Methods to Quantify Water Consumption Trends, Weather Impacts & Conservation Potential

JORDAN VALLEY WATER CONSERVANCY DISTRICT
Delivering Quality Every Day

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Conservation Garden Park
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Why Quantify?

As conservation professionals, we are often tasked with quantifying the benefits of conservation programs. A few potential methods to assist the water conservation professional in this somewhat challenging task are briefly discussed below. These, and similar methods not explicitly discussed below, can be used to quantify the conservation potential of proposed programs as well as the water conserved from previously implemented programs. The author recognizes that every water provider's situation is unique; thus, the ultimate methods used, or hybrids thereof, will likely vary.

Weather Normalization

Weather can significantly impact water use in regions where water is applied to urban landscapes. This impact must be removed when comparing water use over two periods of time. For example, one can't simply attribute savings during a cool period to a conservation program that was implemented just prior to the same cool period. Weather normalization allows one to remove weather impacts, thus allowing for more accurate comparisons.

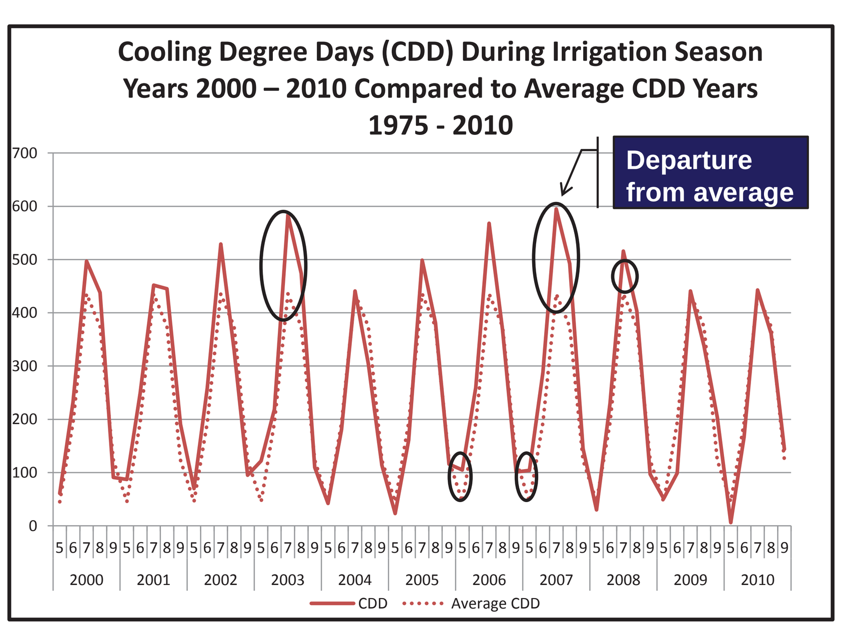

Figure 1. Graphical representation of one potential weather variable (others could be used).

