Water Conservation Strategic Plan

Valley Water

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Water Conservation Strategic Plan

Valley Water

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ACRONYMS AND ABBREVIATIONS

AB	Assembly Bill
ABAG	Association of Bay Area Governments
ACS	American Community Survey
AF	acre-feet
AFY	acre-feet per year
AMI	Advanced Metering Infrastructure
AWIA	America's Water Infrastructure Act
BAO	Board Appointed Officers
BAWSCA	Bay Area Water Supply and Conservation Agency
CBSM	Community Based Social Media
CCF	hundred cubic feet
CCR	California Code of Regulations
CEC	California Energy Commission
CEO	Chief Executive Officer
CII	Commercial, Industrial, and Institutional
CIP	Capital Improvement Program
COVID-19	2019 novel coronavirus
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
CWC	California Water Code
CWS	California Water Service
DIY	Do-It-Yourself
DMM	Demand Management Measure
DWR	California Department of Water Resources
EKI	EKI Environment & Water, Inc.
EOC	Emergency Operations Center
EPA	Environmental Protection Agency
ERPs	Emergency Response Plans
FAHCE	Fish and Aquatic Habitat Collaborative Effort
FEMA	Federal Emergency Management Agency
Flood-MAR	Flood Managed Aquifer Recharge
ft	foot
FTE	full time equivalent
FY	Fiscal Year
GPCD	gallons per capita per day
gpf	gallons per flush
gpm	gallons per minute
gpy	gallons per year
HCD	Housing and Community Development
HE	High Efficiency
HESH	High Efficiency Showerhead
HET	High Efficiency Toilet

HEU	High Efficiency Urinal
HEW	High Efficiency Clothes Washer
HOA	Homeowners Association
IRP	Infrastructure Reliability Plan
IRR	irrigation
KITCH	kitchen
LF	low flow
LHMP	local hazard mitigation plan
LID	low impact development
LRP	Landscape Rebate Program
MF	multi-family
MFD	Multi-Family Dwelling
MFR	Multi-Family Residential
MG	million gallons
MOU	Memorandum of Understanding
MWELO	Model Water Efficient Landscape Ordinance
MWENDO	Model Water Efficient New Development Ordinance
OTH	other
PHET	Premium High Efficiency Toilet
PRV	pressure regulating / reducing valve
R-GPCD	residential-gallons per capita per day
RPTS	reports
RRAs	Risk and Resilience Assessments
RW	recycled water
SB	Senate Bill
SCRWA	South County Regional Wastewater Authority
SDA	Supply and Demand Assessment
SF RWS	San Francisco Regional Water System
SFPUC	San Francisco Public Utilities Commission
SFR	Single-Family Residential
sq ft	square feet
SWP	State Water Project
SWRCB	State Water Resources Control Board
TAF	thousand acre-feet
TAFY	thousand acre-feet per year
UHET	Ultra-High Efficiency Toilet
ULFT	Ultra-Low Flush Toilet
US EPA	US Environmental Protection Agency
USBR	U.S. Bureau of Reclamation
UWMP	Urban Water Management Plan
WBIC	Weather-Based Irrigation Controller
WDO	Water Demand Offset
WET	Water Efficient Technology

WF	water flow
WSAs	Water Supply Assessments
WSCP	Water Shortage Contingency Plan
WUCOLS	Water Use Classification of Landscape Species
WUEdata	Water Use Efficiency Data
WWOS	Water Wise Outdoor Survey

Executive Summary

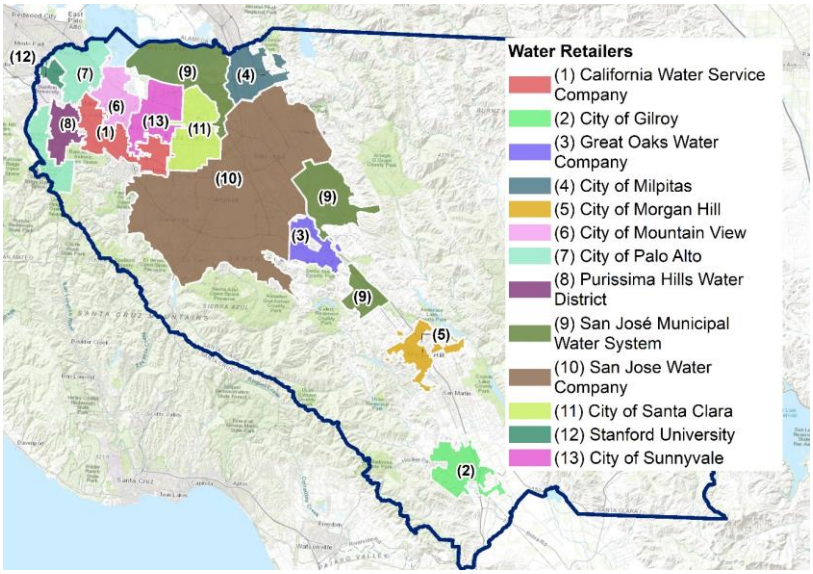
Key Findings and Recommendations

The Strategic Plan finds that Valley Water will be able to meet its long-term conservation targets with continued implementation of its current broad set of conservation programs, but doing so will require increased customer participation and a commensurate increase in staff resources and funding. The Strategic plan also recommends that Valley Water explore additional opportunities to augment and adapt its current programs, including by: (1) evaluating model ordinance options related to further water demand offset policies for new developments, (2) using geospatial-based participation trend analyses as a tool to adaptively manage and increase participation in key programs, (3) considering expanding program offerings to those that provide conservation savings related to water loss, such as a pressure-regulating valve (PRV-) based program, and (4) increasing outreach to commercial customers with smaller landscapes to boost participation rates and program efficiency for the Large Landscape Program.

Introduction (Section 1)

Valley Water is the primary water resources agency in Santa Clara County, California and serves 1.9 million residents, primarily through 13 water retailers [1] (Valley Water, 2019b) (**Figure ES-1**). Valley Water has made significant investments to manage water demands and to develop water supplies and infrastructure to meet the water needs within the County and comply with the Valley Water Board's Ends Policies for water supply reliability, water conservation, and water recycling (Valley Water, 2012).

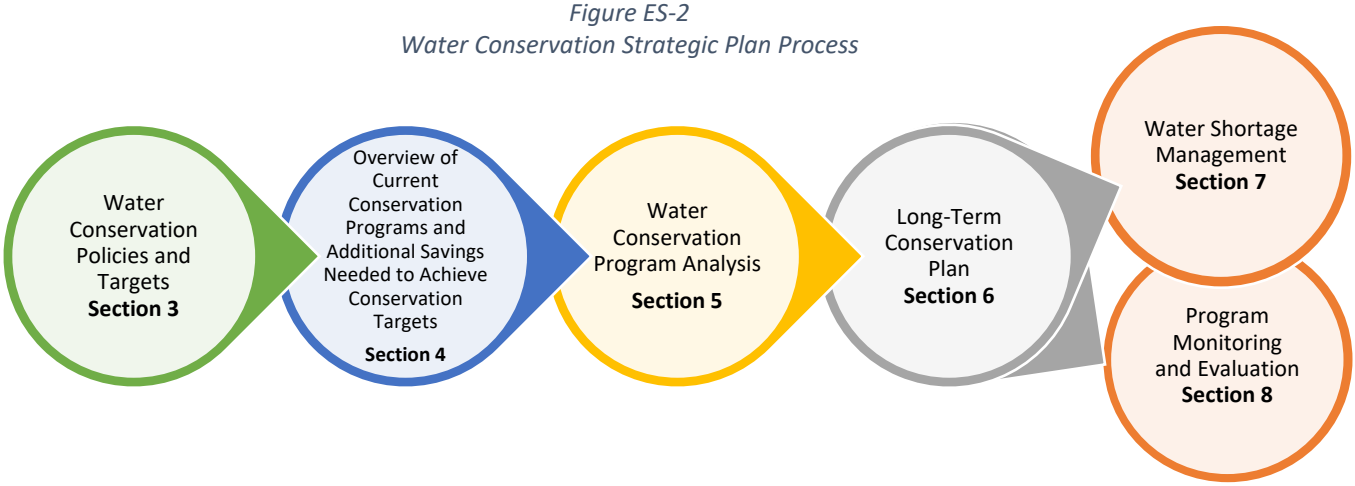
Figure ES-1
Valley Water Service Area Boundary



This Strategic Plan provides a blueprint for meeting Valley Water's established conservation policy objectives and targets and serves as a tool and reference document to inform and support Valley Water's future conservation program marketing and design. **Figure ES-2** outlines the process documented in this Strategic Plan to target and achieve additional water conservation savings.

[1] Some residents operate their own groundwater wells and are not served by water retail agencies; however, Valley Water manages the utilized groundwater system.

Figure ES-2
Water Conservation Strategic Plan Process

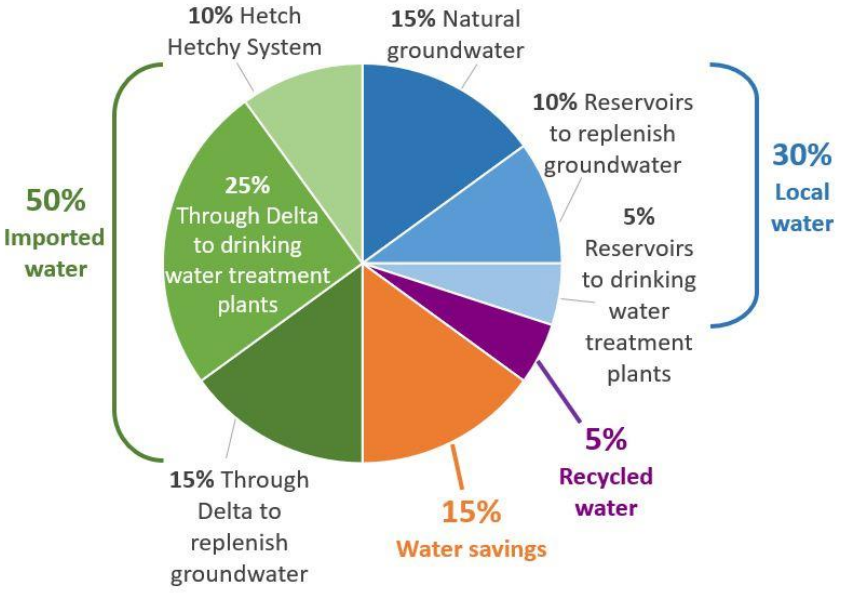


Valley Water Service Area, Demands, and Water Supplies (Section 2)

Valley Water offers water conservation programs and serves water to 13 local retail water agencies located within Santa Clara County (**Figure ES-1**). About half of the County's water supply currently comes from local surface water, groundwater and recycled water sources (**Figure ES-3)**. The remainder comes from imported water sources (i.e., from California Department of Water Resources' [DWR's] State Water Project [SWP] and United States Bureau of Reclamation's [USBR's] Central Valley Project [CVP] supplies and supplies delivered by the San Francisco Public Utilities Commission [SFPUC] to cities in northern Santa Clara County)

Water demand within Valley Water is projected to be approximately 335,000 acre-feet per year (AFY) by 2040. While water use varies considerably among Valley Water's retailers, overall use is primarily comprised of residential and commercial uses, but also includes government/public use, irrigation, and recycled water, with distinct seasonal patterns of higher water use in June through October and lower water use in January through March. Water use for all retail agencies has remained lower than pre-drought (2013) usage. Proportions of indoor and outdoor water use is, on average, approximately 58% indoor and 42% outdoor, but varies substantially by retail agency (**Figure ES-4**).

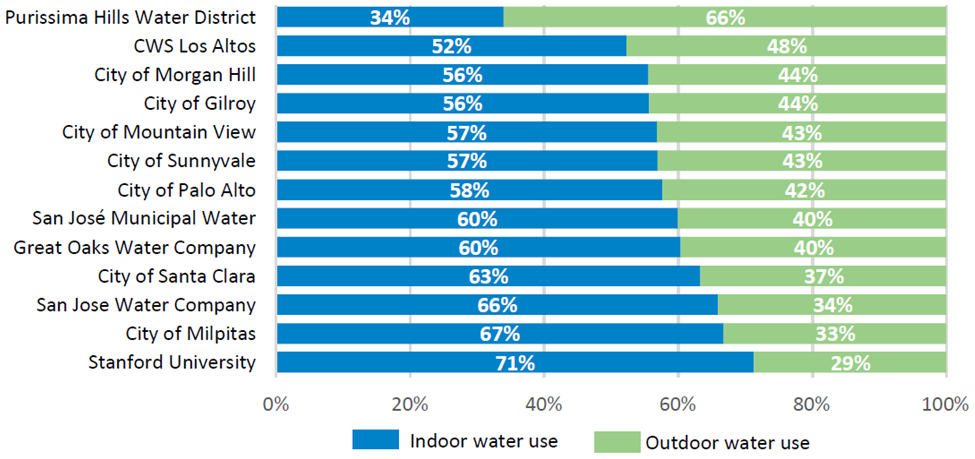
Figure ES-3 Water Use by Source



Valley Water faces various challenges related to its future water supply reliability. Potential climate change impacts include: (1) uncertainties in the quantity and timing of imported and local water supplies, (2) increased irrigation and cooling water demands, (3) decreases in surface reservoir water quality, and (4) an increased severity and duration of

droughts. Other supply reliability challenges include regulatory and permit requirements impacting instream groundwater recharge operations, and imported water supply availability, among others. Valley Water's *Water Supply Master Plan 2040* addresses some of these supply reliability challenges and outlines a strategy to provide a reliable supply of water to meet Valley Water's needs through 2040, including a water conservation target of approximately 99,000 AFY of savings by 2030 and about 109,000 AFY of savings by 2040 (**Figure ES-5**).

Figure ES-4
Estimated Average Indoor and Outdoor Water Use

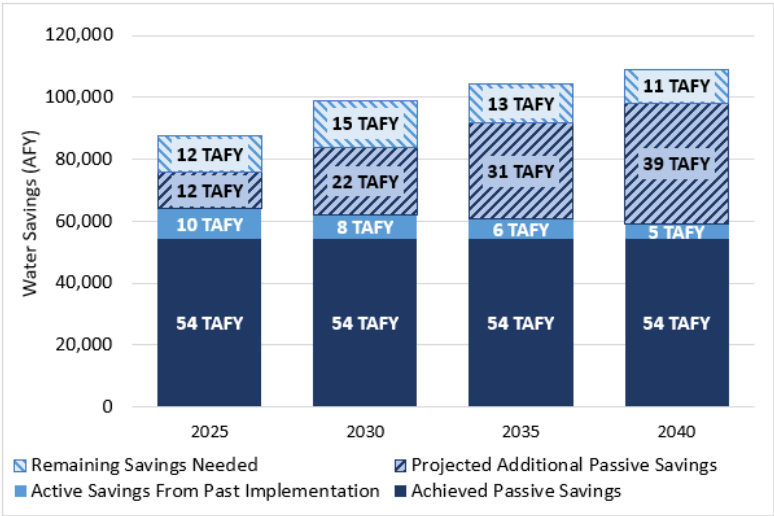


Water Conservation Policies and Targets (Section 3)

Valley Water and its Board of Directors have set specific water conservation policies. Besides Valley Water's water conservation target (**Figure ES-5**), in June 2021, the Board of Directors voted to call for water use reductions of 15% compared to 2019 (pre-drought) water use in order to help meet short-term demands during critical dry periods.

In response to the 2012-2016 historic drought in California, Governor Brown issued an executive order titled "Making Water Conservation A California Way of Life." In 2018, Senate Bill (SB) 606 and Assembly Bill (AB) 1668 passed and state-wide implementation will follow in the next decade. The legislation requires the California Department of Water Resources (DWR) and the State Water Resources Control Board (SWRCB) to establish standards for: (1) indoor residential use; (2) outdoor residential use; (3) outdoor commercial, industrial, and institutional (CII) use with dedicated irrigation meters; and (4) distribution system water losses. The methodologies for calculating the urban water use objectives are still under development, and thus the degree of savings that Valley Water's retail agencies will need to achieve is not currently known.

Figure ES-5
Projected Water Savings to Reach Targets



Valley Water's current water shortage management policy is defined by their Water Shortage Contingency Plan (WSCP), which is included as part of their

2020 Urban Water Management Plan (UWMP). The prior WSCP was enacted during the 2012-2016 drought and helped Valley Water meet its water use reduction targets of 20% in 2014 and 30% in 2015.

A survey of all 13 of Valley Water's retail agencies was conducted in August 2020 to better quantify and understand: (1) which water conservation programs agencies and customers are utilizing; (2) what drives the agencies' and customers' needs to increase water conservation; and (3) what additional programs may be beneficial to the agencies and customers.

