

## BACKGROUND

Recent home water audits for the City of Tempe have identified cases of high water bills for some single family residential homes that have low flow indoor features as well as high efficiency irrigation systems. When the Water Conservation Office conducted these water audits for a number of homes they found that these high water-using houses had no evidence of possible leaks; however, most of these houses have green turf in their front and back yards. This suggests that people may be overwatering their yards.



## PURPOSE

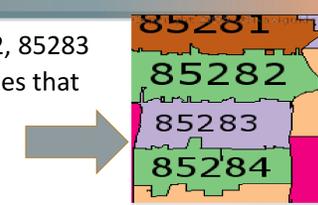
The goal of this research is to analyze summer outdoor water use for single family residential homes in Tempe, Arizona, by answering the question:

**To what extent are Tempe residents over-watering their yards during summer relative to recommended irrigation standards?**

## MATERIALS AND METHODS

44 houses, 11 from each of the four main residential zip codes in Tempe (85281, 85282, 85283 and 85284) were meticulously picked to fit into the two categories below to eliminate houses that have leaks or substantially water their yards during winter.

1. Houses that have consistent water usage for winter and summer months.
2. Houses whose yards are not over-seeded with cool season winter turf.



The yard features and sizes for each one of the 44 houses were measured using the Maricopa County Assessor's Maps

Water use histories for each of the houses from 2014 to 2016 were pulled out from the Oracle Billing System using their addresses.

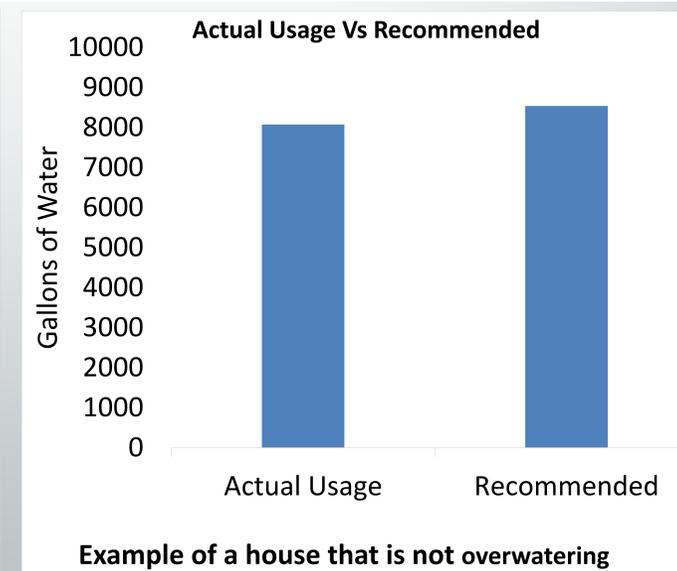
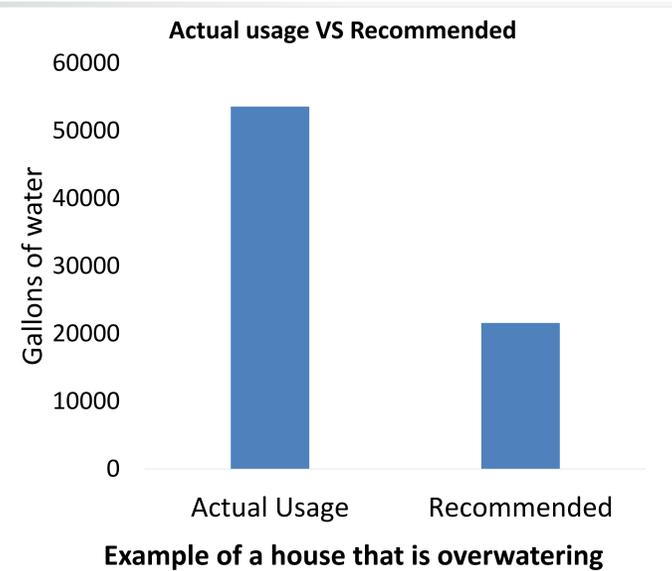


Average usage for each summer and winter month from 2014 to 2016 were calculated in excel and the differences between summer usage and winter usage were recorded

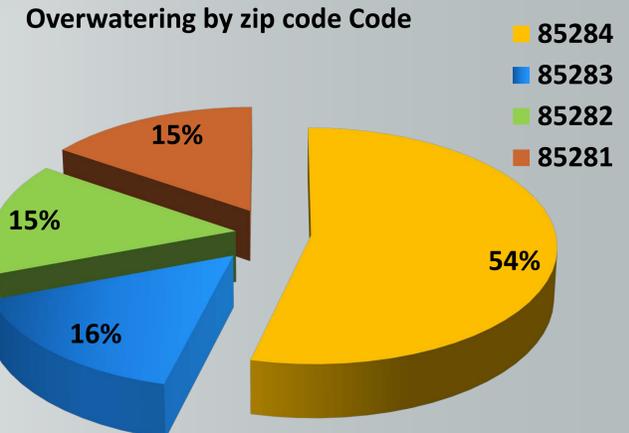
Recommended inches per square foot were pulled out from the Consumptive Use (ETt) in inches to find the recommended amount of water in gallons for each yard size using this formula:  $\frac{ETt \text{ inches} \times 0.623 \text{ gallons} \times \text{yard size}(ft^2)}{1 \text{ inch} \times 1 ft^2}$

## RESULTS

The data was normalized by calculating the average water consumption for four winter months (December, January, February, March) and for four summer months (June, July, August, September) for each of the houses from 2014 through 2016. 70 percent of average winter usage (City's approximation of indoor water use) was subtracted from the average summer usage to calculate how much water is used for irrigation during the summer. The result was compared to the recommended amount of water in gallons for each yard size.



## ANALYSIS OF RESULTS AND CONCLUSION



Out of the 44 houses, 13 houses (30%) are over watering. Of these 13 houses, 7 (54%) are from 85284, and 2 (15.3%) from each of the other zip codes.

**85284** :All 11 houses (100%) are using more than 80,000 gallons per month during the summer, which is almost triple their winter usage. Their winter usage is also substantially higher than the summer usage of most houses from 85281 and 85282. It is evident that a significant number of residents overwater their yards during summer. All of the 11 houses from 85284 have huge yards with turf and trees.

**85281, 85282 and 85283**: Most houses have desert landscape on one side of their yards and a patch of turf on the other. These houses use relatively less water than the houses in 85284.

The results show that there is a correlation between big yards and high water consumption. This may be attributed to irrigation system inefficiencies. As such the City of Tempe could offer intensive irrigation classes, rebates for high efficiency irrigation components and also increase their advertisement for xeriscape rebates. These can help homeowners reduce their water consumption and help save water