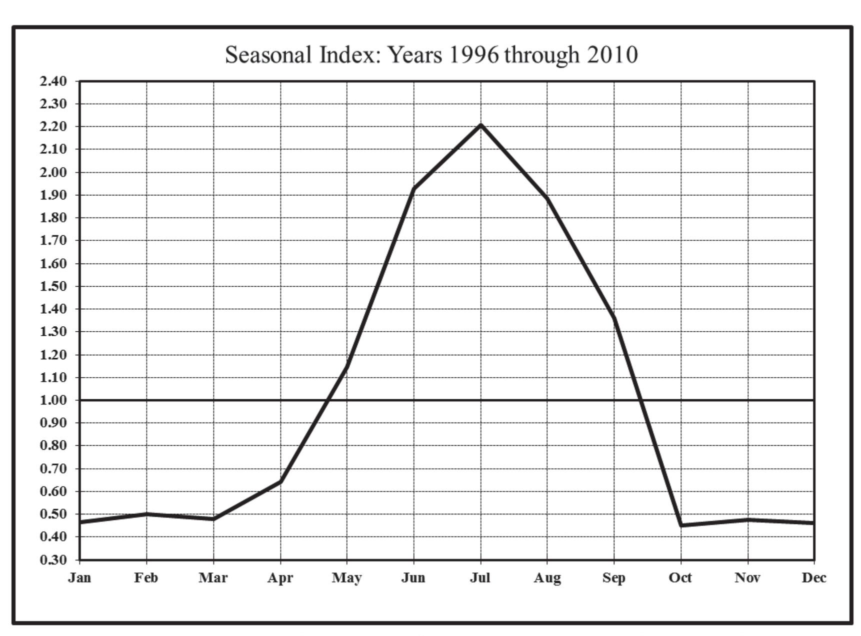

Figure 2. Seasonal Index for Residential Retail Customers

Multiple Regression Analyses

Seasonal Index
Dummy Variable(s)
Weather Variable(s)
Water Consumption Data
Identify Statistically Significant Variable(s)

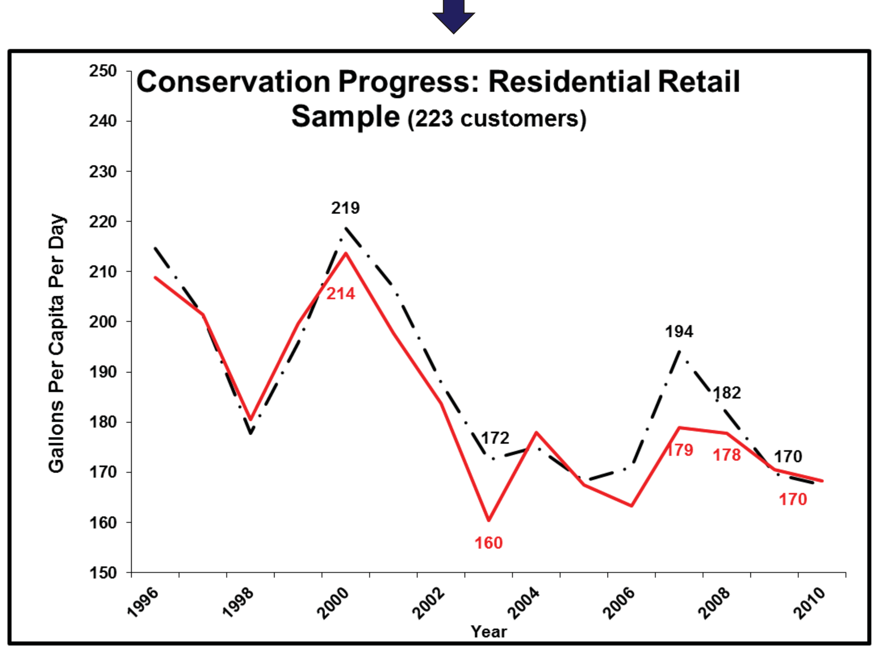

Figure 3. Weather-normalized water consumption data.

Additional Depth

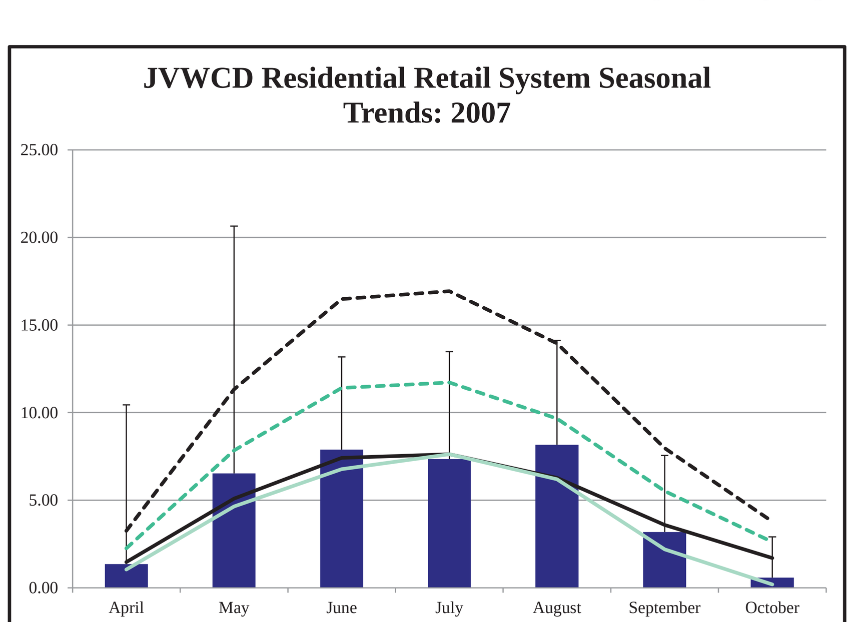

Figure 4. Seasonal Trends in 2007.