Results from the survey indicated strong support for Valley Water's conservation programs and efforts, and a broad interest in continuing existing or similar programs. In addition, the retail agencies expressed openness to implementing new and different water conservation programs, and provided key insight on opportunities for Valley Water to enhance or expand its support to its retail agencies with respect to water conservation.

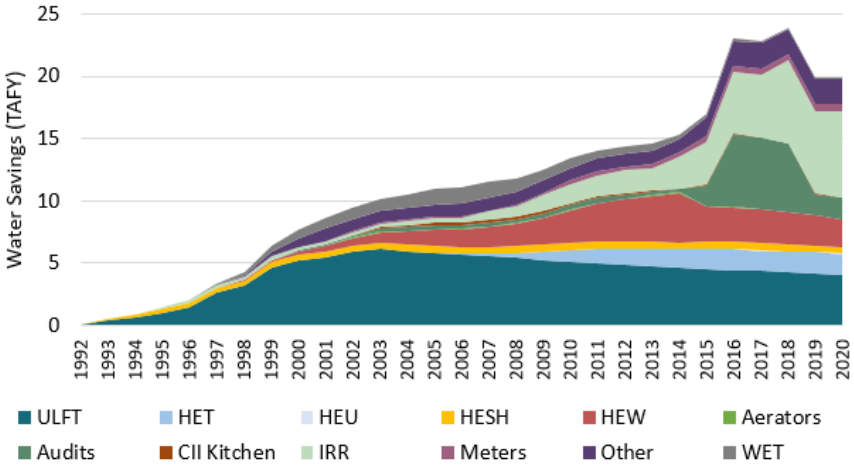
Current Conservation Programs and (Section 4)

Section 4 summarizes the: (1) passive savings achieved to date within the Valley Water service area (**Figure ES-6**), (2) the active savings anticipated to persist based on program implementation to date (**Figure ES-6**), (3) additional passive savings estimated to occur in the future, and (4) the remaining active savings from new program implementation that would be required to achieve Valley Water's water conservation targets.

Based on this analysis, it appears that Valley Water will need to achieve a total of 37,000 AFY of additional savings by 2030 and a total of 50,000 AFY by 2040.

Based on the projections of passive savings and assuming that public education and outreach programs are continued to maintain passive savings at these levels, active conservation programs will need to achieve 15,000 AFY of savings by 2030 and 11,000 AFY by 2040.

Figure ES-6
Historical Water Savings from Water Conservation Programs



Water Conservation Program Analysis (Section 5)

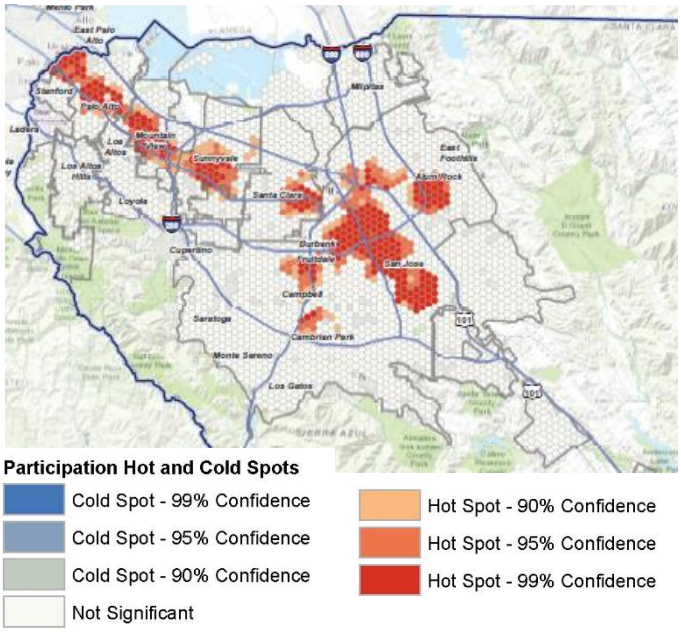
Participation in select water conservation programs was analyzed to help inform Valley Water as to which customers have been participating in which conservation programs, as well as to help inform the strategic design, selection, and marketing of future conservation programs and services.

The conservation programs selected for analysis included the: (1) Commercial and Multi-Family Dwelling High Efficiency Toilet Direct Installation Program (HET Program), (2) Graywater Laundry-to-Landscape Rebate and Direct Installation Programs (Graywater Programs) (3) two elements of the Landscape

Rebate Program (LRP): Landscape Conversion Rebate and Weather-Based Irrigation Controller (WBIC) Rebate, (4) Submeter Rebate Program (Submeter Program), and (5) Water Wise Indoor Survey Do-It-Yourself Kit and Outdoor Survey (Water Wise Survey Program).

This section summarizes the results of the: (1) temporal and spatial trends analysis that was used to identify areas with statistically higher or lower rates of participation (see the example "hot spot" analysis shown on **Figure ES-7**), (2) building stock characteristics analysis (i.e., an assessment of program participation rates relative to the age of housing stock), and (3) demographic characteristics analysis for each selected conservation program (i.e., an assessment of program participation rates relative to factors such as income, age, and rentership).

Figure ES-7
Participation Density Hot Spot Analysis for High Efficiency Toilet Program



Based on these results, two approaches were identified that Valley Water can use for potential conservation program marketing and targeting: (1) For programs with a good amount of participation to date, Valley Water can expand to new customer groups by targeting future outreach to customers that appear to be underrepresented with respect to program participation; and (2) For programs that have had more limited participation to date, Valley Water can build on current success by identifying customers that share common characteristics (e.g., location, income level, or other demographic characteristics) with those that are currently participating at higher rates and target future outreach to these customers.

Long-Term Conservation Plan (Section 6)

This section first identifies the future water savings associated with conservation program implementation that will be needed to meet the water conservation targets presented in Valley Water's *Water Supply Master Plan 2040* (**Table ES-1**). Then, based on application of the Conservation Tracking Model, this section presents and evaluates a range of potential conservation programming scenarios with a varying suite of program offerings and implementation levels.

Each scenario is evaluated in terms of its efficacy to meet the water conservation targets, incorporating the potential range of benefits from the Model Water Efficient New Development Ordinance (MWENDO) implementation, as well as evaluating the anticipated budget expenditures to achieve each scenario, and an evaluation of the unit costs of savings associated with each scenario. Based on the scenario analyses, this section also includes an evaluation and discussion of additional considerations for Valley Water's future conservation program planning, including: (1) a review of the changes in program participation observed during the recent drought period in response to Valley Water's increased conservation funding and focus, (2) a review of conservation program staffing levels, (3) a discussion of potential regional

model ordinance considerations, and (4) a discussion of potential new approaches to augment and adapt Valley Water's conservation programs in the future.

Table ES-1 Valley Water Conservation Targets and Water Savings Requirements

Year	Target Water Savings (AFY)	Savings from Plumbing Codes and Appliance Standards (AFY)	Residual Savings from Pre-2021 Program Participation (AFY)	Required Additional Savings from Programs and Initiatives (AFY)
2020	NA	54,000	NA	NA
2030	99,000	76,000	8,000	15,000
2040	109,000	94,000	5,000	11,000

Savings rounded to nearest thousand AFY and values in rows may not sum exactly due to rounding.

Key findings and considerations for the design and implementation of Valley Water's conservation programs going forward are summarized below.

- If Valley Water continues its current conservation program at recent levels of implementation and participation going forward, it is not likely to meet its 2030 water conservation target.
- The particular program offerings in Valley Water's current broad and comprehensive mix of conservation programs are sufficient and appropriate to allow it to meet its 2030 and 2040 water conservation targets, if program implementation rates are increased and shifted towards the highest saving programs (e.g., those that target outdoor landscaping water use). The current program mix remains beneficial because it offers a broad suite of programs to all customers and sectors.
- In order to meet its 2030 and 2040 water conservation targets, Valley Water will need to increase implementation and participation rates in its programs, which will require a commensurate increase in expenditures. Through its experiences responding to the recent, historic drought, Valley Water demonstrated the ability to significantly increase participation in its programs, including ten-fold participation increases for specifically targeted programs, which was enabled by the increased funding allocated to these programs and outreach as part of the drought response efforts.
- Valley Water's current conservation staffing levels are much lower than that of other similarly sized agencies. With limited staff resources, Valley Water's ability to deploy and manage programs is limited and even with additional funding, Valley Water may not be able to achieve the levels of implementation identified in the preferred program scenario. Specifically, based on review of the Valley Water's staffing levels, the current staffing level may not be adequate to continue to expand the programs needed to achieve the water conservation targets.
- It is recommended that Valley Water continue to pursue a broad mix of conservation programs that target all aspects of customer water use. This analysis was based on the already comprehensive and diverse set of program offerings provided by Valley Water. Valley Water's conservation programs have been so successful in the past in part due to Valley Water's ability

to adopt new technologies and approaches to conservation as they evolve and in response to the needs within its service area. Three additional opportunities to continue to augment and adapt Valley Water's conservation programs into the future include: (1) evaluating model ordinance options related to further water demand offset policies, (2) using geospatial-based participation trend analyses as a tool to identify customers to target with marketing and outreach to adaptively manage and increase participation in key programs, (3) considering expanding program offerings to those that provide conservation savings related to water loss, such as a pressure regulating valve or pressure reducing valve (PRV) program, and (4) increasing outreach to small site landscape customers to boost program participation rates and program efficiency.

Water Shortage Management (Section 7)

Drought and other supply interruption risks are real and significant. A variety of planning documents (**Figure ES-8**) are available for Valley Water and their water retailers to employ, including WSCPs, Infrastructure Reliability Plan (IRP), local hazard mitigation plans (LHMPs), and Emergency Response Plans (ERPs), all of which identify actions and responses to address water shortages and droughts.

Figure ES-8
Selected Drought and Risk Planning Documents



For example, by employing their WSCP and reacting swiftly to observed and projected water shortage conditions, Valley Water was able to effectively enact water use reduction targets at various stages of the recent historic drought to reduce water use and to mitigate the effects of water shortages. Some effective actions taken by Valley Water to improve water conservation and meet the drought savings targets included: (1) creating avenues for public involvement to report water waste and submit ideas for new conservation programs, (2) active coordination with and amongst water retailers to improve internal and external communication, and (3) increasing rebates for certain conservation programs. These and other actions can serve to support Valley Water's future drought response planning and actions.

Looking forward, DWR is requiring more stringent and proactive drought response planning through updates to WSCP requirements and annual Supply and Demand Assessment (SDA) reporting. These new regulations will allow Valley Water to incorporate lessons learned from the recent drought and further improve its response and preparedness to future water shortage conditions. As stated in Valley Water's 2020 WSCP, Valley Water monitors its water supply reliability by using projected end-of-year groundwater storage to provide an early warning signal of potential water shortages and will prepare an annual SDA to quantify any potential supply shortages. As the frequency and severity of droughts in California continues to increase, proactive planning efforts will be more important than ever.

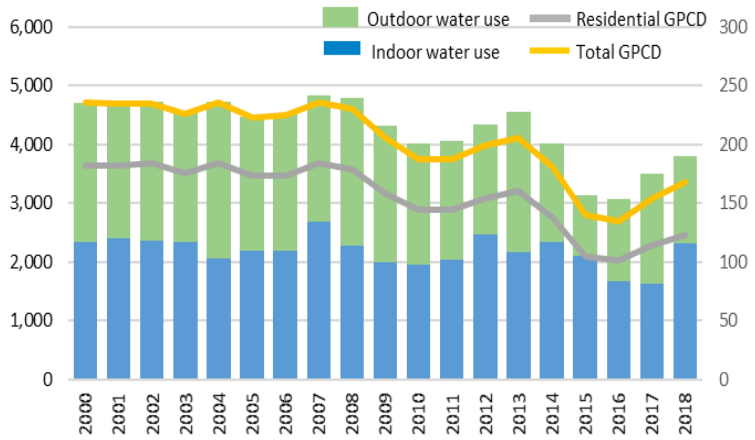
As customer water use becomes more efficient, responses to future droughts may require more effort to achieve the same levels of drought savings achieved in previous droughts, a phenomenon known as "demand hardening." Depending on the water savings needed in the current or future droughts or water shortages, Valley Water may need to increase outreach and other efforts to achieve the same savings

results as were achieved during the 2012-2016 drought period, and should assess the degree of demand hardening as part of future drought response planning and efforts.

Program Monitoring and Evaluation (Section 8)

The section identifies recommendations for methods of program monitoring and evaluation to support the continued adaptive management of Valley Water's conservation program to ensure that its water conservation targets and the needs within its service area are met. The recommendations include: (1) continue utilizing the Conservation Tracking Model to estimate both passive and active conservation savings, (2) periodically update and track percentage and total water use by sector (total residential vs. non-residential) and changes in per capita water use (see the example shown on **Figure ES-9**) to identify trends in water use that may impact program design or effectiveness, and (3) continue to coordinate with its retailers on the annual SDA. These actions will allow Valley Water to be proactively assessing its water demand characteristics and be on track to achieve its water conservation targets.

Figure ES-9
Example Water Use Characteristic Summary



1 Introduction

1.1 Valley Water Service Area and Role

Santa Clara Valley Water District (Valley Water) is the primary water resources agency for 1.9 million residents and covers 1,300 square miles in Santa Clara County (County), California (Valley Water, 2019b). It acts not only as the County's primary water wholesaler, but also as its flood protection agency and the steward for its streams and creeks, underground aquifers, and Valley Water-built reservoirs. As the County's primary water wholesaler, Valley Water provides clean, safe water for homes and businesses. As the agency responsible for local flood protection, Valley Water works diligently to protect Santa Clara County residents and businesses from the devasting effects of flooding. Valley Water's stream stewardship responsibilities include creek restoration and wildlife habitat projects, pollution prevention efforts, and commitment to natural flood protection.

Valley Water has made significant investments to manage demands for water and develop water supplies and infrastructure to meet the County's water needs, the mission of the District laid out in Valley Water's enabling legislation (the "Santa Clara Valley Water District Act" or "District Act"), and meet the Valley Water Board's Ends Policies for water supply reliability, water conservation, and water recycling (Valley Water, 2012). These policies, in conjunction with Valley Water's Water Supply Master Plan 2040 (Valley Water, 2019b), and the 2020 UWMP (Valley Water, 2021) require that:

- Valley Water does any and every lawful act necessary to be done so that sufficient water may be available for any present or future beneficial use or uses by the lands or inhabitants within the Valley Water service area.
- There is a reliable, clean water supply for current and future generations.
- Water supplies meet at least 100% of average annual water demands in non-drought years and not call for water use reductions greater than 20% during times of shortage.

In addition to these broad policy objectives, Valley Water's Water Supply Master Plan 2040 establishes the following numeric targets for conservation (Valley Water, 2019b):

- Conservation savings increasing from about 77,000 Acre-Feet per year (AFY) in 2018 to about 99,000 AFY by 2030 and to about 109,000 AFY by 2040 relative to a baseline of 1992.[2,3]

1.2 Strategic Plan Objective

The Water Conservation Strategic Plan (Strategic Plan) is intended to provide a blueprint for meeting Valley Water's established conservation policy objectives and targets. The Strategic Plan evaluates and recommends water conservation measures and programs that will support meeting policy objectives and targets for long-term water conservation and water shortage response; develops schedules for

[2] The long-term conservation targets include an additional 1,000 AFY of savings, for a total of 110,000 AFY of savings by 2040, which is expected to be met through stormwater management programs, rather than water conservation programs. It is noted that there are some overlaps between Valley Water's conservation programs and stormwater as an alternative supply (e.g., rain cisterns, rain barrels, and rain gardens). For purposes of this Strategic Plan, these programs are considered to be conservation programs, and the 1,000 AFY of stormwater savings are anticipated to come from larger scale stormwater management programs, such as the Flood Managed Aquifer Recharge (Flood-MAR) that is currently being evaluated (Valley Water, 2019b)).

[3] Water savings are estimated from 1992 onward, with 1992 as the first-year savings are accrued.

implementation; estimates costs; and identifies protocols for monitoring and evaluating program performance over time.

The Strategic Plan is also intended to be a tool and reference document to inform and support Valley Water's future conservation program marketing and design. Included in the Strategic Plan are insights from a retail agency survey, historical participation trends analysis, geospatial participation density analysis, and participation trends by retail agency. To achieve Valley Water's long-term conservation targets, the Strategic Plan presents an evaluation and estimate of the necessary level of program implementation, an anticipated program schedule that considers device saturation and lifetimes, estimated costs of proposed programs with an emphasis on the most cost-effective programs, and compliance with State of California regulations.

