



**Erler &
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Single-Family Residential Water Use and Conservation Potential Pilot Study

Solano County Water Agency

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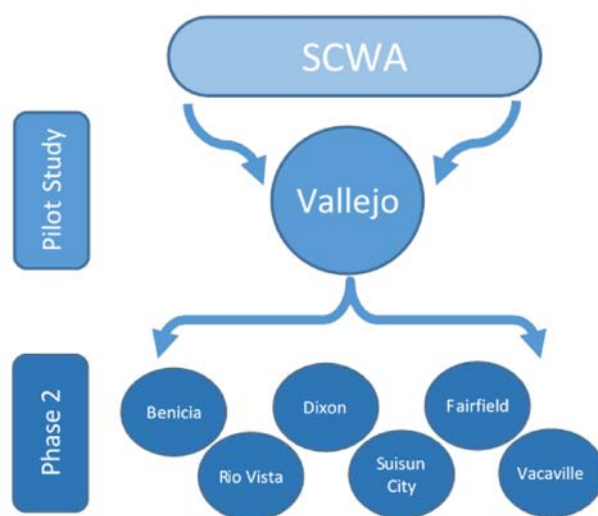
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EXECUTIVE SUMMARY

This report documents the results of the *Single-Family Residential Water Use and Conservation Potential Pilot Study* (“Pilot Study”) that was conducted on behalf of Solano County Water Agency (“SCWA”). The objective of this study was to assist SCWA in gaining a greater understanding of single-family residential (“SFR”) water use throughout the SCWA service area, evaluate the effectiveness of SCWA’s water conservation programs, and identify remaining water conservation potential in the SFR sector.

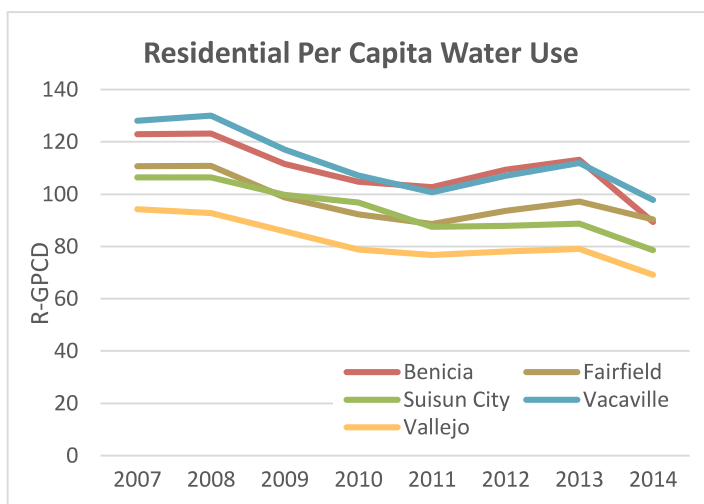
This Pilot Study first presents a high-level overview of SCWA’s water conservation programs – High-efficiency (“HE”) Toilet Rebates, HE Washer Rebates, Turf Replacement Rebates, Residential Water Use Surveys, and Smart Irrigation Controller Rebates – and their implementation across the seven cities (or “member units”) served by SCWA: Benicia, Dixon, Fairfield, Rio Vista, Suisun City, Vacaville, and Vallejo. The study then focuses on an analysis of individual water conservation program impacts, benefits, and opportunities within the City of Vallejo, which was selected as the subject of this Pilot Study. As illustrated by the graphic to the right, it is anticipated that, based upon the results of this Pilot Study, a similar focused analysis will be conducted in the future for additional member units, and potentially across other water use sectors, within the SCWA service area.



An introduction to the Pilot Study, including the study’s goals and objectives, is provided in Section 1 of this report. The SCWA service area and characteristics are described in Section 2. The findings of the Pilot Study are addressed in Sections 3 through 7, and summarized below.