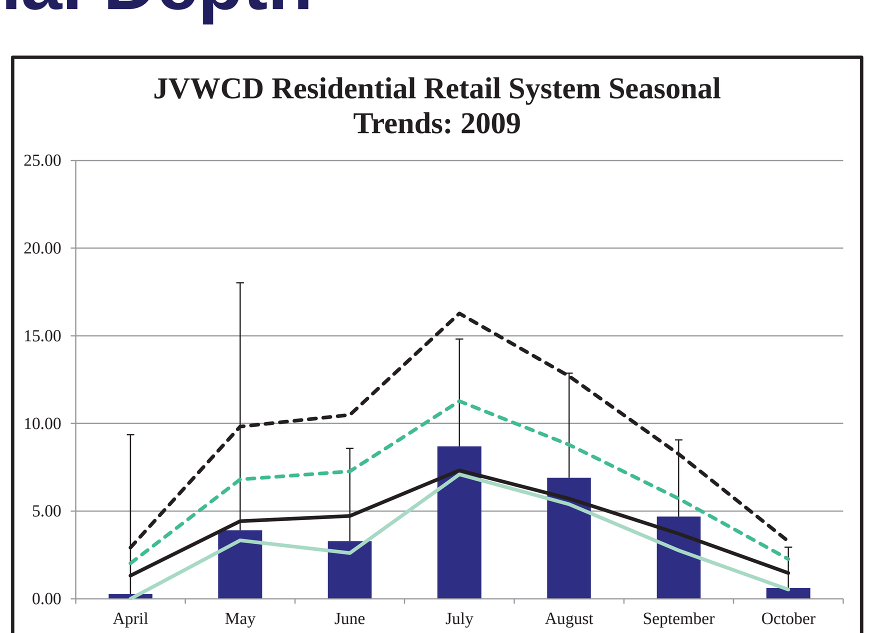

Figure 5. Seasonal Trends in 2009.

Cumulative Frequencies

Identifying trends can be ameliorated by using cumulative frequency analyses. These simple, yet helpful, analyses allow for quick visual comparisons (e.g. before and after a conservation program) and identifying potentially conservable water. For example, one could filter the data shown in Figures 9 and 11 below to identify which lot sizes have more conservable volume in a given month.

These analyses are also useful when developing rate structures, as one can quickly quantify the volume consumed, and the number of accounts using water, in each consumption block.

T-tests, not shown on this poster, can be used to verify statistical significance of quantified savings.