1.3 Document Organization

The remaining sections of the Strategic Plan cover:

- **Section 2 Valley Water Service Area, Demands, and Water Supplies** provides an overview of Valley Water supplies, water demands, system characteristics, and water supply reliability, including near-term risks to Valley Water's imported water supply and the potential for near-term water shortages, based on current supply planning documents.
- **Section 3 Water Conservation Policies and Targets** reviews Valley Water's drivers for conservation, including long-term water conservation policies and targets, current water shortage management policies, implications of future policies, and drivers identified by retail agencies.
- **Section 4 Current Conservation Programs and Additional Water Savings Needed to Achieve Long-Term Conservation Targets** gives an overview of Valley Water conservation programs to date, including historical participation in each, an estimate of the savings achieved to date including through active program conservation and passive savings, and an estimate of the remaining savings needed in order to reach Valley Water's long-term conservation targets through 2040.
- **Section 5 Water Conservation Program Analysis** presents a detailed evaluation of past customer participation in five selected water conservation programs and includes historical participation trends analysis, geospatial participation density analysis, trends in participation by customer demographics, and participation trends by retail agency.
- **Section 6 Long-Term Conservation Plan** provides a detailed evaluation of three potential conservation program scenarios and implementation levels to assess Valley Water's ability to achieve the long-term conservation targets, and evaluates each of these scenarios under two cases, which bracket the range of potential effects of the recently developed Model Water Efficient New Development Ordinance. This section also includes a discussion of additional considerations for Valley Water's future conservation program planning, including: (1) a review of the changes in program participation observed during the recent drought period in response to Valley Water's increased conservation funding and focus, (2) a review of conservation program staffing levels, (3) a discussion potential regional model ordinance considerations, and (4) a discussion of potential new approaches to augment and adapt Valley Water's conservation programs in the future.

- **Section 7 Water Shortage Management** discusses the various documents that are employed by Valley Water to address water shortage conditions; explores Valley Water's response to the recent historic drought, including specific actions taken in regard to water conservation and demand management policies and recommendations for future drought response; and discusses the challenge demand hardening may pose for future drought response.
- **Section 8 Program Monitoring and Evaluation** identifies recommendations for methods of program monitoring and evaluation to support the continued adaptive management of Valley Water's conservation program to ensure that its long-term water conservation targets and the needs of the County and retail agencies are met.
- **Section 9 References** provides key references and sources.

2 Valley Water Service Area, Demands, and Water Supplies

Valley Water offers water conservation programs to serve the entirety of Santa Clara County (**Figure 2-1**). Santa Clara County is home to a dynamic economy and approximately 1.9 million people (Valley Water, 2019b). Most water use occurs on the valley floor between the Santa Cruz Mountains to the west and the Diablo Range to the east. Santa Clara County is home to Silicon Valley and the northern portion of the valley floor is highly urbanized. Southern Santa Clara County has some urban development, but much of the land use is still rural and agricultural.

This section provides an overview of Valley Water's service area, historical water demands by retail agency, projected water demands, and water supplies. Following this overview, current water supply reliability challenges confronting Valley Water's supply portfolio are discussed, as well as the role of conservation in improving supply reliability.

2.1 Service Area Description

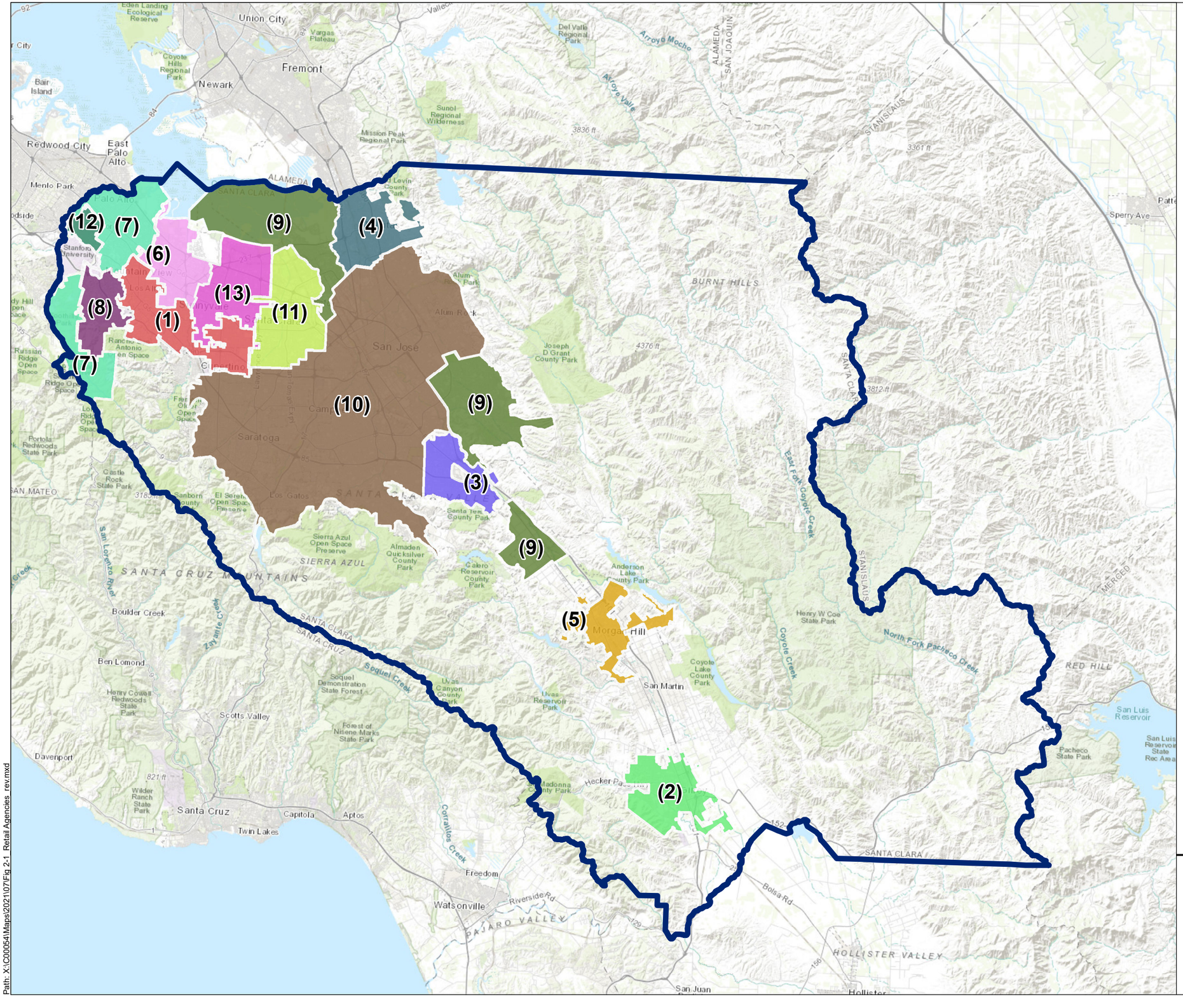
Valley Water has a diverse mix of water supplies and a strong commitment to water use efficiency. Valley Water's water supply system is a complex interdependent system comprised of storage, conveyance, treatment, and distribution facilities that include water treatment plants, local reservoirs, creeks, recharge ponds, canals, groundwater subbasins, and raw and treated water conveyance facilities.

About half of the County's water supply currently comes from local sources and about half comes from imported water sources (Valley Water, 2021). Imported water includes Valley Water's contract supplies from the California Department of Water Resources' (DWR's) State Water Project (SWP) and the United States Bureau of Reclamation's (USBR's) Central Valley Project (CVP) and retailers' contract supplies delivered by the San Francisco Public Utilities Commission (SFPUC). Local sources include natural groundwater recharge and surface water supplies, including surface water rights held by Valley Water, San Jose Water Company, and Stanford University, as well as locally generated recycled water supply. Valley Water supplies are used to recharge the local groundwater subbasins, treated at drinking water treatment plants for direct service to customers, released to local creeks to meet environmental needs, or sent directly to water users. Valley Water provides water conservation services to all people within the County, including those who are not retail agency customers (e.g., those that rely on private groundwater wells for drinking water). The water savings achieved through conservation programs has been significant and serves to offset the need to invest in new water supply projects.

Valley Water provides treated water and groundwater to local water retail agencies that serve communities within the County and has primary responsibility for the management of the County's groundwater subbasins used by private well owners. Valley Water's conservation programs are offered to all residents and businesses within the County regardless of the source of their water supply. The 13 retail agencies within Valley Water's service area include:

- California Water Service (CWS), Los Altos District
- City of Gilroy
- City of Milpitas
- City of Morgan Hill
- City of Mountain View
- City of Palo Alto[4]
- City of Santa Clara
- City of Sunnyvale
- Great Oaks Water Company
- Purissima Hills Water District[4]
- San José Municipal Water System
- San Jose Water Company
- Stanford University[4]

[4] City of Palo Alto, Purissima Hills Water District, and Stanford University do not purchase water directly from Valley Water.



Legend

Valley Water Boundary

Water Retailer

- (1) California Water Service Company
- (2) City of Gilroy
- (3) Great Oaks Water Company
- (4) City of Milpitas
- (5) City of Morgan Hill
- (6) City of Mountain View
- (7) City of Palo Alto
- (8) Purissima Hills Water District
- (9) San José Municipal Water System
- (10) San Jose Water Company
- (11) City of Santa Clara
- (12) Stanford University
- (13) City of Sunnyvale

Notes

1. All locations are approximate.

Sources

1. Basemap provided by ESRI.

N

0 5 10

(Scale in Miles)

Valley Water Service Area

Valley Water
Water Conservation Strategic Plan
July 2021
C00054.00
Figure 2-1

eki environment & water

Path: X:\C00054\Maps\2021\07\Fig 2-1_Retail Agencies_rev.mxd

2.2 Service Area Water Demand

The Association of Bay Area Governments (ABAG) projects that the County's population will increase from about 1.9 million in 2015 to about 2.5 million by 2040 (ABAG, 2018). Jobs are projected to increase from approximately 1.1 million in 2015 to approximately 1.3 million in 2040. Valley Water estimates that there will be a net increase in water demands from the current average of approximately 310,000 AFY to a non-drought year demand of approximately 335,000 AFY in 2040 (Valley Water, 2020d; 2020e).

Estimated future demands for Valley Water, which include the anticipated water conservation necessary to meet the targets are shown in **Figure 2-2** (rounded to the nearest 5,000 AFY; Valley Water, 2020d; Valley Water, 2020f). The Fiscal Year 2020-21 Monitoring and Assessment Program Report identifies that the planned water conservation is an important component of Valley Water's supply strategy in order to provide sufficient supplies to meet demand in non-drought years (Valley Water, 2020f).

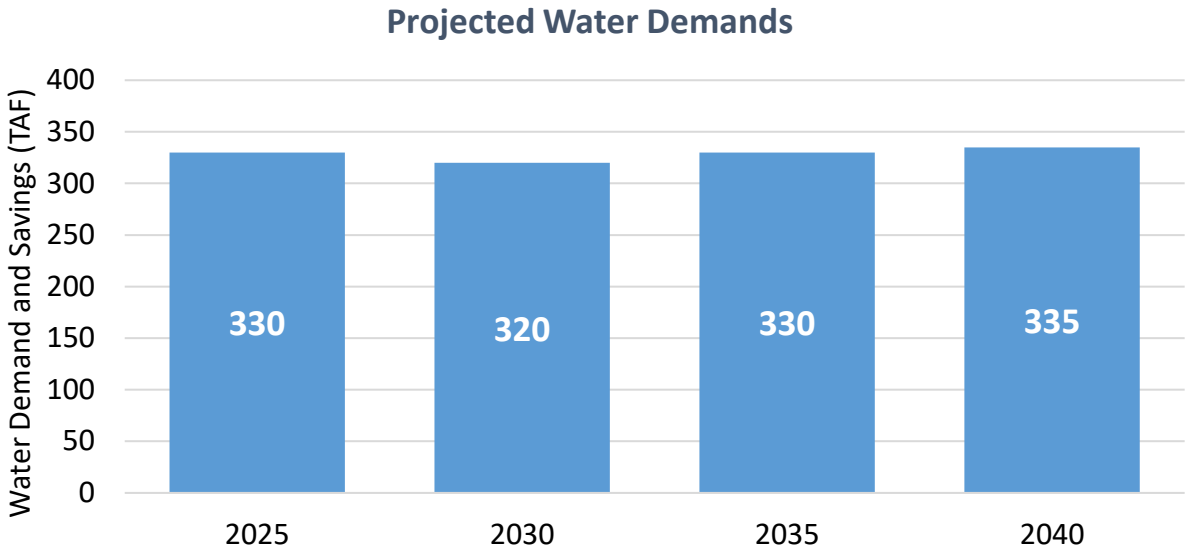


Figure 2-2 Projected Water Demands Inclusive of Conservation Savings

2.2.1 Water Use by Sector

Figure 2-3 shows the approximate distribution of sales by sector in 2018, based on data provided by the retail water agencies. The data presented in **Figure 2-3** reflect generalized water use sectors to allow comparison across all retail agencies and tracks water use from the retailers listed in Section 2.1, and is believed to be generally representative of County-wide water use proportions. [5]

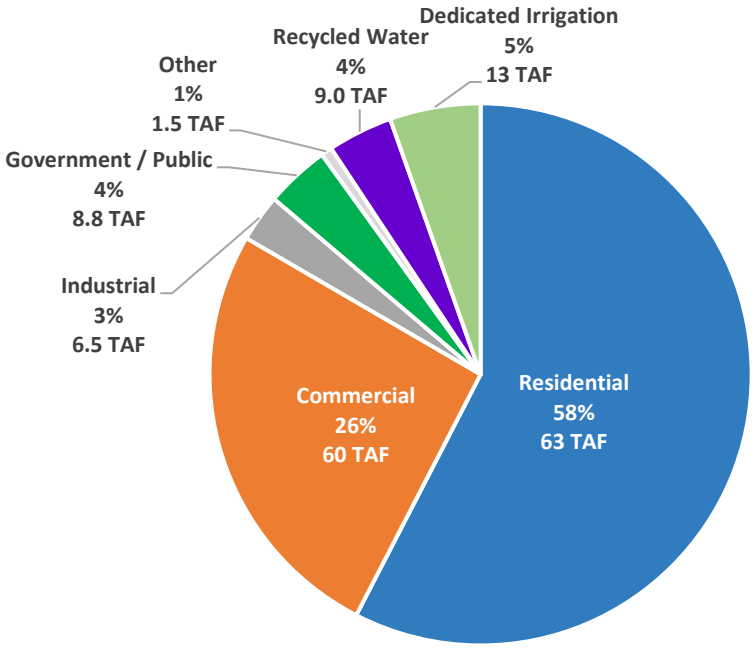


Figure 2-3 2018 Water Use by Customer Class

2.2.2 Water Use by Retail Agencies

Thirteen water retail agencies serve water to customers across the County, with substantial differences in population, housing stock, commercial sector size and types, and other factors that can significantly affect customer water use. The diversity in Valley Water's service area results in substantial differences between the retail agencies in terms of total water use, proportion of water use by sector, and other water use patterns (e.g., indoor versus outdoor water use). The following sections and figures (**Figure 2-4** through **Figure 2-7**) explain the process used to determine key water use metrics for the retail agencies summarized and presented in Water Use Profiles (see **Figure 2-8** through **Figure 2-20**). **Figure 2-8** shows a summary of this information for all of the retail agencies. The data presented in the Water use Profiles were provided to Valley Water by each of the retail agencies, and the timeframe of available data varies between agencies. These Water Use Profiles are used to support the evaluation of conservation potential

[5] The percentages reflected here vary slightly from those presented in Figure 4-2 of Valley Water's 2020 UWMP, as the figures show include slightly different sector classifications (i.e., UWMP Figure 4-2 does not included recycled water, splits residential into single- and multi-family categories, and does not differentiate dedicated irrigation sectors).

opportunities discussed in Section 7. The elements included in the Water Use Profiles and key findings are summarized below.

2.2.2.1 Total Monthly Water Use

Total water use (or "consumption") by month is shown to illustrate the variability in water use by season and by year. Data are shown for 2000 through 2019, based on the data available for each agency.[6] **Figure 2-4** is provided as an example of how total monthly water use data are reflected in the Water Use Profiles. Monthly water use reflects potable and recycled water use, based on data reported by the retail agencies and provided by Valley Water. All retail agencies show a distinct seasonal water use pattern, with water use generally the highest in June through October, and lowest in the January through March period (**Figure 2-8** through **Figure 2-20**). Although, the magnitude of summer water use to winter water use can vary substantially between agencies and between years.