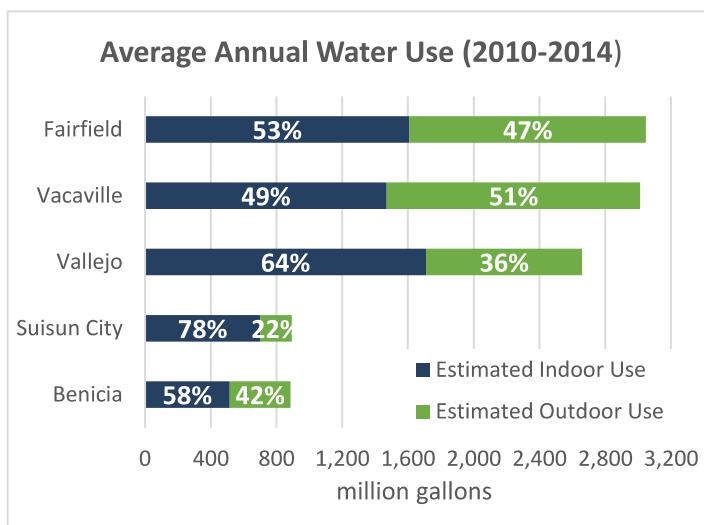
Member Unit Water Use Profiles

The demographics and water use profiles of the seven SCWA member units were evaluated, and to the extent that data were available, water use was summarized in terms of water use by sector, SFR monthly indoor and outdoor consumption, and annual total and per capita consumption for residential accounts.



Key findings based on these water use profiles include:

- Although water demand by SFR customers has generally declined over the last ten to fifteen years, the SFR sector uses the most water within each member unit, ranging from approximately 49% in Fairfield to 82% in Dixon.
- Monthly SFR consumption was highest in the summer and fall. The Cities of Benicia, Fairfield, and Vacaville tend to experience the greatest seasonal variability in SFR water use, likely linked to landscape irrigation.
- Residential per capita water use in 2014 ranged from approximately 69 gallons per capita per day (“R-GPCD”) for Vallejo to 98 R-GPCD for Vacaville.
- In response to the historic drought of 2012-2015, each member unit has reduced its R-GPCD significantly relative to use in 2013. These reductions range from 36% in Benicia to 22% in Vallejo. As of June 2015, six member units have achieved greater savings than the target conservation goals set by the State Water Resources Control Board (“SWRCB”) in accordance with Executive Order B-29-15; Rio Vista’s service area fell short of its 36% conservation standard by 4.3% (SWRCB, 2016).



Water Conservation Program Participation by SFR Accounts

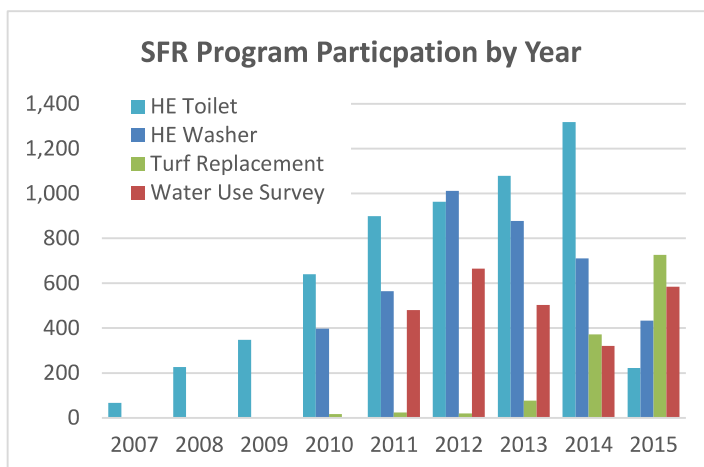
This Pilot Study evaluated participation by SFR accounts in the water conservation programs administered by SCWA on a County-wide basis and at more detailed level in the City of Vallejo, as the focus of the Pilot Study. Across the SCWA service area, more HE toilet rebates have been issued to SFR accounts than any of the other SCWA rebate programs. The Turf Replacement Rebate Program has seen increasing participation since 2013, while participation in the HE Washer Rebate Program has been declining since 2012. Participation in the HE in the Residential Water Survey Program has shown some decline from 2012 through 2014, with an increase in participation in 2015; it should be noted that the highest

SFR Conservation Program	Program Implemented	Total Number of Interventions	Estimated Annual Water Savings
HE Toilet Rebates	2007 – Jan. 2015	5,764	52.5 million gal.
HE Washer Rebates	2007 – present	3,997	34.5 million gal.
Turf Replacement Rebates	2013 – present	1,235	23 million gal.
Residential Water Use Surveys	2011 – present	2,554	67 million gal.
Smart Irrigation Controller Rebates	2011 – present	15	n/a

residential water users in the County are specifically targeted for participation in this program.

