where n is the number of consecutive days in a streak, and μ is the mean or average number of consecutive days in a streak.

The following graph shows the relative frequency distribution of streaks of daily average temperatures below normal and the theoretical curve. The theoretical curve is a good fit to the data. The mean of this data set is 3.0555 days.



The following graph shows the relative frequency distribution of streaks of daily average temperatures normal or above normal and the theoretical curve. Again, the theoretical curve is a good fit to the data. The mean of this data set is 4.1042 days.



Thus, since January 1, 1991, streaks of below normal daily average temperatures have averaged roughly three days in length, and streaks of normal or above normal daily average temperatures have averaged roughly four days in length.

As more data are gathered, the models will probably fit even better.

Note: I used Amarillo's climate normal data for the 30-year window from 1961 through 1990 as my standard. The climate normal data have been updated twice since then, with the current window being 1991 through 2020. I wanted my analysis to be based on a fixed standard.