A Look at Amarillo's Annual and Monthly Snowfall Totals

By Robert Ashcraft

I looked at Amarillo's annual and monthly snowfall totals by accessing the NOAA Online Weather Data (NOWData) website. For some reason the data are complete only back to 1931.

Since the snowfall for a given season begins in the fall and ends in the following spring, it is necessary to use two years to describe the season. For example, the first season of recorded snowfall occurred in 1931 - 1932.

Summary Statistics

	Total	Average	Maximum
Sep	0.3	0.003	0.3
Oct	33.5	0.356	7.4
Nov	171.1	1.820	13.8
Dec	283	3.011	21.2
Jan	377.7	4.018	15.9
Feb	351.7	3.741	25.6
Mar	246.2	2.647	21.5
Apr	60.7	0.646	6.9
May	7.4	0.079	4.7
Annual	1531.6	16.294	47.9

This table shows summary statistics for the monthly and annual snowfall totals. All numbers in the table are in inches.

During the 94 winter seasons, Amarillo has received snowfall as early as September and as late as May. It has snowed only once in September; 0.3 inches occurred in 1984. It has snowed only three times in May; 2.2 inches in 1935, 0.5 inches in 1978, and 4.7 inches in 2005.

Overall, Amarillo has received a total of 1531.6 inches of snow (a little over 127 feet!), for an average of 16.3 inches per season. Extremes reported over the seasons range from 0 inches in 1949 - 1950 and 2017 - 2018 to 47.9 inches in 1982 - 1983.

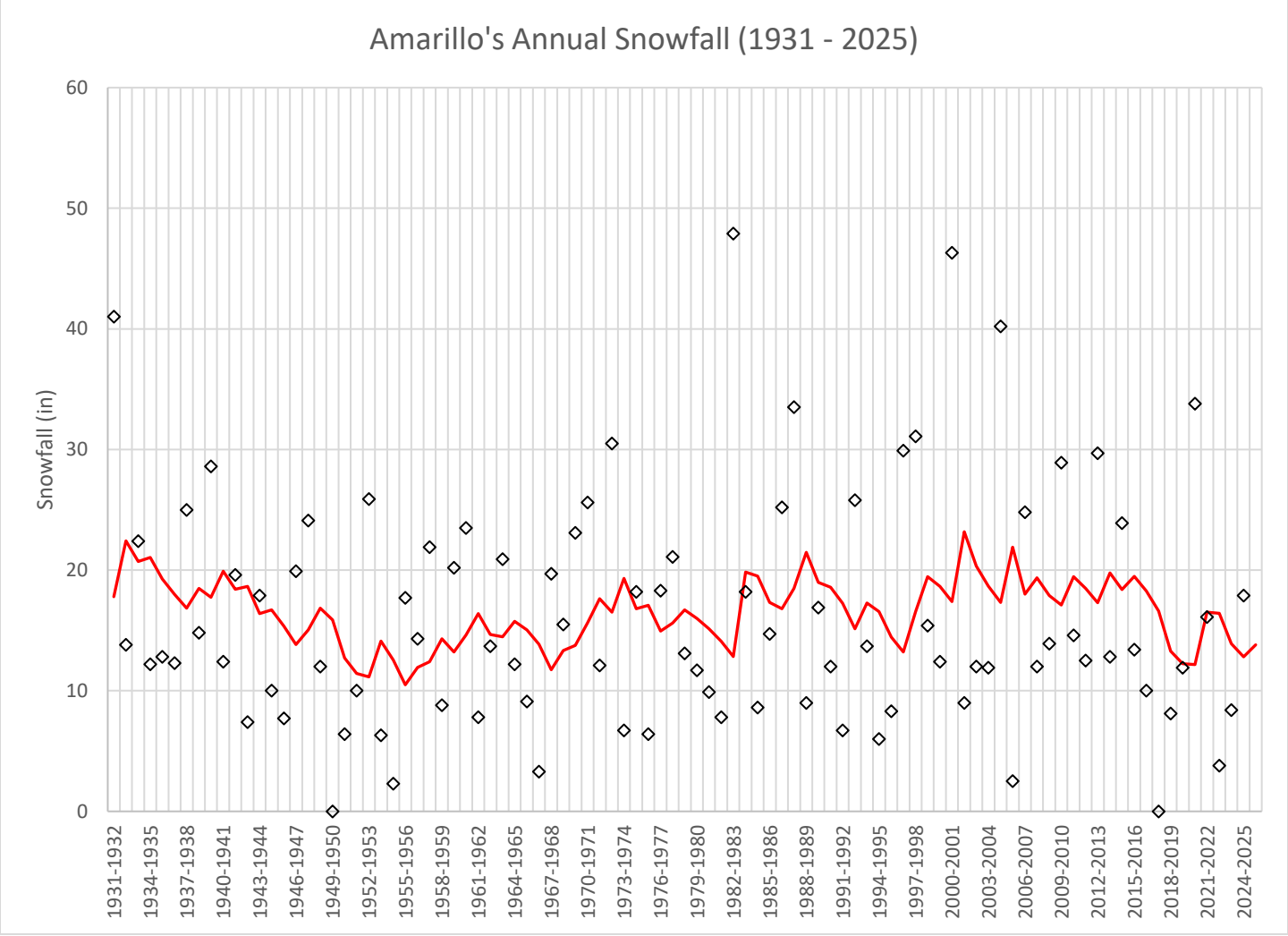
The most snow has occurred during the months of January, but the most snow for a single month (25.6 inches) occurred in February of 2013.

