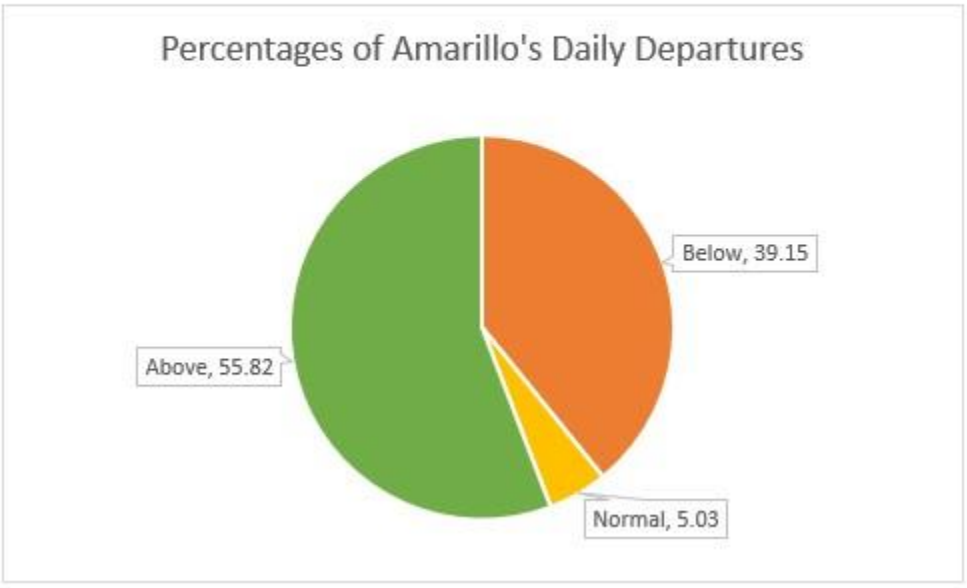
A Look at Amarillo's Daily Average Temperatures

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
11689	4576	588	6525

Percentage	39.15	5.03	55.82



Thus, roughly 39% of the 11,689 days have been below normal, and roughly 61% of the days have been normal or above normal.

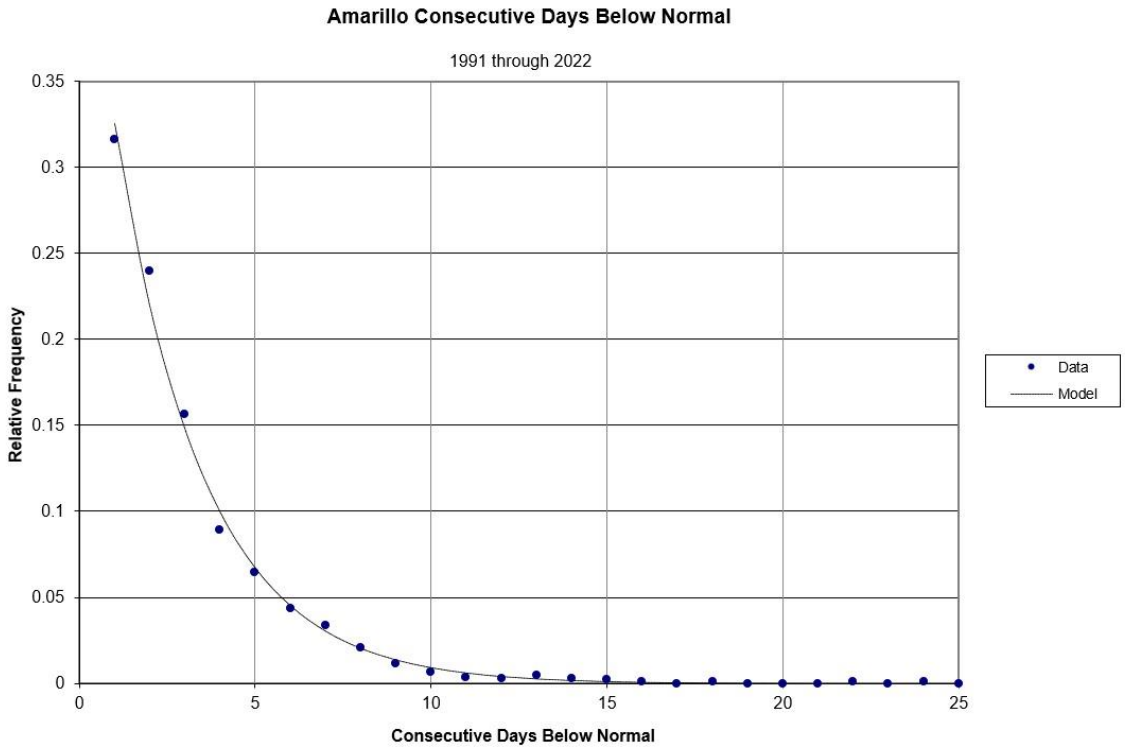
I also looked at streaks (consecutive days with the same category). For example, starting June 22, 2011, we had 50 consecutive days with daily average temperatures normal or above normal. That was followed by one day below normal, followed by 24 more consecutive days of normal or above normal daily average 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