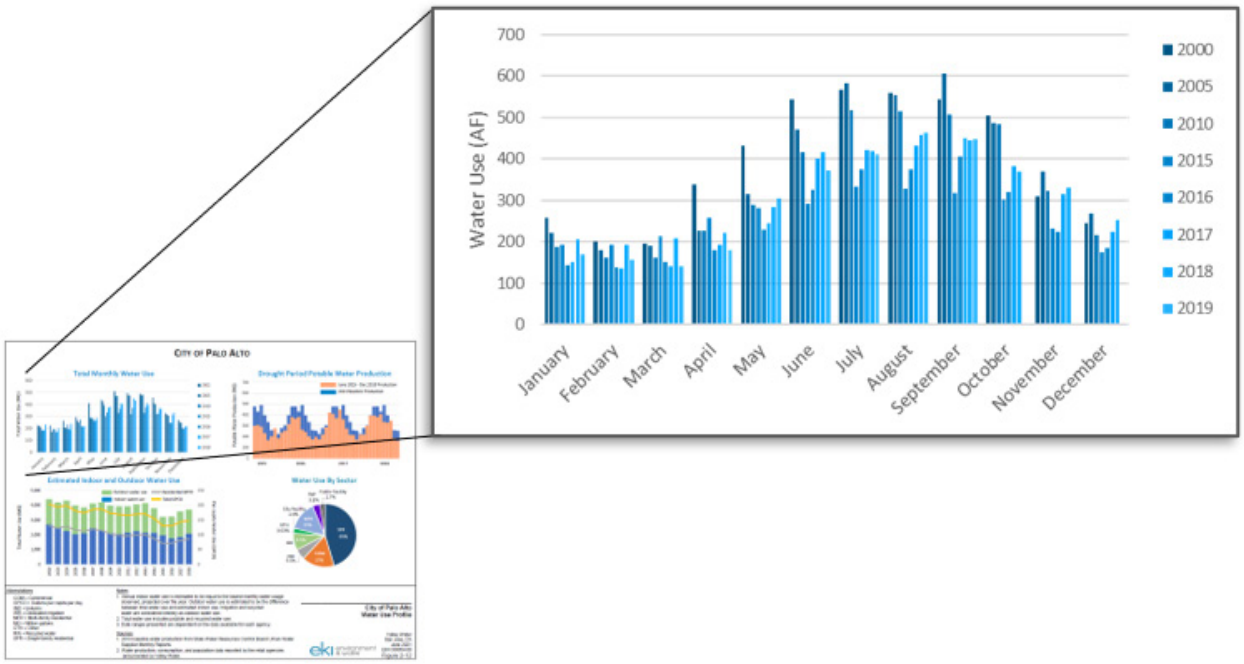


Figure 2-4 Example Total Monthly Water Use Data in Water Use Profiles

2.2.2.2 Drought Period Potable Water Production

Figure 2-5 is provided as an example of how drought period potable water production data are reflected in the Water Use Profiles. Monthly water production for the mid-drought period

[6] As part of Valley Water's effort to develop a water demand forecast model, Valley Water collected monthly water use data from water retailers for the period of 2000 through 2019. However, not all retail agencies were able to provide data for this complete period. Thus, the data reflected in the Water Use Profiles reflects the periods available for each retail agency. The water use reported includes all supply sources, including Valley Water purchases and other sources such as purchases from SFPUC.

beginning June 2015 is shown in comparison to the 2013 baseline production.[7] Post-drought water production is shown in orange and pre-drought water production from 2013 is shown in blue. These graphs show the degree to which agencies reduced their water use relative to 2013 and have rebounded since. Water use by all retail agencies has remained lower than 2013 levels.

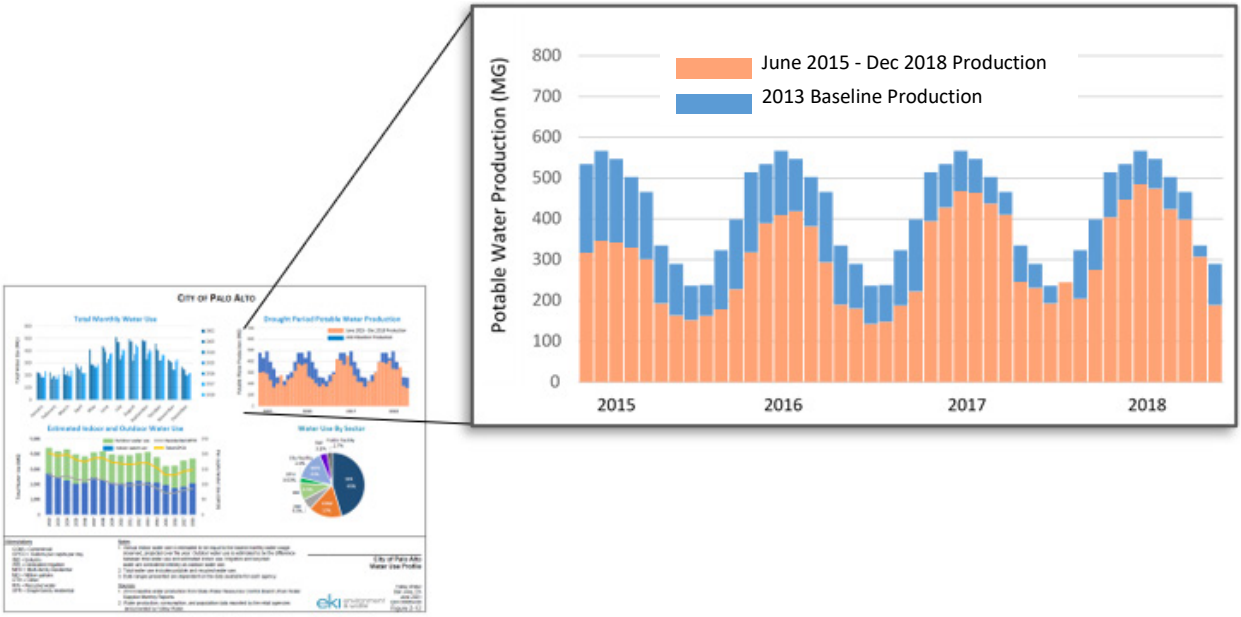


Figure 2-5 Example Drought Period Potable Water Production Data in Water Use Profiles

2.2.2.3 Estimated Indoor and Outdoor Water Use

Estimated indoor and outdoor total water use were calculated on an annual basis, based on total water use reported by the retail agencies. **Figure 2-6** is provided as an example of how estimated indoor and outdoor water use data are reflected in the Water Use Profiles. Estimated indoor water use is shown in blue and estimated outdoor water use is shown in green. Indoor water use is estimated to be equal to the lowest monthly water usage observed, projected over the year. Outdoor water use is estimated to be the difference between total water use and estimated indoor water use.[8] Water use by dedicated irrigation and recycled water accounts are assumed to be entirely outdoor water use. Total per capita water use and residential per capita water use

[7] California experienced a historic drought between 2012-2017, although dry year conditions began in Valley Water's service area in 2011. In 2014, Governor Brown issued Executive Order B26-14 declaring a Drought State of Emergency and requested all Californians to voluntarily reduce water use by 20%. In 2015, the State Water Resources Control Board implemented emergency conservation regulations that, among other things, required water agencies to reduce their water use and prohibited certain types of water uses. Per state requirements, 2013 was used as the "baseline" period for assessing water use reduction relative to mandatory state water use reduction targets.

[8] This methodology provides a rough estimate of indoor and outdoor water use, which errs on the side of overestimating indoor water use.

are shown as yellow and grey lines, respectively.[9] The data shown are is based on consumption data, and exclude non-revenue water.

On average, approximately 58% of water use by retail agencies is used indoors and 42% is used outdoors (**Figure 2-8** through **Figure 2-20**). Estimated outdoor usage ranges substantially by agency, from 29% to 66%, and appears to be driven largely by the size of an agency's residential sector. The estimate of indoor water use is expected to be slightly higher than actual indoor water use because residential irrigation does occur to some degree during the winter months.

All agencies show decreasing trends in both total and per capita water use over time. Most agencies show a significant decrease in total and per capita water use from 2013 through 2016, likely influenced by the historic drought conditions, mandatory state-wide restrictions in urban water use imposed by the SWRCB, and local drought response. Total and per capita water use has remained lower than pre-drought conditions for all agencies, although many are showing an increase from 2017 onward, indicating a degree of rebound following the drought.

Across all agencies, the average per capita water use in 2013 was 170 gallons per capita per day (GPCD) and in 2018 was 135 GPCD, showing a decrease of 21% over this period. Similarly, average residential per capita water use decreased from 112 residential-gallons per capita per day (R-GPCD) in 2013 to 87 R-GPCD in 2018, a decrease of 22%. In 2018, per capita water use by agency ranged from 75 GPCD to 297 GPCD and residential per capita water use ranged from 21 R-GPCD to 275 R-GPCD.

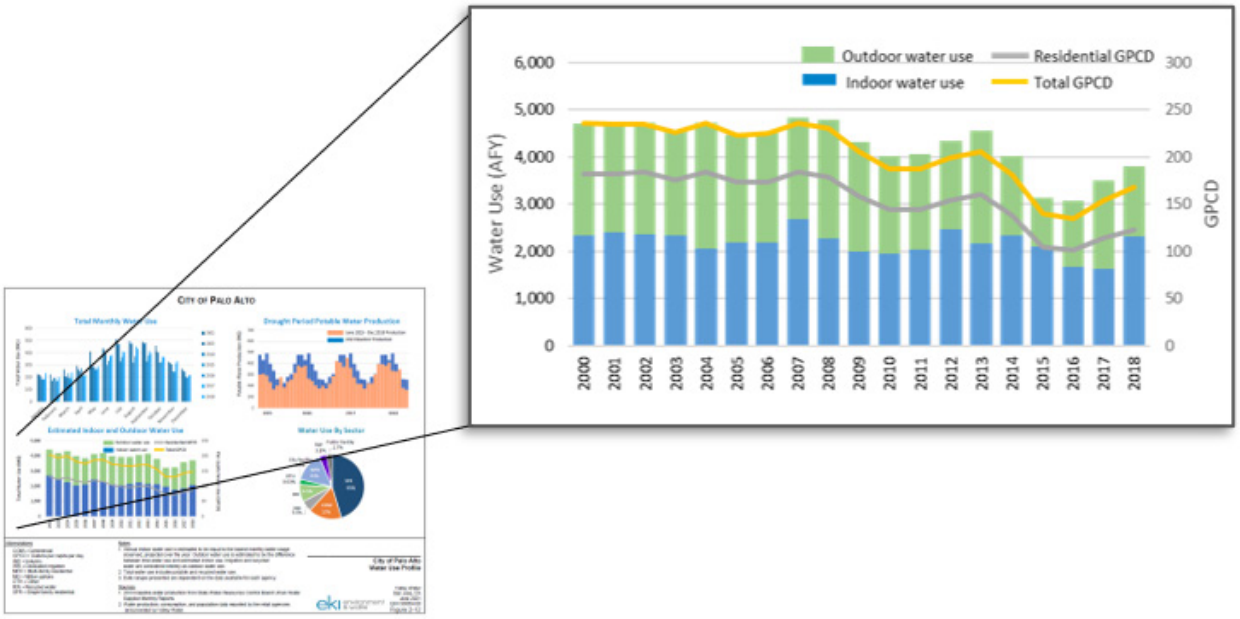


Figure 2-6 Example Estimated Indoor and Outdoor Water Use Data in Water Use Profiles

[9] Population data used to calculate per capita water use were reported by the retail agencies and provided by Valley Water, except for Stanford University's population, which was reported in present and past Bay Area Water Supply and Conservation Agency (BAWSCA) Annual Surveys (BAWSCA, 2020; BAWSCA, 2015).

2.2.2.4 Total Water Use by Sector

Total water use for each retail agency is summarized in terms of the percentage of water use by sector, based on the sectors provided and tracked by each agency[10]. **Figure 2-7** is provided as an example of how water use b sector data are reflected in the Water Use Profiles. **Figure 2-8** generalizes the sectors to provide comparison across agencies.[11] **Figure 2-9** through **Figure 2-21** report sectors as tracked by each agency. The single-family residential (SFR) sector tends to be the largest water using sector for most agencies, with the exception of City of Mountain View and Stanford University. Additionally, the San Jose Water Company and City of Morgan Hill only track total residential water use (both SFR and Multi-Family Residential [MFR]) instead of spitting use between SFR and MFR. Total residential water use across all agencies ranges from 44% to 93%. Water use by the combined commercial, industrial, institutional/government (CII) sector ranges from 7% to 49% among the agencies, and dedicated irrigation[12] ranges from 0% to 23% among the agencies.

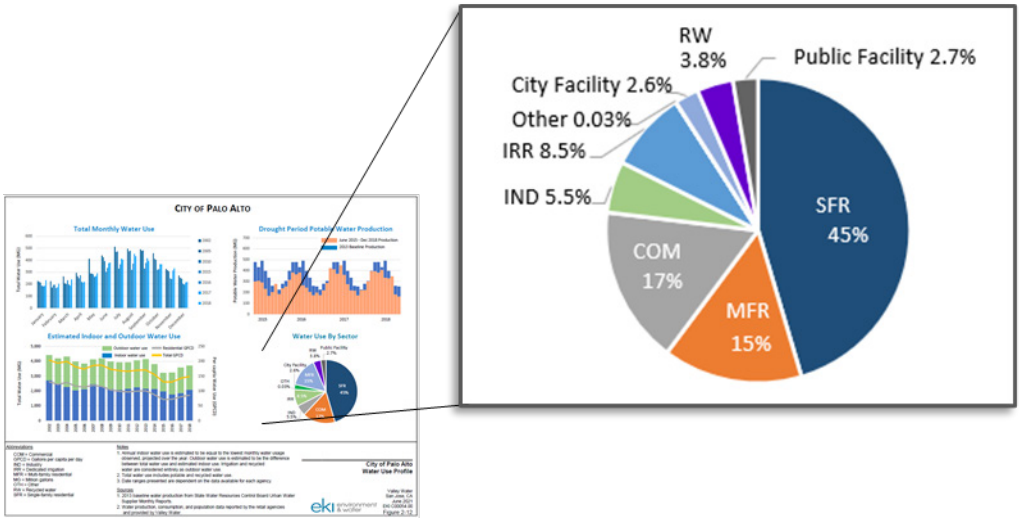


Figure 2-7 Example Water Use by Sector Data in Water Use Profiles

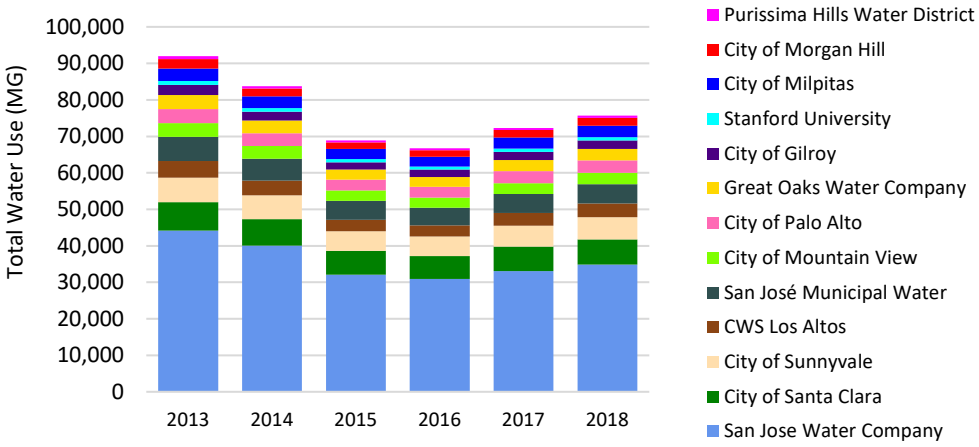
[10] Years selected to support this analysis were the most recent five years (2015-2019) and then years selected in 5-year intervals (2010, 2005, 2000), to the extent data are available for each agency.

[11] Each agency reports different water use sectors and **Figure 2-8** presents an approximate comparison between the various sectors. For example, the government sector groups sectors such as public authorities, municipal, institutional, public, and city facilities.