Amarillo received 17.9 inches of snow this season. That ranks 34th for the 94 seasons.

Time Series Plot

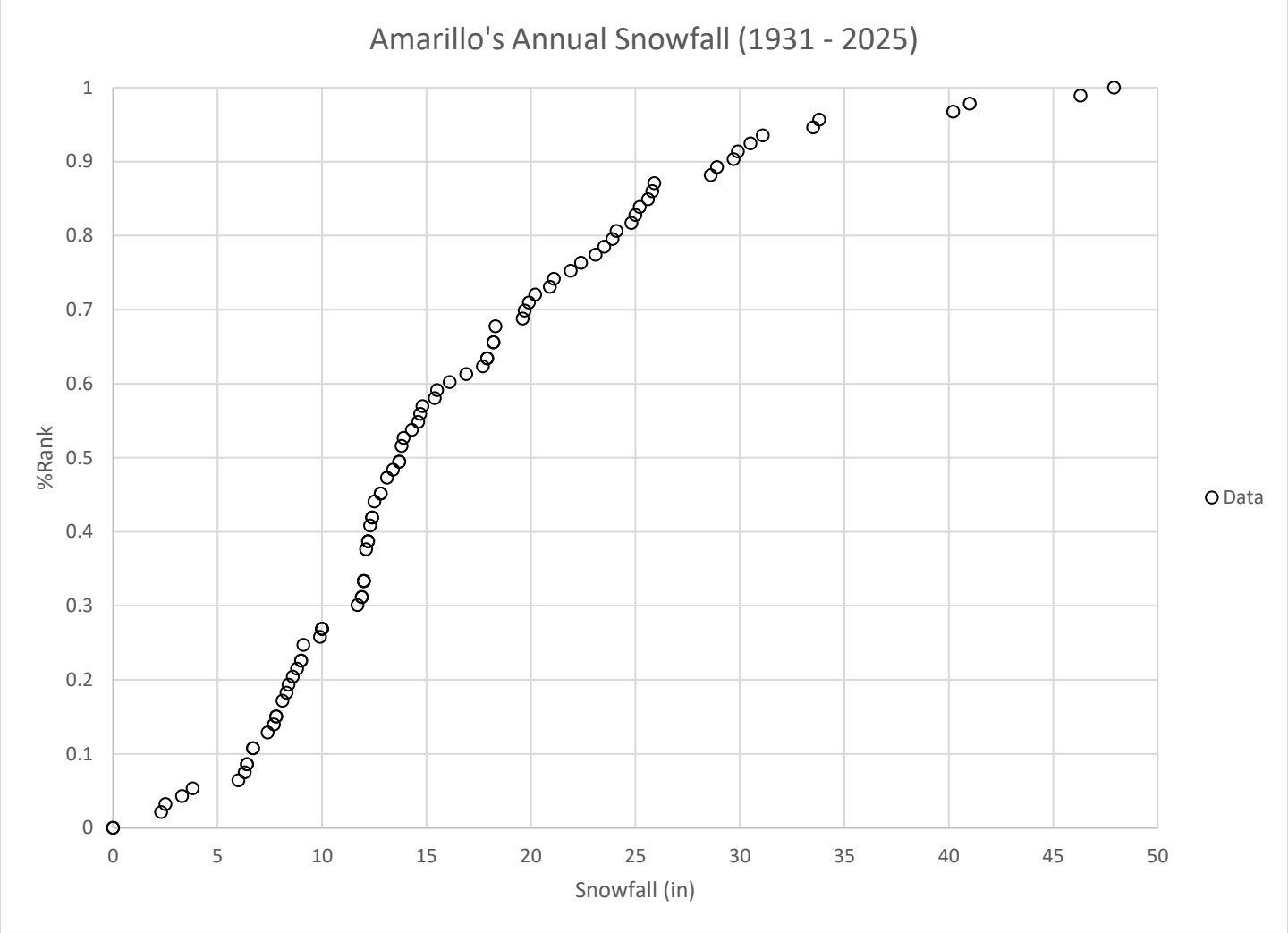
The following time series plot shows no trend in the annual snowfall totals. The top ten seasons for snowfall have been

1982 - 1983 47.9 inches
2000 - 2001 46.3 inches
1931 - 1932 41.0 inches
2004 - 2005 40.2 inches
2020 - 2021 33.8 inches
1987 - 1988 33.5 inches
1997 - 1998 31.1 inches
1972 - 1973 30.5 inches
1996 - 1997 29.9 inches
2012 - 2013 29.7 inches