Review of the program participation in the City of Vallejo revealed several trends, including lower-than-expected participation in HE Toilet and HE Washer Rebate Programs in some of the older areas of the city, which are more likely to have older, less efficient fixtures and therefore be prime candidates

to participate in these programs. This analysis also identified distinct clusters of participation in the Turf Replacement Rebate Program, which may indicate evidence of the public outreach and educational aspects of the turf replacement programs (i.e., the “neighbors seeing neighbors” effect).



Water Conservation Program Effectiveness and Opportunities – City of Vallejo

The amount of water savings resulting from participation in each of the SCWA’s major water conservation programs was estimated by comparing water use by conservation program participants in Vallejo to that of representative cohorts for periods before and after participation in a given program. Based on the results of this analysis, participation in water conservation programs by Vallejo SFR water customers resulted in significant and measurable water savings, as shown in the table below.

The analysis of the remaining water conservation potential within Vallejo’s SFR sector suggests that the markets for the SCWA conservation programs within Vallejo are not yet saturated and that there are significant opportunities to continue and expand water conservation programs within the city. Specifically, as shown in the above table, based on the current information regarding program participation, housing age, and historical water use, it is estimated that up to an additional 37 million gallons per year could be saved through toilet change-outs and up to 69 million gallons per year could be saved by increasing

SFR Conservation Program	Estimated Annual Water Savings Per Account	Rebate Cost per 100 Gallons of Water Saved	Remaining Conservation Potential
HE Toilet Rebates	10,000 - 19,000 gal.	\$0.06 - \$0.10/100 gal.	37 million gal./year
HE Washer Rebates	7,500 - 9,800 gal.	\$0.10 - \$0.11/100 gal.	40 million gal./year
Turf Replacement Rebates	18,700 gal.	\$0.40/100 gal.	69 million gal./year
Residential Water Use Surveys	20,900 - 31,500 gal.	n/a	60 million gal./year

participation in the Turf Replacement Rebate Program. Based on current levels of program participation across the SCWA service area (i.e., typically less than 5% of SFR accounts, as shown in the chart to the right), similar results are expected across the other member unit cities.

Based on rebate costs and measured water savings, the HE Toilet and HE Washer Rebate Programs have been the most cost effective of the water conservation programs implemented to date by SCWA. However, when considering which programs to support on a going-forward basis, there are additional factors to consider regarding overall program cost-effectiveness and success, including changes to plumbing code that diminish the impact of fixture rebate programs and the public education and outreach benefits associated with a highly visible program such as turf replacement.

Recommendations and Next Steps

The findings of the Pilot Study indicate that the SFR water conservation programs that SCWA has implemented in Vallejo have resulted in a significant and measurable amount of water savings and that additional water conservation potential remains. Given the results of this analysis, potential programs and actions that SCWA may consider are summarized below.

- Expand this study to include additional member unit cities, potentially including a refined cost-benefit analysis and evaluation of other water use sectors.
- Refine the structure and implementation of the fixture rebate programs to target specific accounts, to limit the effects of free-ridership, and to push the market toward even more efficient fixtures (e.g., 0.8 gallons per flush toilets).
- Expand and promote outdoor water use conservation programs (e.g., the Turf Replacement Rebate and Smart Irrigation Controller Rebate Programs) and consider implementing additional or alternative programs designed to target outdoor water use or to influence behavioral changes with respect to water use.
- Implement a Customer Survey to gain a greater understanding of how member unit customers use water and think about water conservation and alternative water sources (e.g., recycled water).