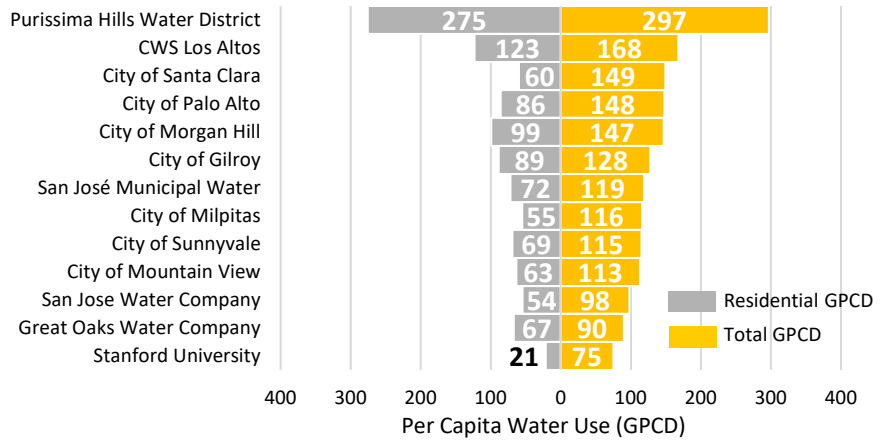
[12] Water use reported by agencies as "landscape" or "irrigation" is water use measured using a dedicated irrigation meter.

Valley Water Service Area

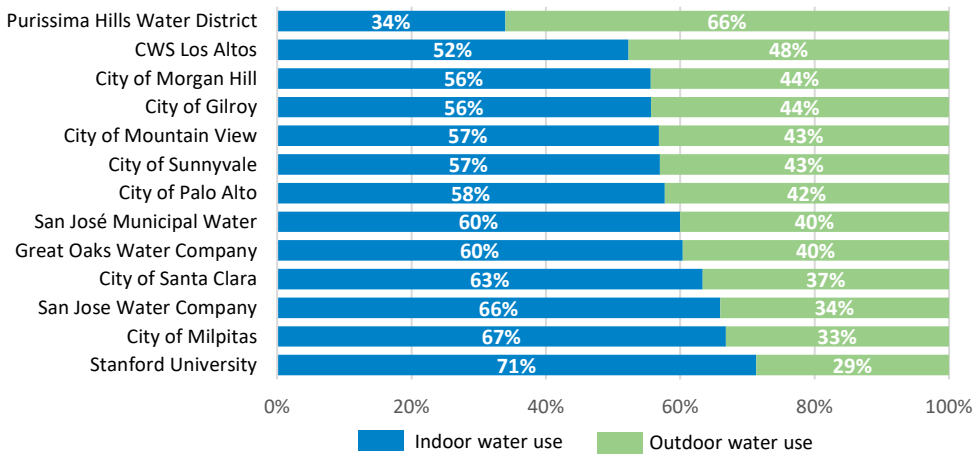
Total Annual Water Use



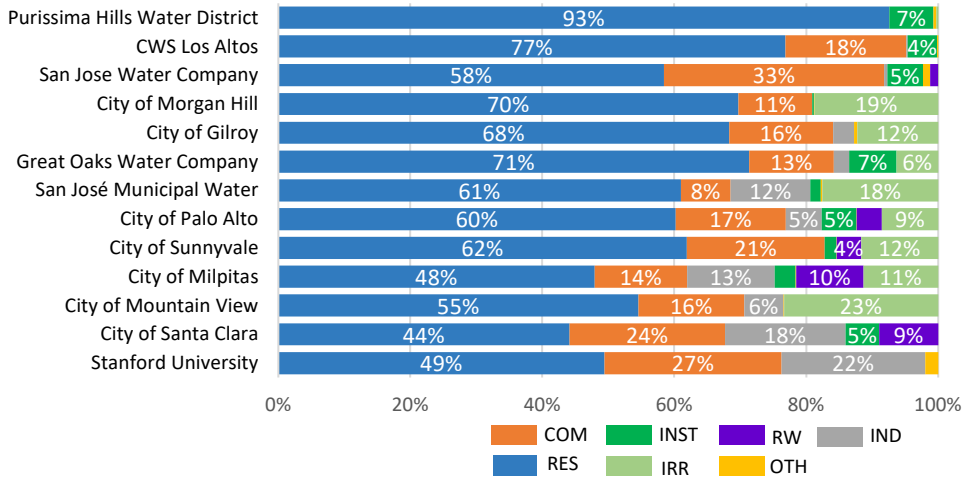
2018 Per Capita Water Use



Estimated Average Indoor and Outdoor Water Use



Water Use By Sector



Abbreviations

CWS = California Water Service
COM = Commercial
GPCD = Gallons per capita per day
IND = Industry
INST = Institutional
IRR = Dedicated irrigation
MG = Million gallons
OTH = Other
RES = Residential
RW = Recycled Water

Notes

1. Annual indoor water use is estimated to be equal to the lowest monthly water usage observed, projected over the year. Outdoor water use is estimated to be the difference between total water use and estimated indoor use. Irrigation and recycled water are considered entirely as outdoor water use.
2. Total water use includes potable and recycled water use, excluding non-revenue water.
3. Water use sectors presented are broad categories. Water use profiles for each retail agency provide more details.

Sources

1. Water production, consumption, and population data reported by the retail agencies and provided by Valley Water.

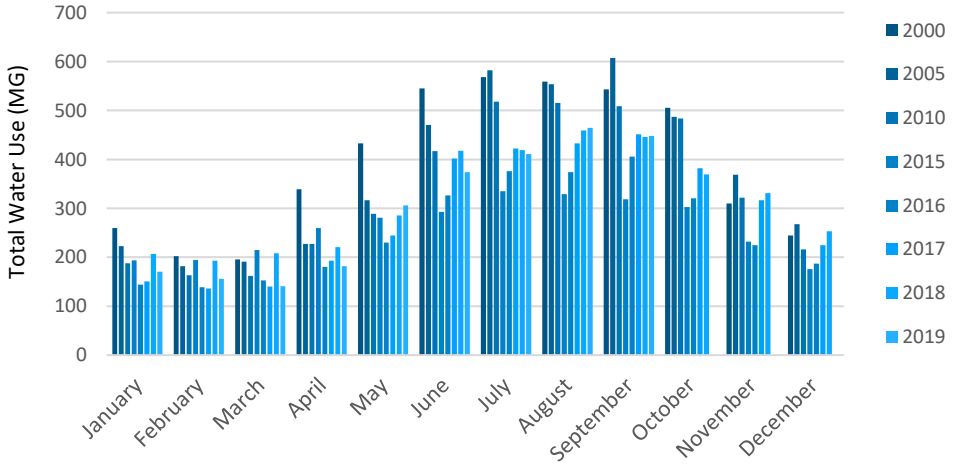
Valley Water Service Area
Water Use Profile

Valley Water
San Jose, CA
July 2021
EKI C00054.00
Figure 2-8

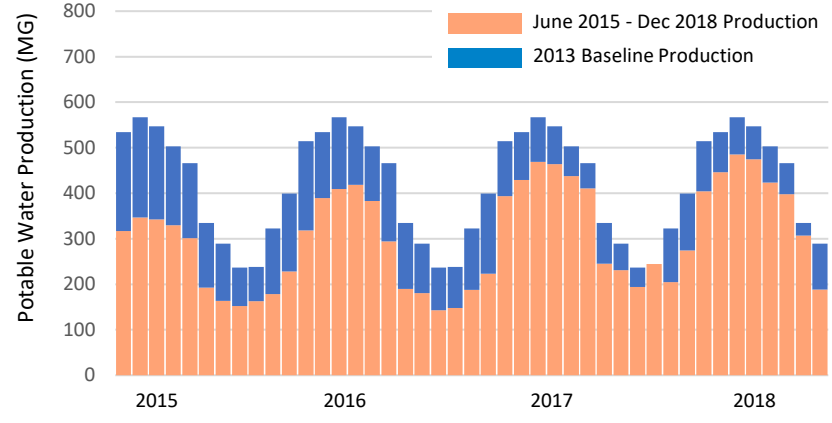
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California Water Service, Los Altos District

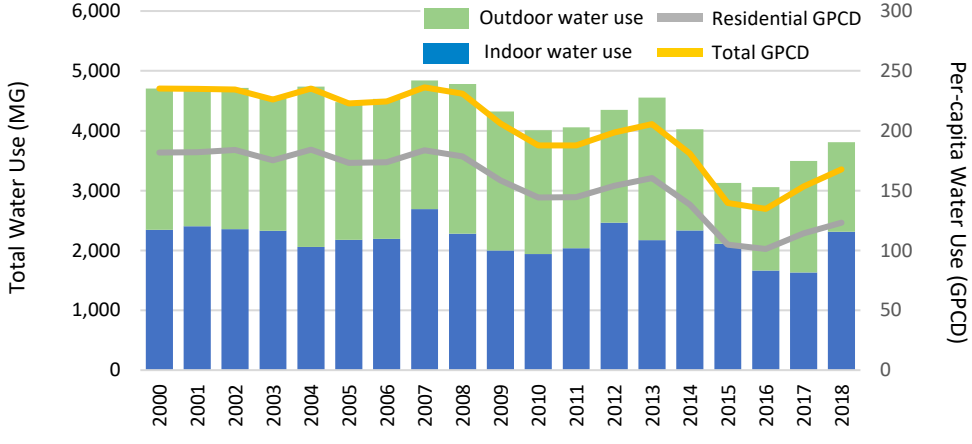
Total Monthly Water Use



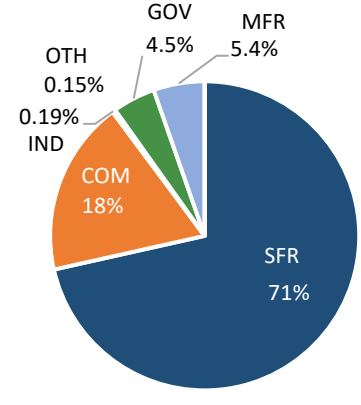
Drought Period Potable Water Production



Estimated Indoor and Outdoor Water Use



Water Use By Sector



Abbreviations

COM = Commercial
GOV = Government
GPCD = Gallons per capita per day
IND = Industry
MFR = Multi-family residence
MG = Million gallons
OTH = Other
SFR = Single-family residence

Notes

1. Annual indoor water use is estimated to be equal to the lowest monthly water usage observed, projected over the year. Outdoor water use is estimated to be the difference between total water use and estimated indoor use. Irrigation and recycled water are considered entirely as outdoor water use.
2. Total water use includes potable and recycled water use, excluding non-revenue water.
3. Date ranges presented are dependent on the data available for each agency.

Sources

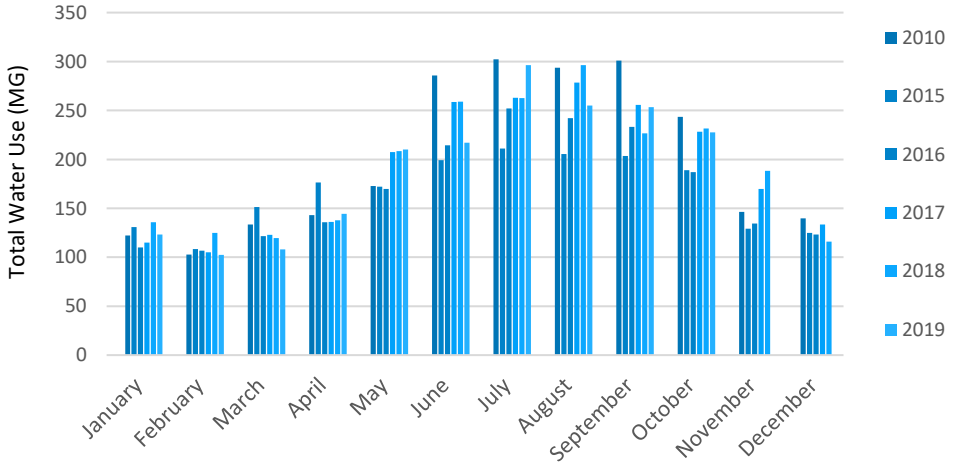
1. 2013 baseline water production from State Water Resources Control Board Urban Water Supplier Monthly Reports.
2. Water production, consumption, and population data reported by the retail agencies and provided by Valley Water.

California Water Service
Los Altos District
Water Use Profile

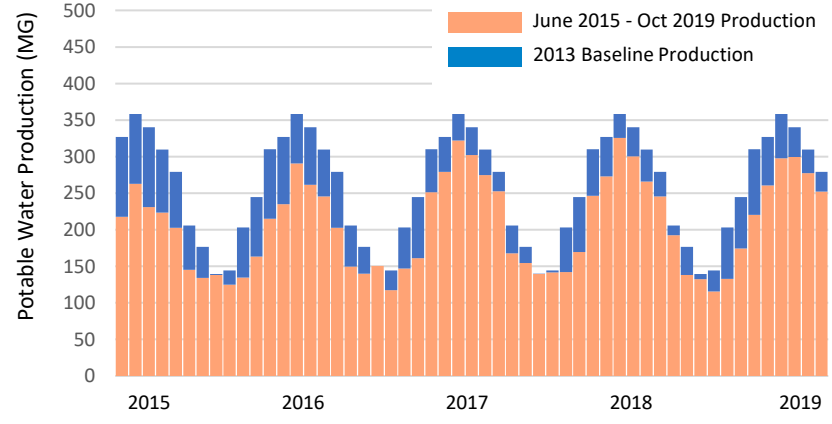
Valley Water
San Jose, CA
July 2021
EKI C00054.00
Figure 2-9

CITY OF GILROY

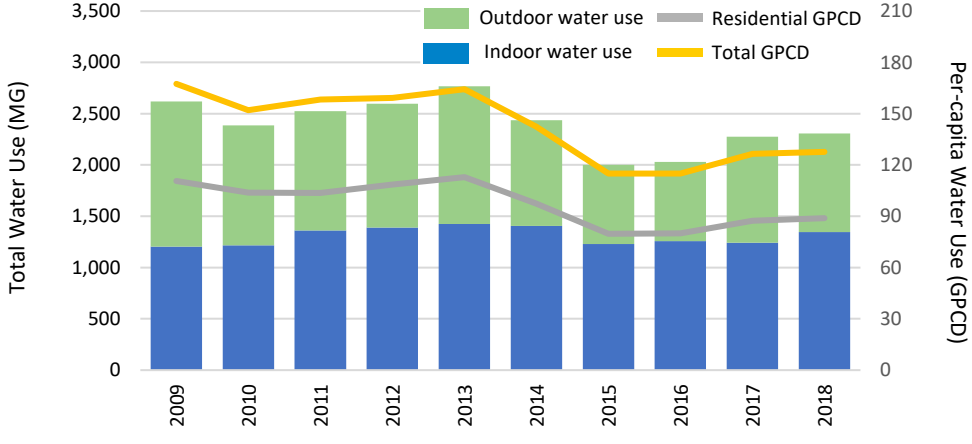
Total Monthly Water Use



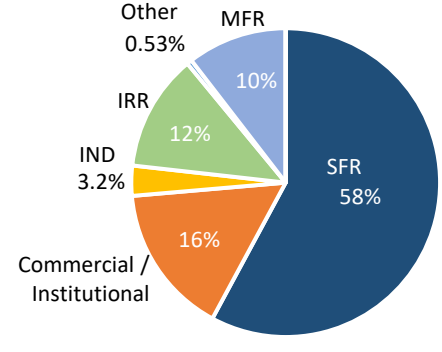
Drought Period Potable Water Production



Estimated Indoor and Outdoor Water Use



Water Use By Sector



Abbreviations

GPCD = Gallons per capita per day
IND = Industrial
IRR = Dedicated irrigation
MFR = Multi-family residential
MG = Million gallons
SFR = Single-family residential

Notes

1. Annual indoor water use is estimated to be equal to the lowest monthly water usage observed, projected over the year. Outdoor water use is estimated to be the difference between total water use and estimated indoor use. Irrigation and recycled water are considered entirely as outdoor water use.
2. Total water use includes potable and recycled water use, excluding non-revenue water.
3. Date ranges presented are dependent on the data available for each agency.