Percent Rank Regression

After sorting the annual snowfall totals, I was able to calculate the percent rank for each season by using Excel's PERCENTRANK function. Despite its name, it doesn't return a percentage. It returns values ranging from 0 to 1. Here is a plot of the points:



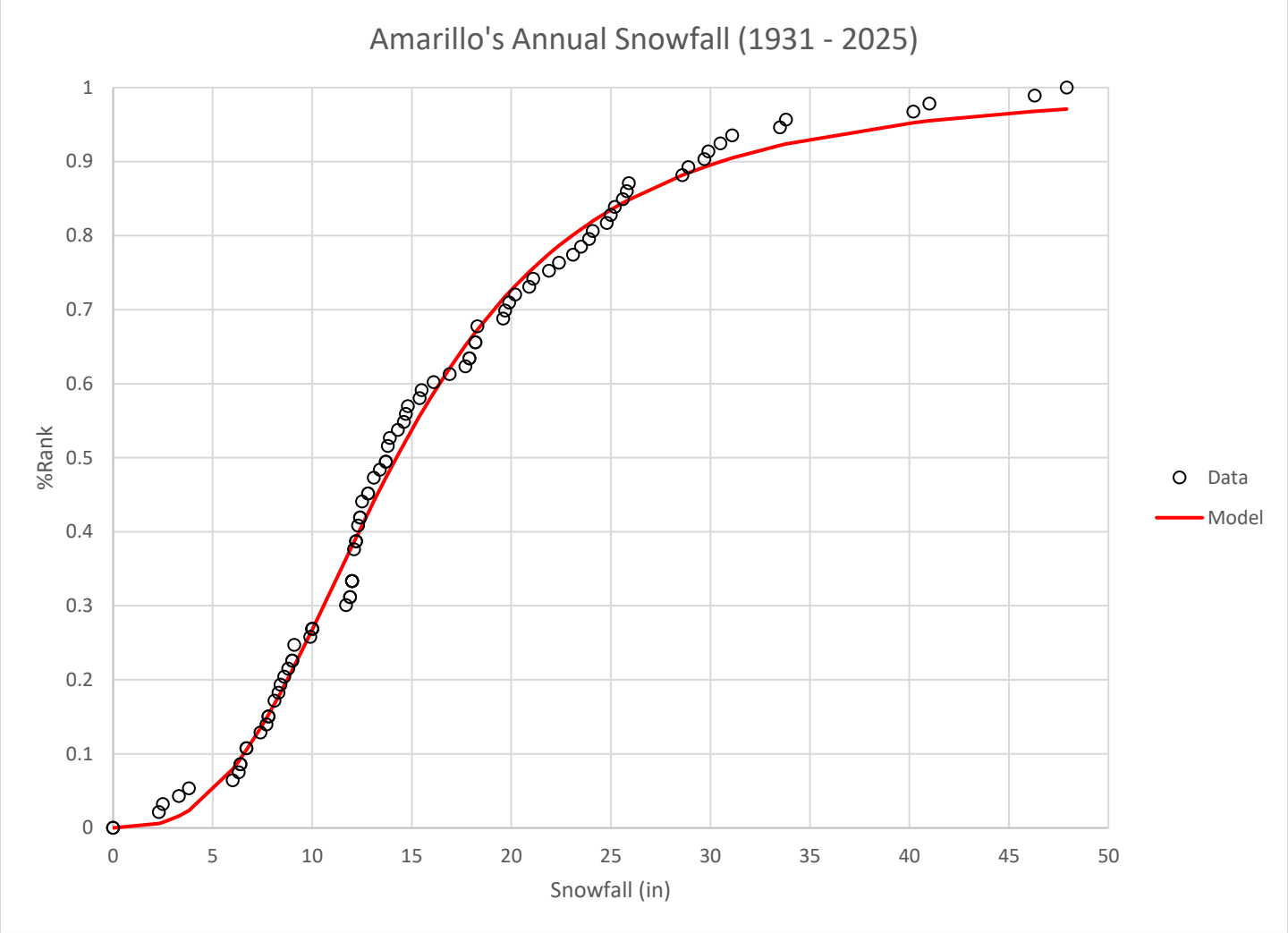
The data points tend to be irregular and have gaps, so a smooth curve might not provide a good fit. The model chosen for these data is a modified logistic curve given by

$$Q = \frac{1}{1 + exp\left(\frac{\alpha - x^{\gamma}}{\beta}\right)}$$

Q is the %Rank, x is the annual snowfall total in inches, and α, β, and γ are the regression parameters. The parameters are

$\alpha = 1.0472682$
$\beta = 0.0063665$
$\gamma = 0.0173935$

The R^2 value for the model is 0.993071, i.e., the model accounts for 99.31% of the variation in the %Ranks. Here is a plot of the data with the resulting regression model.



The end (until next season).