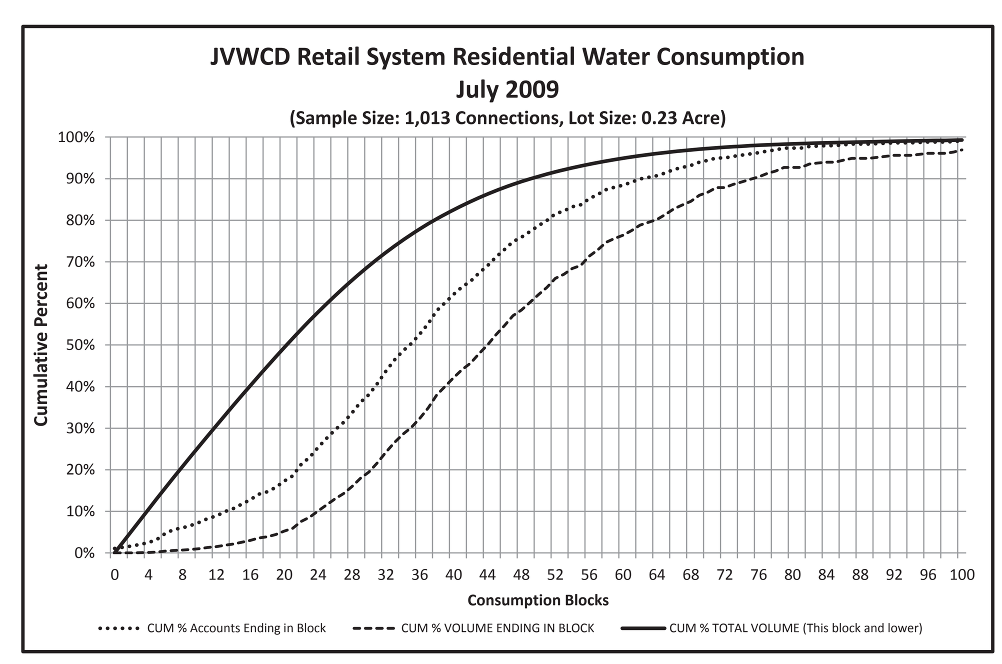

Figure 6. Residential bill frequency analysis.

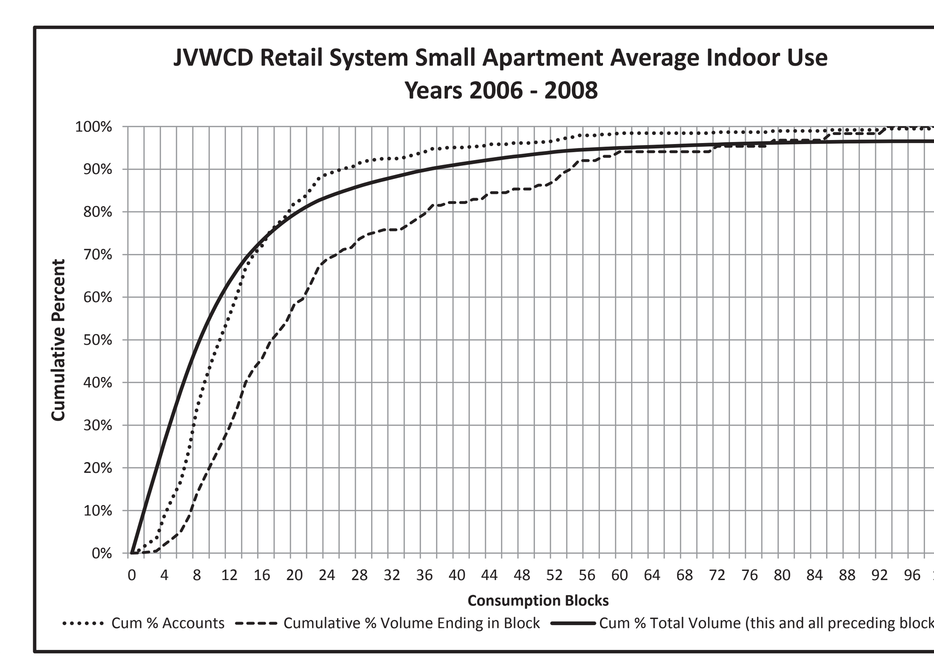

Figure 7. Small apt bill frequency analysis.