Sources

1. 2013 baseline water production from State Water Resources Control Board Urban Water Supplier Monthly Reports.
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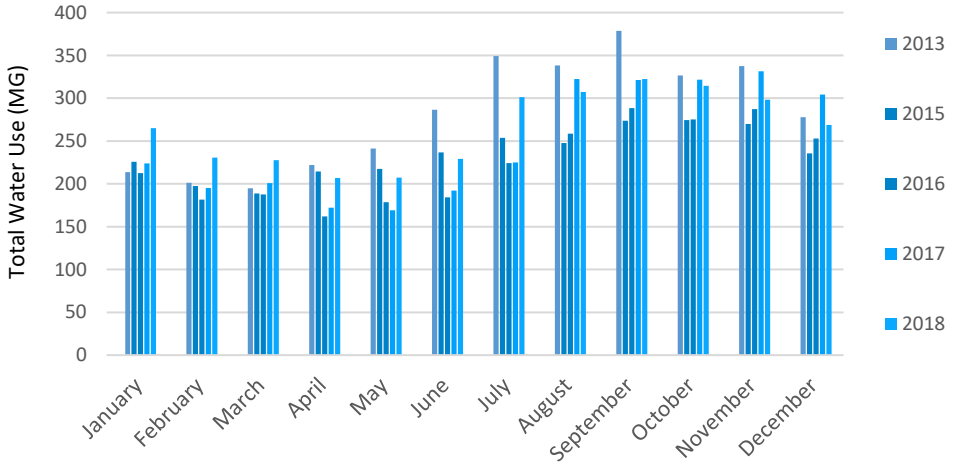
City of Gilroy
Water Use Profile

Valley Water
San Jose, CA
July 2021
EKI C00054.00
Figure 2-10

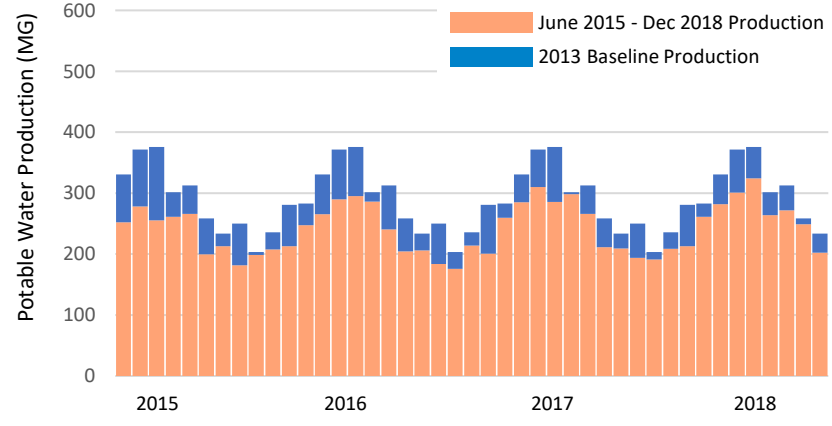
eki environment & water

CITY OF MILPITAS

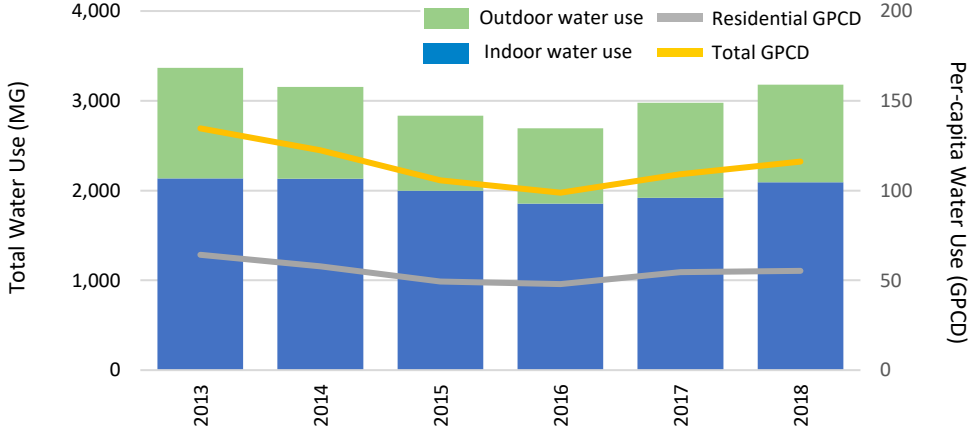
Total Monthly Water Use



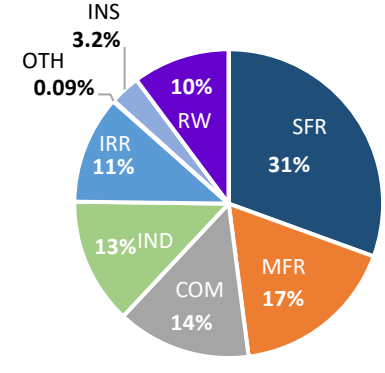
Drought Period Potable Water Production



Estimated Indoor and Outdoor Water Use



Water Use By Sector



Abbreviations

COM = Commercial
GPCD = Gallons per capita per day
IND = Industry
INS = Institutional
IRR = Dedicated irrigation
MFR = Multi-family residence
MG = Million gallons
OTH = Other
RW = Recycled water
SFR = Single-family residence

Notes

1. Annual indoor water use is estimated to be equal to the lowest monthly water usage observed, projected over the year. Outdoor water use is estimated to be the difference between total water use and estimated indoor use. Irrigation and recycled water are considered entirely as outdoor water use.
2. Total water use includes potable and recycled water use, excluding non-revenue water.
3. Date ranges presented are dependent on the data available for each agency.

Sources

1. 2013 baseline water production from State Water Resources Control Board Urban Water Supplier Monthly Reports.
2. Water production, consumption, and population data reported by the retail agencies and provided by Valley Water.

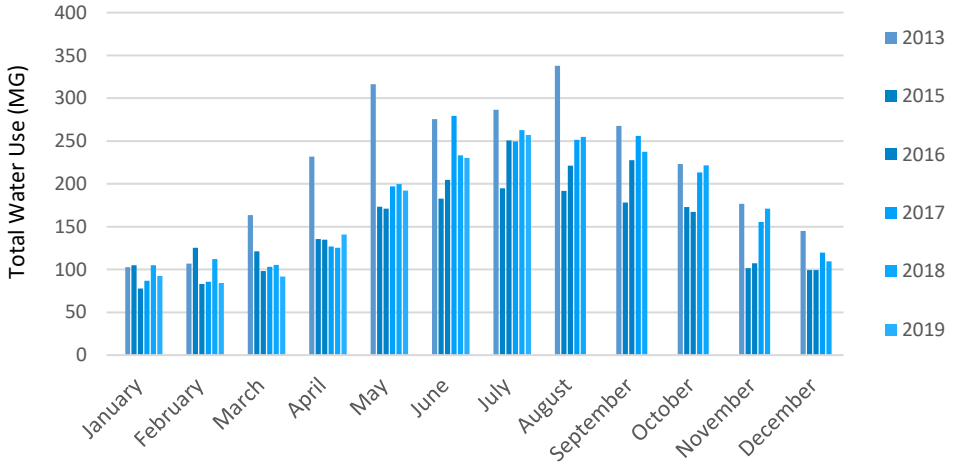
City of Milpitas
Water Use Profile

Valley Water
San Jose, CA
July 2021
EKI C00054.00
Figure 2-11

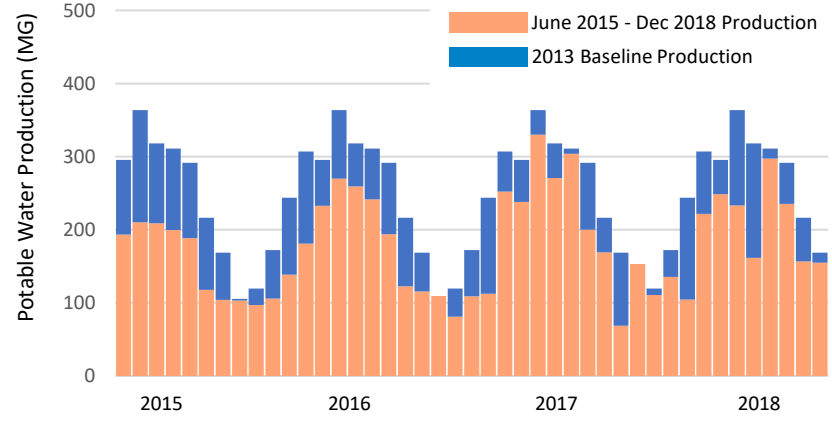
eki environment & water

City of Morgan Hill

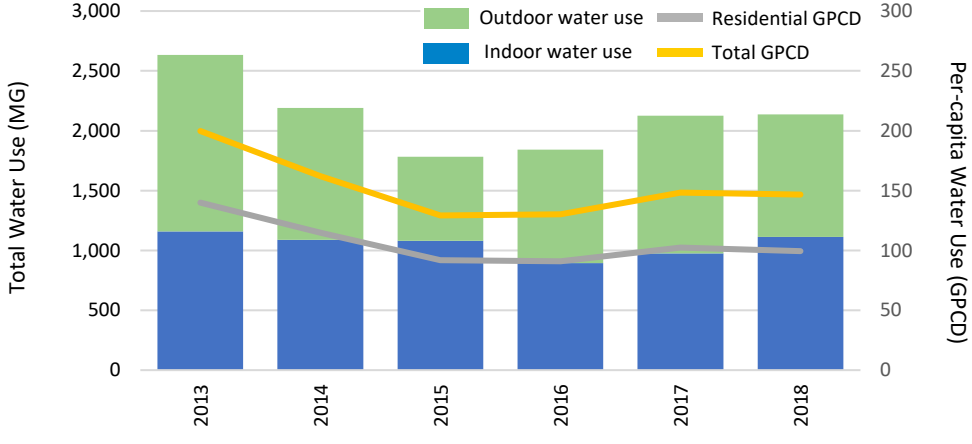
Total Monthly Water Use



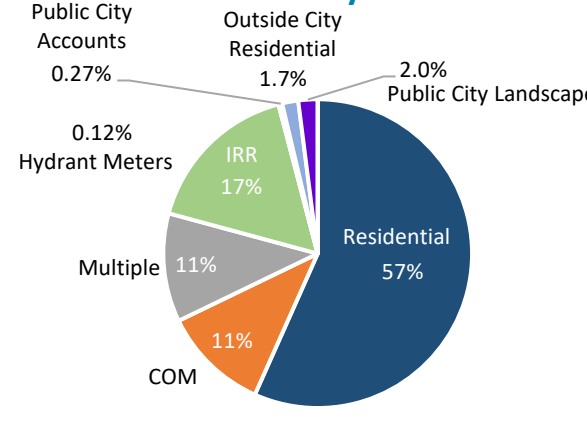
Drought Period Potable Water Production



Estimated Indoor and Outdoor Water Use



Water Use By Sector



Abbreviations

COM = Commercial
GPCD = Gallons per capita per day
IRR = Dedicated irrigation
MG = Million gallons

Notes

1. Annual indoor water use is estimated to be equal to the lowest monthly water usage observed, projected over the year. Outdoor water use is estimated to be the difference between total water use and estimated indoor use. Irrigation, hydrant, and recycled water are considered entirely as outdoor water use.
2. Total water use includes potable and recycled water use, excluding non-revenue water.
3. Date ranges presented are dependent on the data available for each agency.

Sources

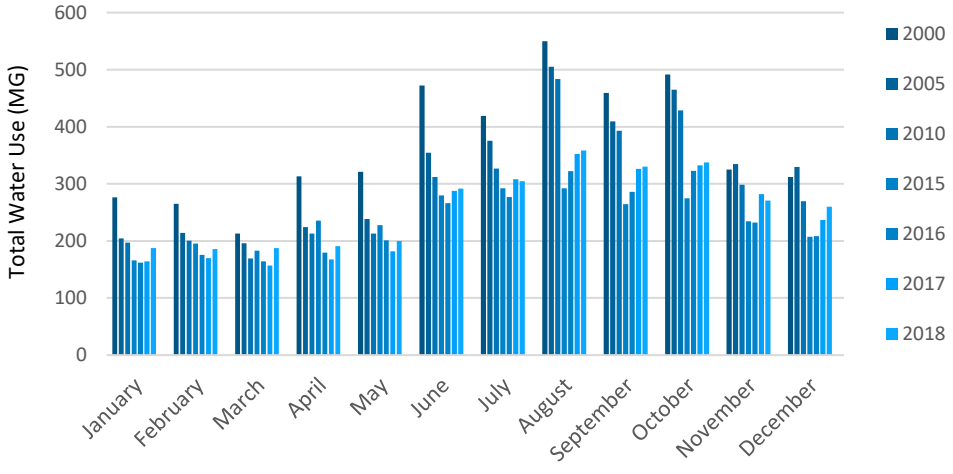
1. 2013 baseline water production from State Water Resources Control Board Urban Water Supplier Monthly Reports.
2. Water production, consumption, and population data reported by the retail agencies and provided by Valley Water.

City of Morgan Hill
Water Use Profile

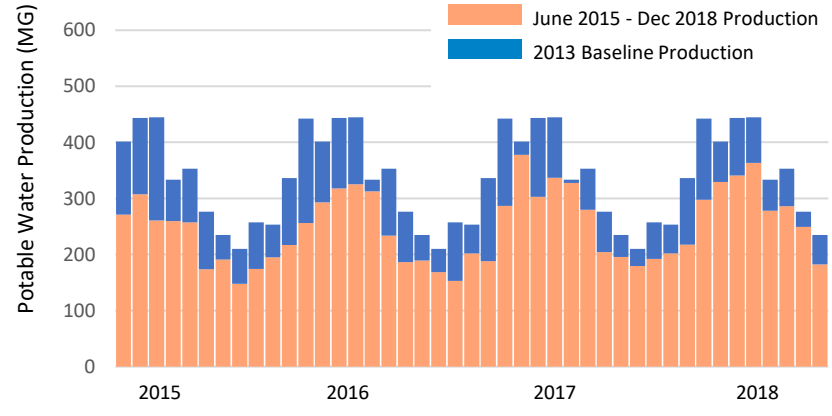
Valley Water
San Jose, CA
July 2021
EKI C00054.00
Figure 2-12

City of Mountain View

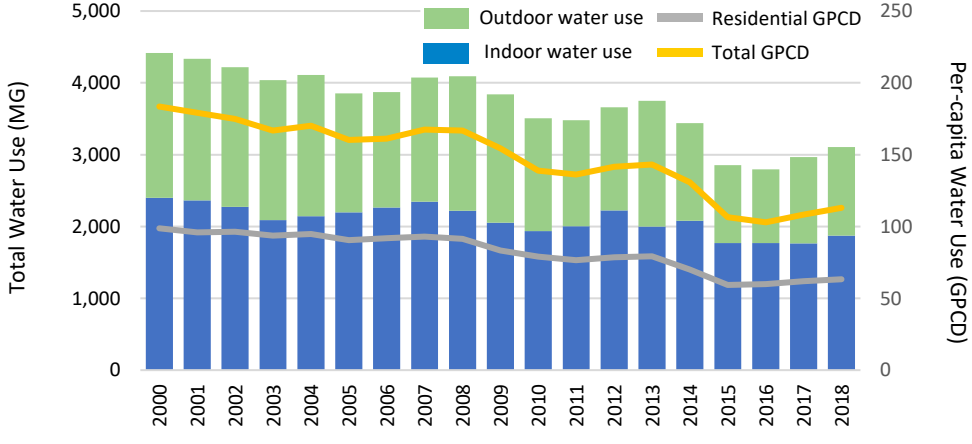
Total Monthly Water Use



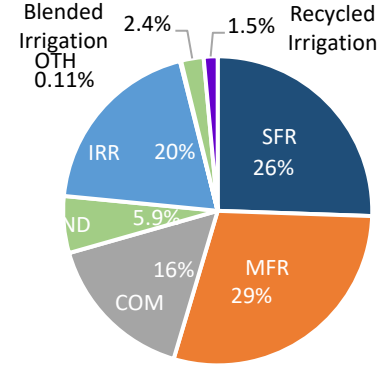
Drought Period Potable Water Production



Estimated Indoor and Outdoor Water Use



Water Use By Sector



Abbreviations

COM = Commercial
GPCD = Gallons per capita per day
IND = Industry
IRR = Dedicated irrigation
MG = Million gallons
MFR = Multi-family residence
OTH = Other
SFR = Single-family residence

Notes

1. Annual indoor water use is estimated to be equal to the lowest monthly water usage observed, projected over the year. Outdoor water use is estimated to be the difference between total water use and estimated indoor use. Irrigation and recycled water are considered entirely as outdoor water use.
2. Total water use includes potable and recycled water use, excluding non-revenue water.
3. Date ranges presented are dependent on the data available for each agency.

