Analysis of Water Consumption Trends in the City of Goodyear

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Research Question

What are the factors that indicate why some residential properties have higher water usage than others in the City of Goodyear?

Why is this relevant?

The Phoenix Metropolitan area has shown great adversity growing to 4 million people in a dry desert environment. The area has created one of the largest water storage systems ever created, yet the growing population is putting strain on its vast water supply, especially when growth is predicted to reach 7 million by 2030. Residential growth is becoming a greater factor in water demand and it is necessary to understand its consumption patterns. There is a lot of uncertainty about what factors contribute to high water consumption in residential properties because of large variability in how much water people use and what aspects impact that decision to use more or less.

How the study was conducted

- Four communities were closely studied within the city limits of Goodyear.
- All of the properties were around 5500 square feet in lot size and lots were chosen at random from each community.
- Three of the communities (Cottonflower, Wildflower, and Centerra) were very similar in date of construction and Goodyear Estates was 30 years older.
- Water consumption information was collected from public records (2003 to 2012).
- Climatic data was collected from a nearby weather station. Data was then organized into various water use over time graphs.

Q1 & Q3?

Q1= Quartile 1 is the line of the 25 percentile of the data, representing lower water users (black line.
Q3= Quartile 3 is the line of the 75 percentile of the data, representing higher water users (red line)

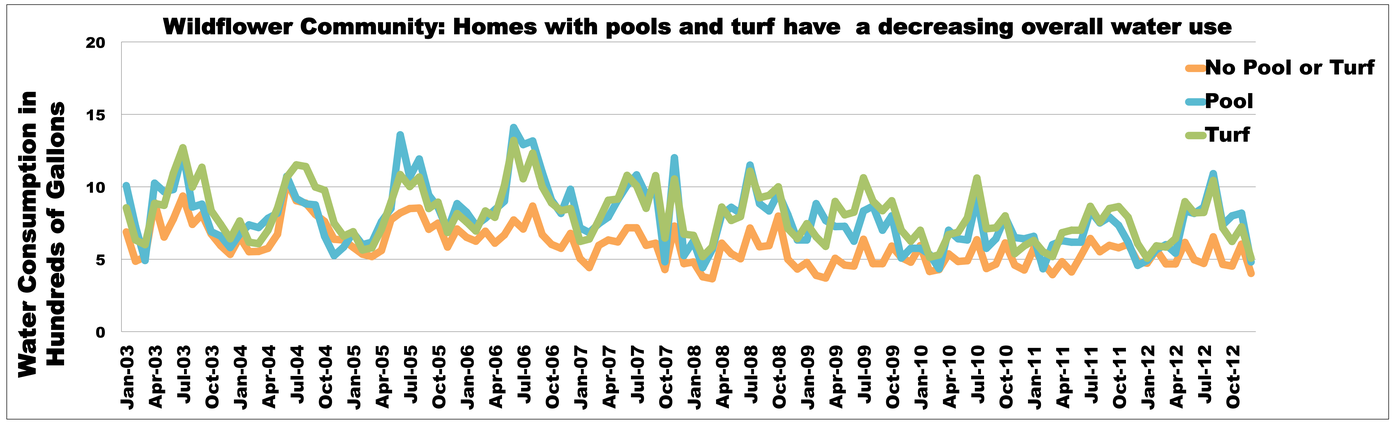

Figure 1: The figure shows that properties with pools and turf tend to have a much greater water use than properties without a pool. Overall, there seems to be a trend of properties with pools and turf decreasing overall consumption to match properties without pools or turf.