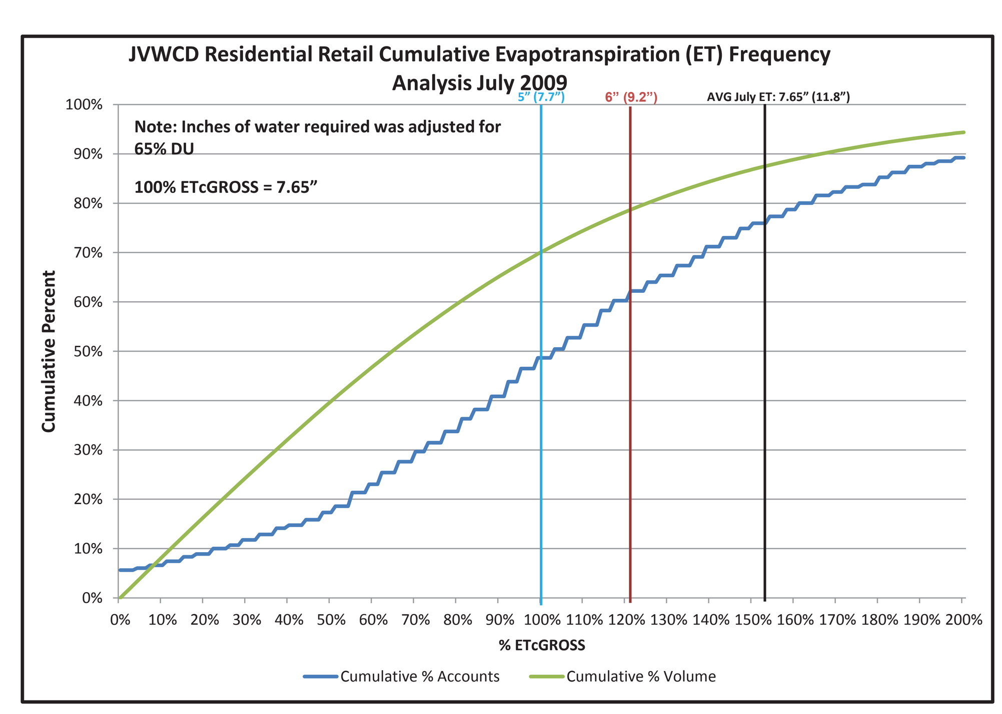

Figure 8. ET frequency analysis.

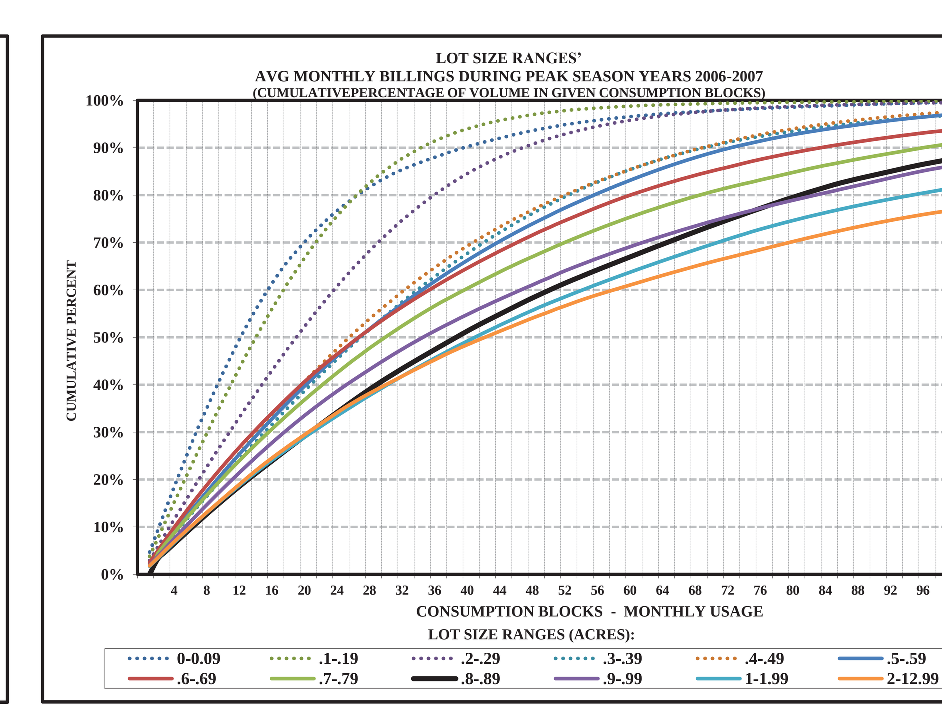

Figure 9. Bill frequency analysis broken down by lot size ranges.