Sources

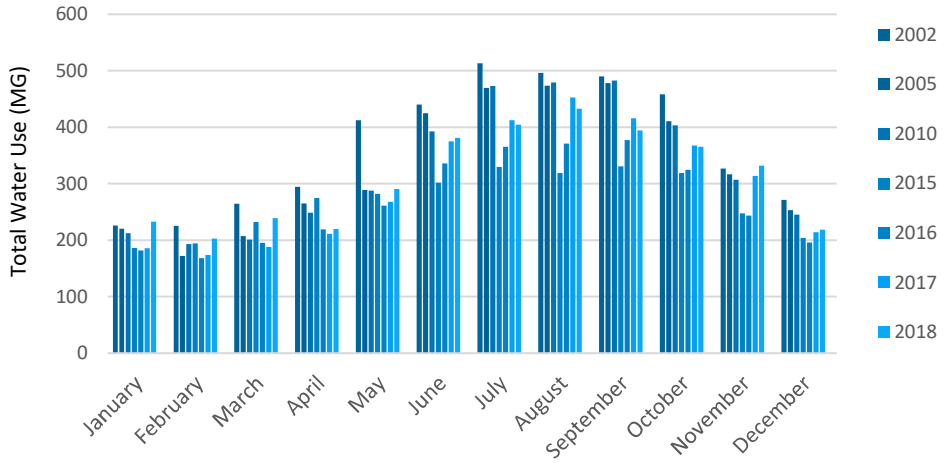
1. 2013 baseline water production from State Water Resources Control Board Urban Water Supplier Monthly Reports.
2. Water production, consumption, and population data reported by the retail agencies and provided by Valley Water.

City of Mountain View
Water Use Profile

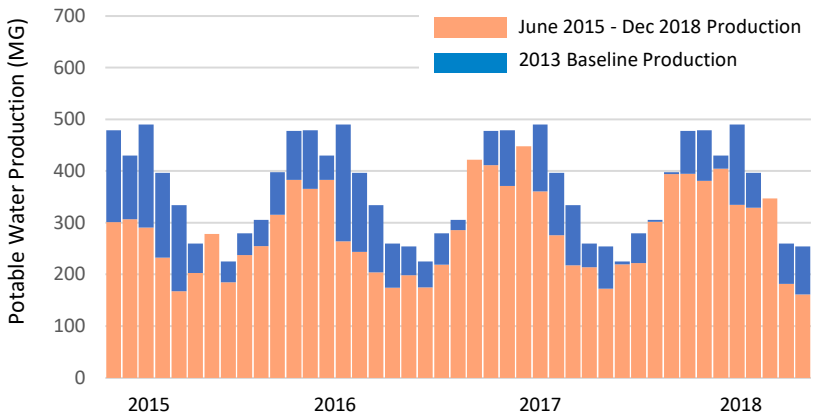
Valley Water
San Jose, CA
July 2021
EKI C00054.00
Figure 2-13

CITY OF PALO ALTO

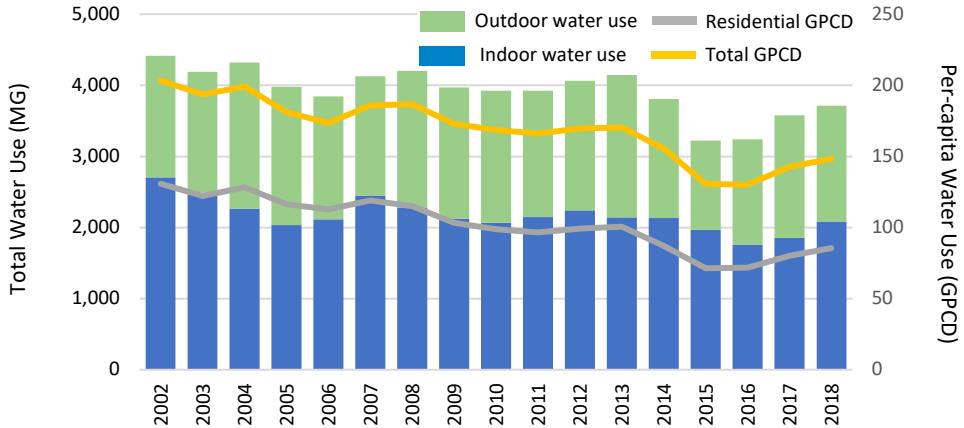
Total Monthly Water Use



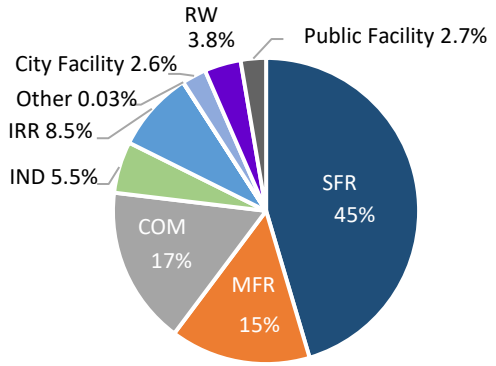
Drought Period Potable Water Production



Estimated Indoor and Outdoor Water Use



Water Use By Sector



Abbreviations

COM = Commercial
GPCD = Gallons per capita per day
IND = Industry
IRR = Irrigation
MFR = Multi-family residence
MG = Million gallons
OTH = Other
RW = Recycled water
SFR = Single-family residence

Notes

1. Annual indoor water use is estimated to be equal to the lowest monthly water usage observed, projected over the year. Outdoor water use is estimated to be the difference between total water use and estimated indoor use. Irrigation and recycled water are considered entirely as outdoor water use.
2. Total water use includes potable and recycled water use, excluding non-revenue water.
3. Date ranges presented are dependent on the data available for each agency.

Sources

1. 2013 baseline water production from State Water Resources Control Board Urban Water Supplier Monthly Reports.
2. Water production, consumption, and population data reported by the retail agencies and provided by Valley Water.

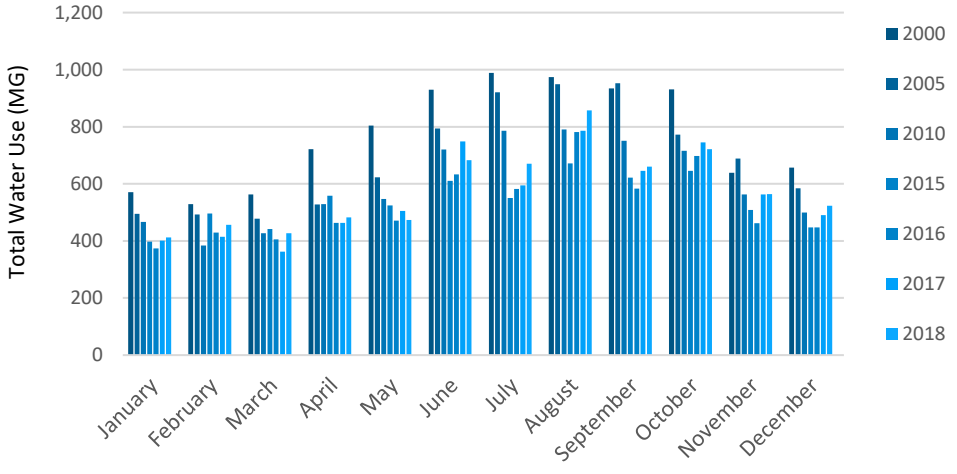
City of Palo Alto
Water Use Profile

eki environment & water

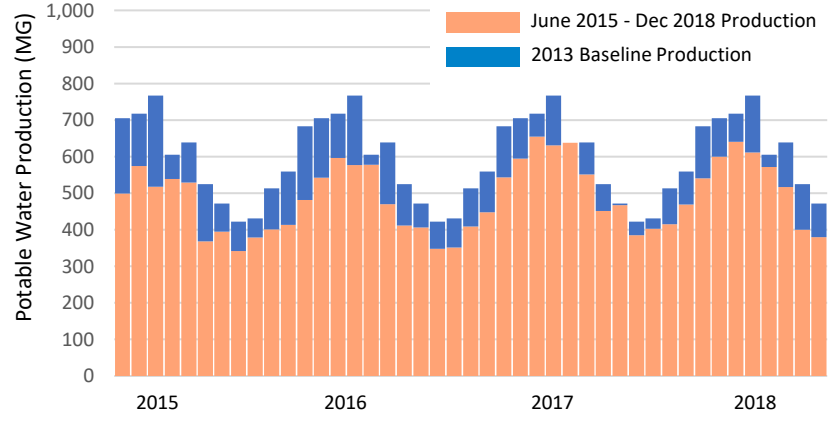
Valley Water
San Jose, CA
July 2021
EKI C00054.00
Figure 2-14

CITY OF SANTA CLARA

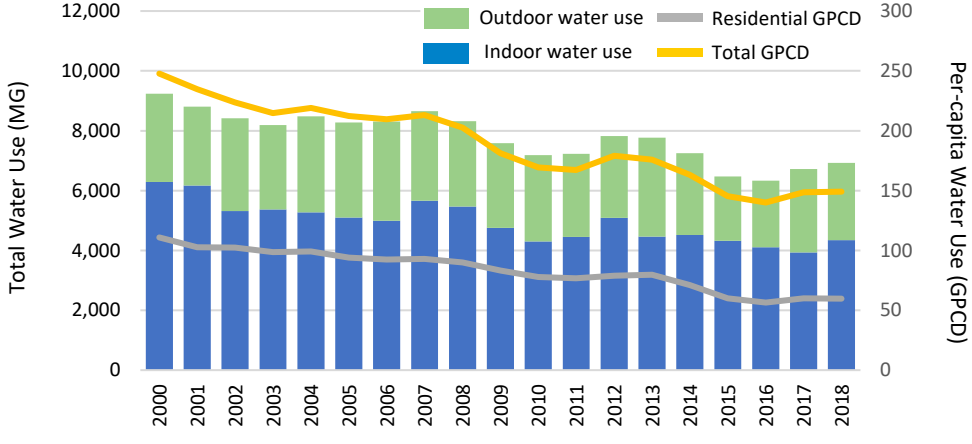
Total Monthly Water Use



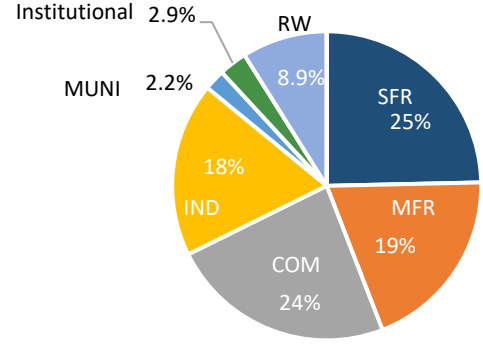
Drought Period Potable Water Production



Estimated Indoor and Outdoor Water Use



Water Use By Sector



Abbreviations

COM = Commercial
GPCD = Gallons per capita per day
IND = Industry
MFR = Multi-family residence
MG = Million gallons
MUNI = Municipal
RW = Recycled water
SFR = Single-family residence

Notes

1. Annual indoor water use is estimated to be equal to the lowest monthly water usage observed, projected over the year. Outdoor water use is estimated to be the difference between total water use and estimated indoor use. Irrigation and recycled water are considered entirely as outdoor water use.
2. Total water use includes potable and recycled water use, excluding non-revenue water.
3. Date ranges presented are dependent on the data available for each agency.

Sources

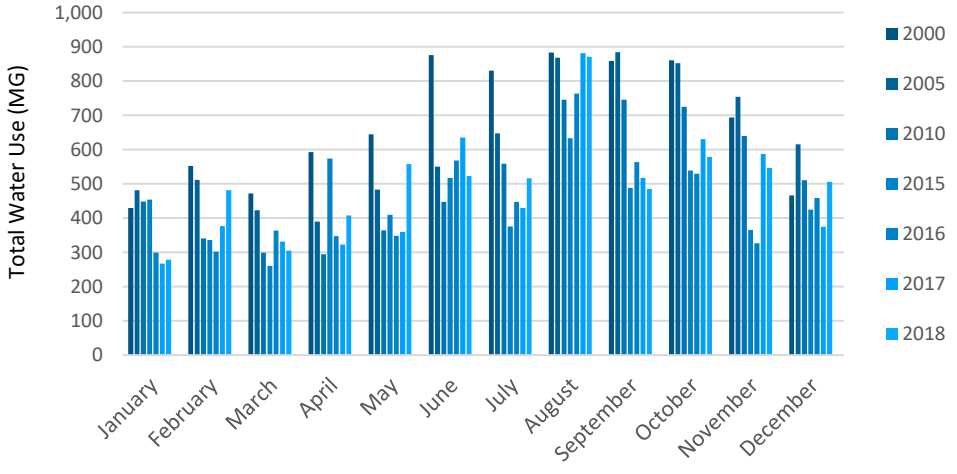
1. 2013 baseline water production from State Water Resources Control Board Urban Water Supplier Monthly Reports.
2. Water production, consumption, and population data reported by the retail agencies and provided by Valley Water.

City of Santa Clara
Water Use Profile

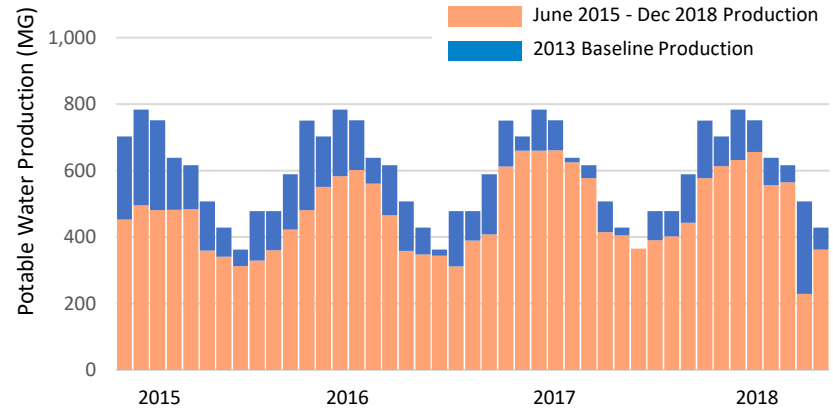
Valley Water
San Jose, CA
July 2021
EKI C00054.00
Figure 2-15

CITY OF SUNNYVALE

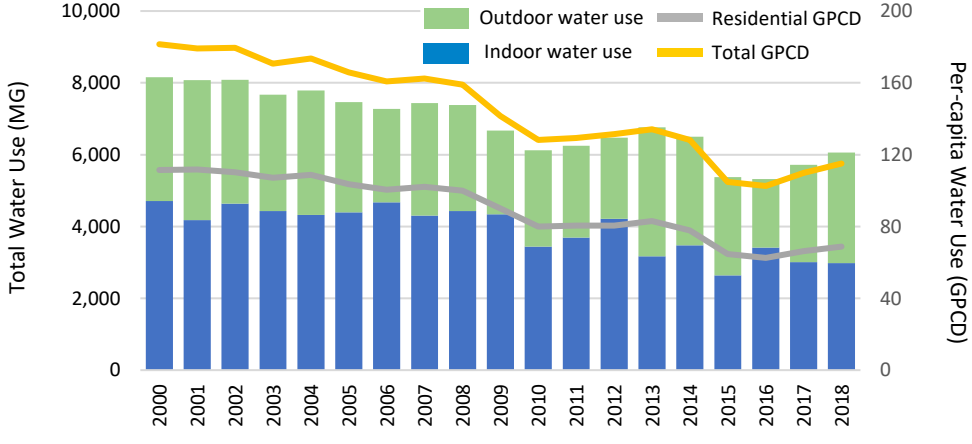
Total Monthly Water Use



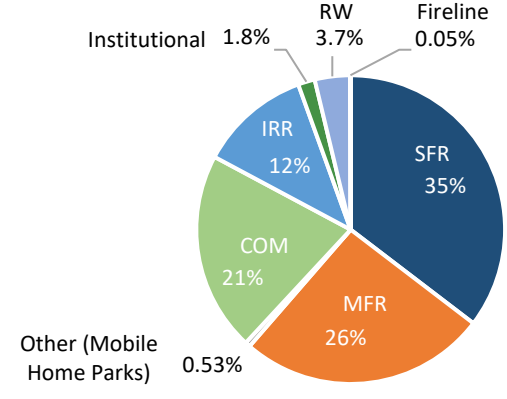
Drought Period Potable Water Production



Estimated Indoor and Outdoor Water Use



Water Use By Sector



Abbreviations

COM = Commercial
GOV = Government
GPCD = Gallons per capita per day
IRR = Dedicated irrigation
MFR = Multi-family residence
MG = Million gallons
OTH = Other
SFR = Single-family residence

Notes

1. Annual indoor water use is estimated to be equal to the lowest monthly water usage observed, projected over the year. Outdoor water use is estimated to be the difference between total water use and estimated indoor use. Irrigation and recycled water are considered entirely as outdoor water use.
2. Total water use includes potable and recycled water use, excluding non-revenue water.
3. Date ranges presented are dependent on the data available for each agency.