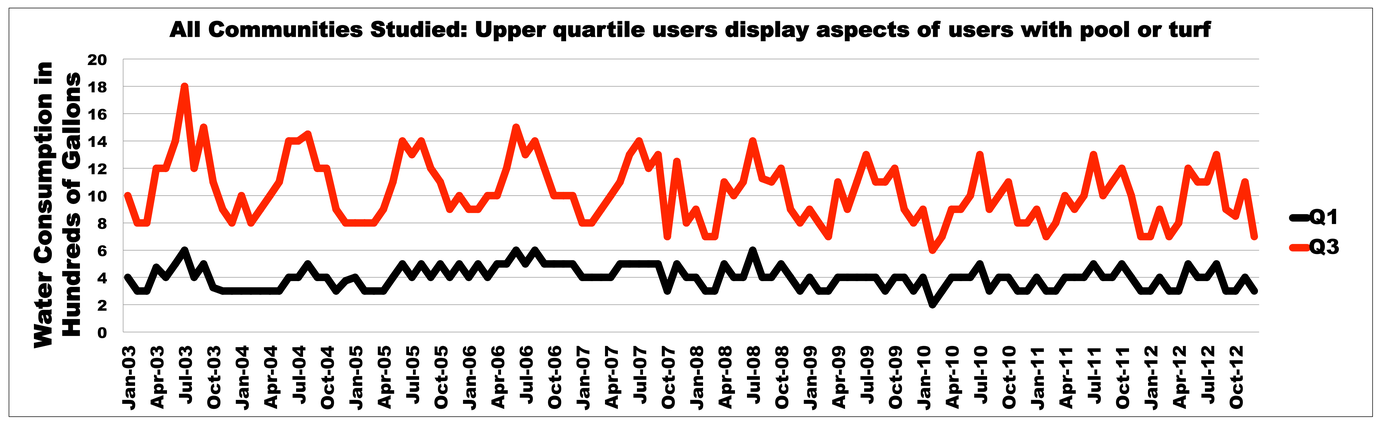

Figure 2: The figure shows that the higher water users have much greater seasonal variation than the lower water users. The upper quartile water users contain a majority of the users that have a pool or contain turf.

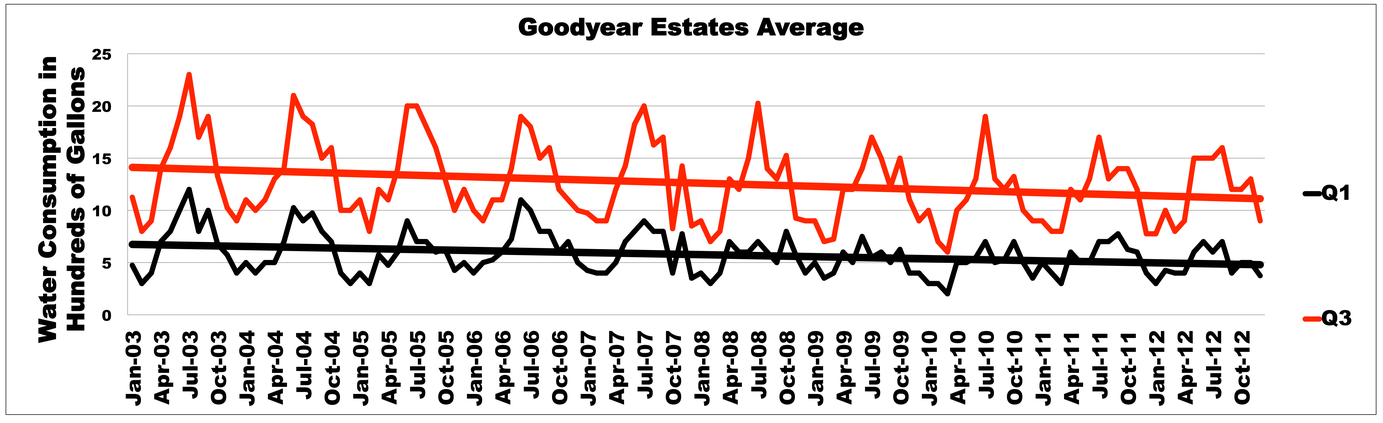

Figure 3: The figure shows that the older community has a very large amount of seasonal variation and a much greater water use compared to the other 3 communities shown in Figures 1 &2. There is still an overall decrease in water use over the long-term.

Category in Wildflower	Average Yearly Water Use in Gallons	Difference of Use in Gallons
Without Pool or Turf	7,254.80	0.00
With Pool	9,621.79	2,366.99
With Turf	9,904.52	2,649.72
With Pool & Turf	10,781.40	3,526.60

Table 1: With just looking at the Wildflower community, a 10 year average shows that pool, turf, and both pool and turf have a much higher water consumption over a ten year average.

Category	R^2	Slope of Regression	T-Test
Wildflower - No Pool	0.1974	-0.0004	2.54E-15
Wildflower - Pool	0.0580	-0.0004	
Cottonflower - No Pool	0.0005	4.00E-05	7.91E-08
Cottonflower - Pool	0.269	-0.0012	
Centerra - No Pool	0.407	0.0013	5.41E-06
Centerra - Pool	0.252	0.0427	
Goodyear Estates - No Pool	0.094	-0.0008	3.73E-05
Goodyear Estates - Pool	0.062	-0.0309	

Table 2: Many of the communities showed around a 1% decrease in overall water use, where properties with pools tended to have a slightly greater decrease.

Conclusion

- Presence of a pool or turf are significant factors in determining overall water demand.
- Age of the community is also a major factor in water demand.
- All communities studied did have a decrease in overall usage, comparable to many other areas in the country.

Future Planning and Research Focus

- Future planning should focus on encouraging low impact landscaping design as well as community pools rather than personal ones.
- Future research should focus on what aspects make the top water consumers use so much water and what physical aspects of community design may have a large impact.

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