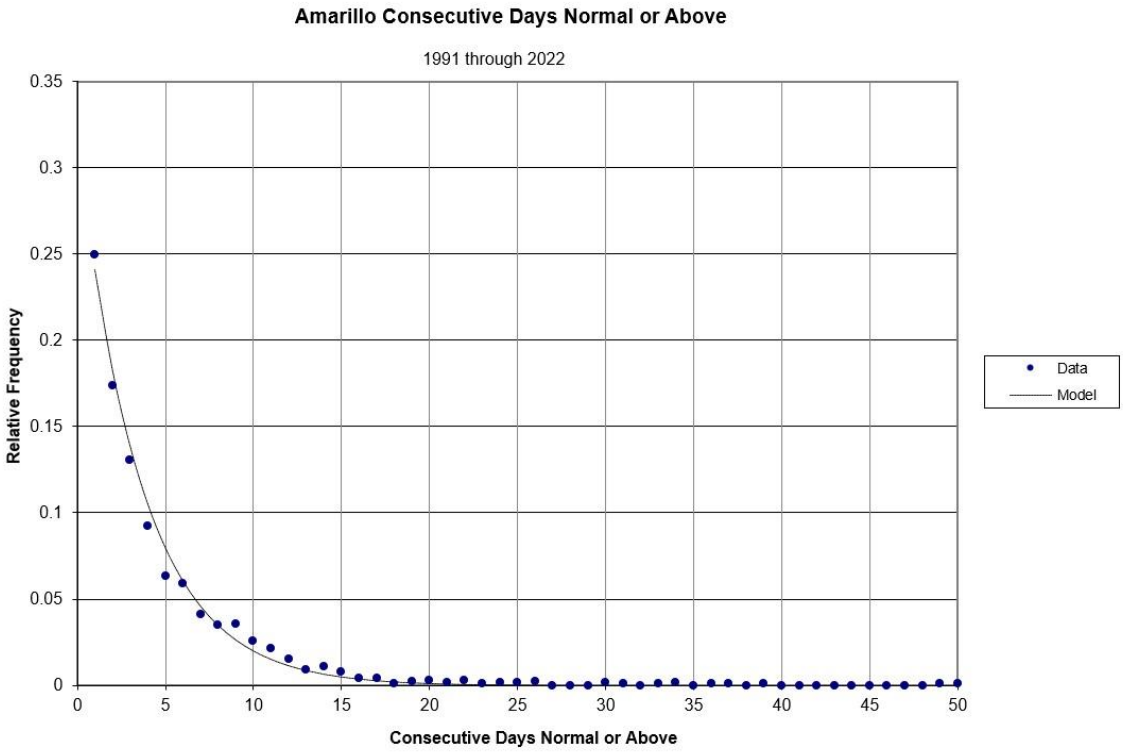
$$p(n) = \left(1 - \frac{1}{\mu}\right)^{n-1}\left(\frac{1}{\mu}\right)$$

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 3.0689 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 4.1503 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.