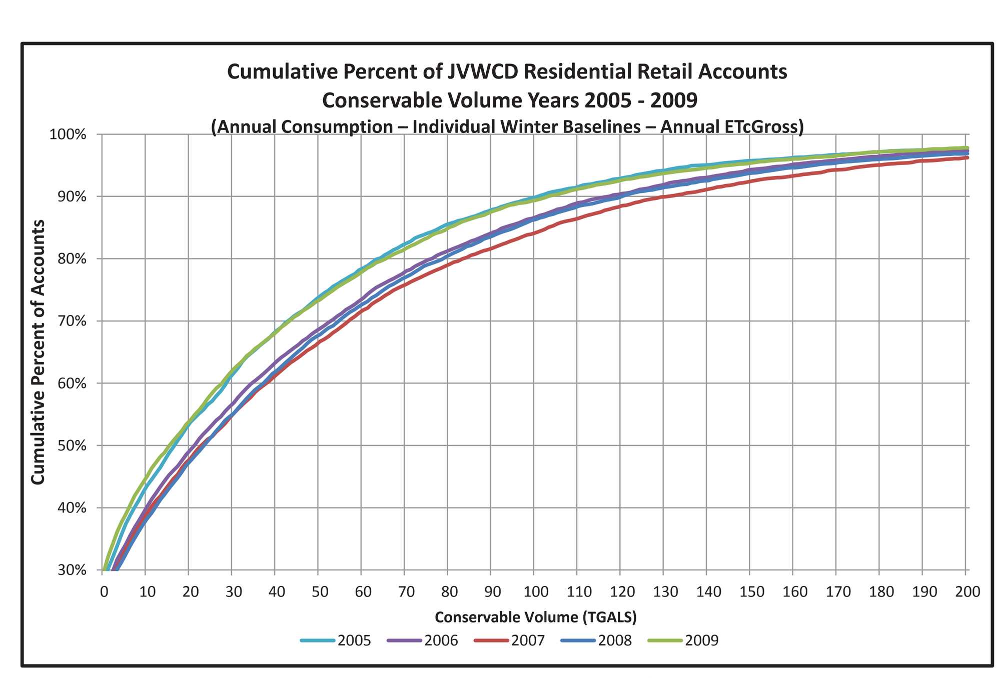

Figure 10. Annual conservable volume frequency analysis.

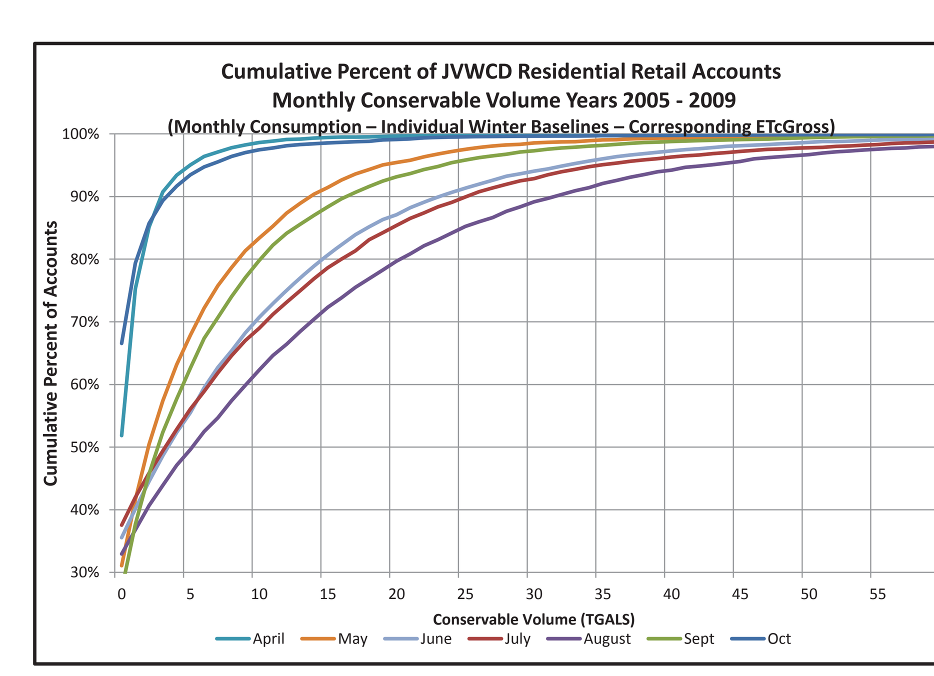

Figure 11. Monthly conservable volume frequency analysis.

Acknowledgements

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