Sources

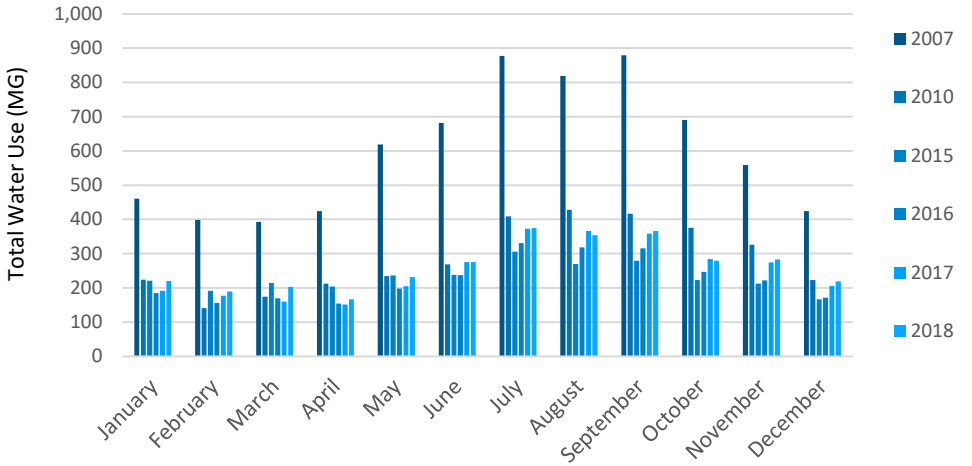
1. 2013 baseline water production from State Water Resources Control Board Urban Water Supplier Monthly Reports.
2. Water production, consumption, and population data reported by the retail agencies and provided by Valley Water.

City of Sunnyvale
Water Use Profile

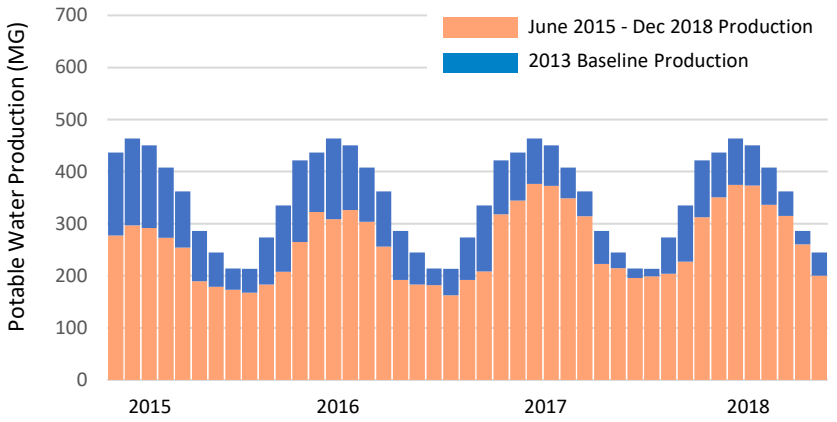
Valley Water
San Jose, CA
July 2021
EKI C00054.00
Figure 2-16

GREAT OAKS WATER COMPANY

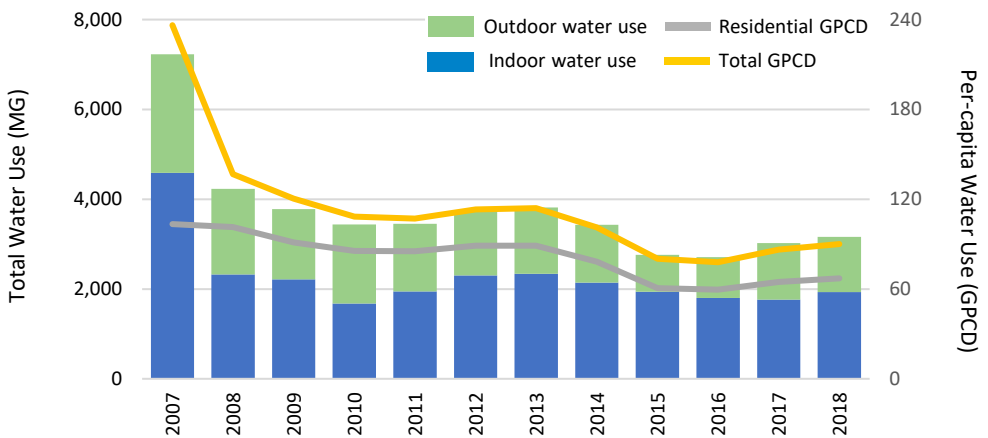
Total Monthly Water Use



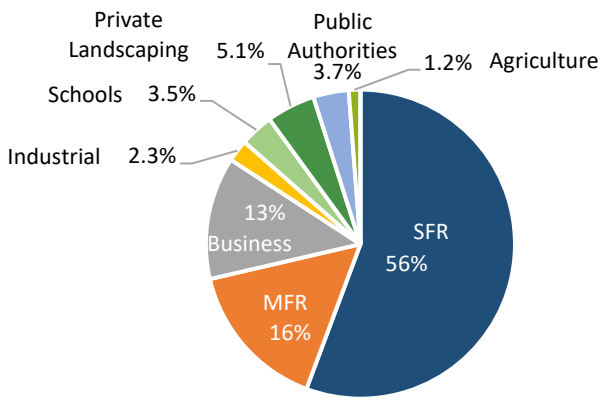
Drought Period Potable Water Production



Estimated Indoor and Outdoor Water Use



Water Use By Sector



Abbreviations

GPCD = Gallons per capita per day
MFR = Multi-family residence
MG = Million gallons
SFR = Single-family residence

Notes

1. Annual indoor water use is estimated to be equal to the lowest monthly water usage observed, projected over the year. Outdoor water use is estimated to be the difference between total water use and estimated indoor use. Irrigation and recycled water are considered entirely as outdoor water use.
2. Total water use includes potable and recycled water use, excluding non-revenue water.
3. Date ranges presented are dependent on the data available for each agency.

Sources

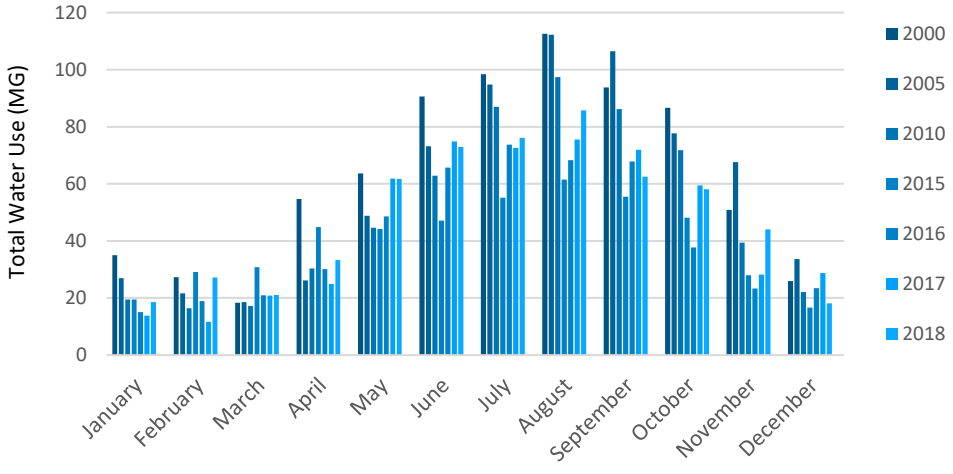
1. 2013 baseline water production from State Water Resources Control Board Urban Water Supplier Monthly Reports.
2. Water production, consumption, and population data reported by the retail agencies and provided by Valley Water.

Great Oaks Water Company
Water Use Profile

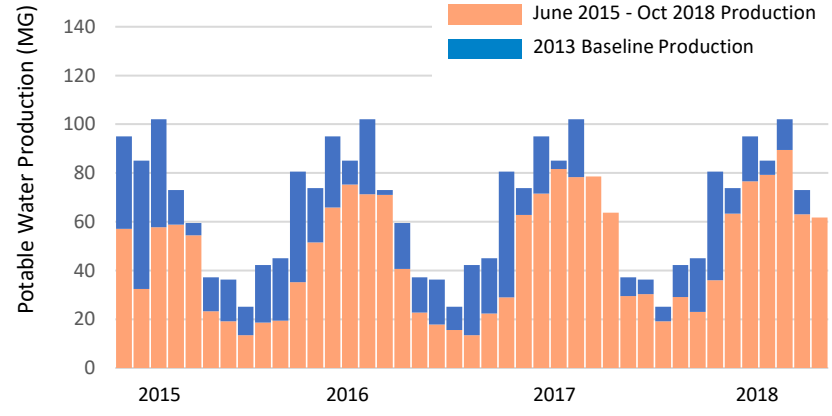
Valley Water
San Jose, CA
July 2021
EKI C00054.00
Figure 2-17

Purissima Hills Water District

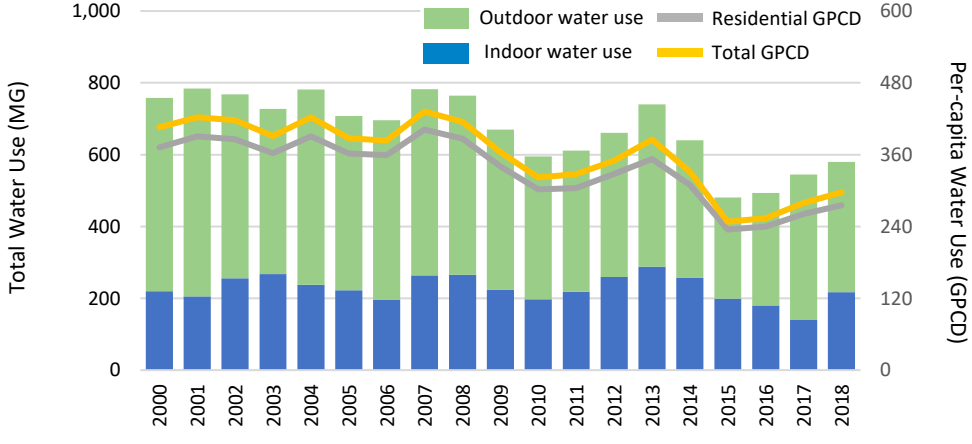
Total Monthly Water Use



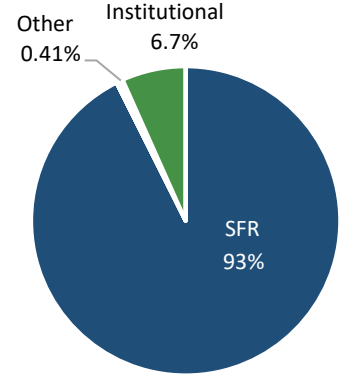
Drought Period Potable Water Production



Estimated Indoor and Outdoor Water Use



Water Use By Sector



Abbreviations

GPCD = Gallons per capita per day
MG = Million gallons
SFR = Single-family residence

Notes

1. Annual indoor water use is estimated to be equal to the lowest monthly water usage observed, projected over the year. Outdoor water use is estimated to be the difference between total water use and estimated indoor use. Irrigation and recycled water are considered entirely as outdoor water use.
2. Total water use includes potable and recycled water use, excluding non-revenue water.
3. Date ranges presented are dependent on the data available for each agency.

Sources

1. Water production, consumption, and population data reported by the retail agencies and provided by Valley Water.

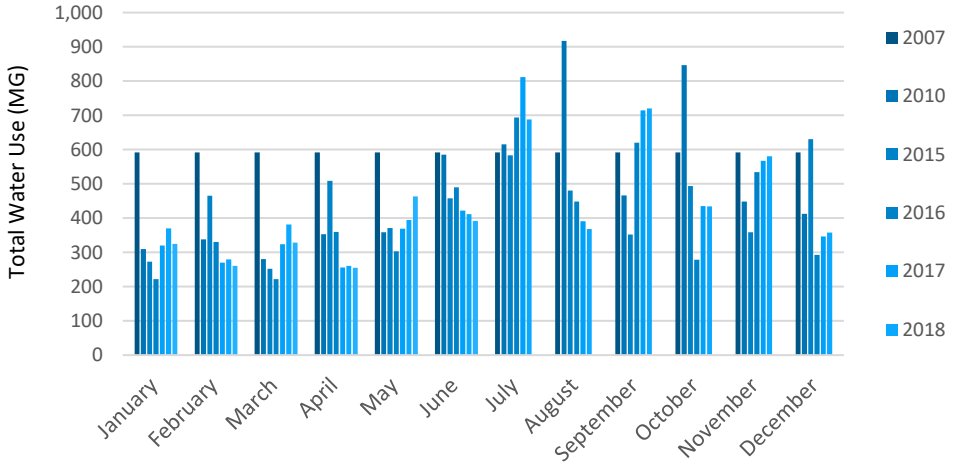
Purissima Hills Water District
Water Use Profile

Valley Water
San Jose, CA
July 2021
EKI C00054.00
Figure 2-18

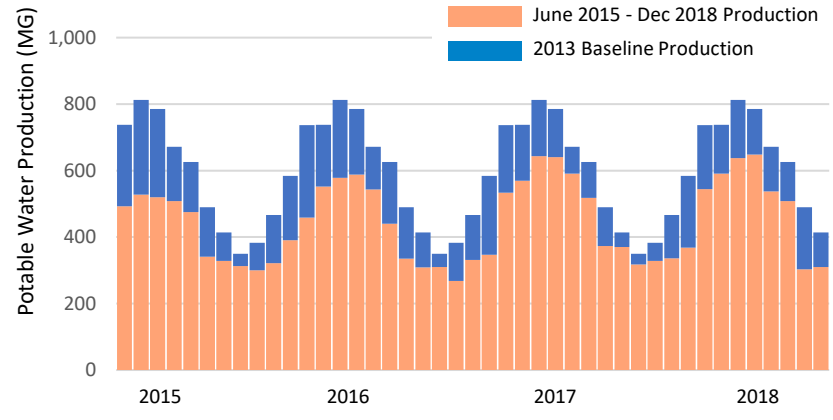
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San José Municipal Water System

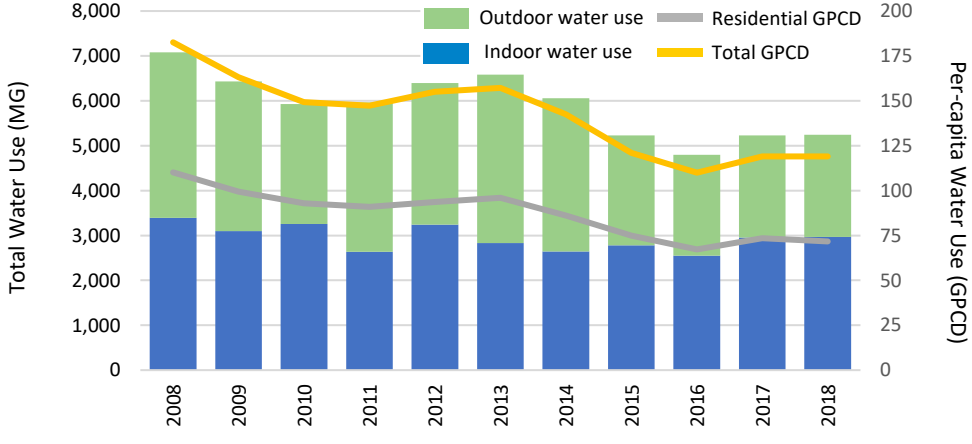
Total Monthly Water Use



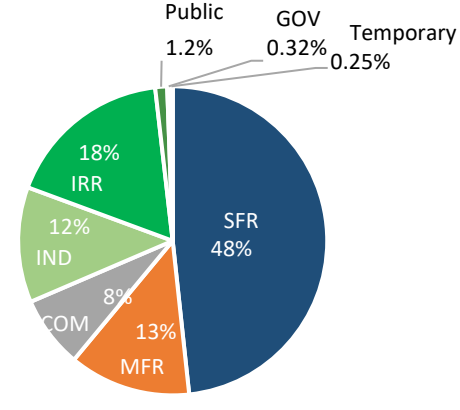
Drought Period Potable Water Production



Estimated Indoor and Outdoor Water Use



Water Use By Sector



Abbreviations

COM = Commercial
GOV = Government
GPCD = Gallons per capita per day
IND = Industry
IRR = Dedicated irrigation
MFR = Multi-family residence
MG = Million gallons
SFR = Single-family residence

Notes

1. Annual indoor water use is estimated to be equal to the lowest monthly water usage observed, projected over the year. Outdoor water use is estimated to be the difference between total water use and estimated indoor use. Irrigation and recycled water are considered entirely as outdoor water use.
2. Total water use includes potable and recycled water use, excluding non-revenue water.
3. Date ranges presented are dependent on the data available for each agency.

Sources

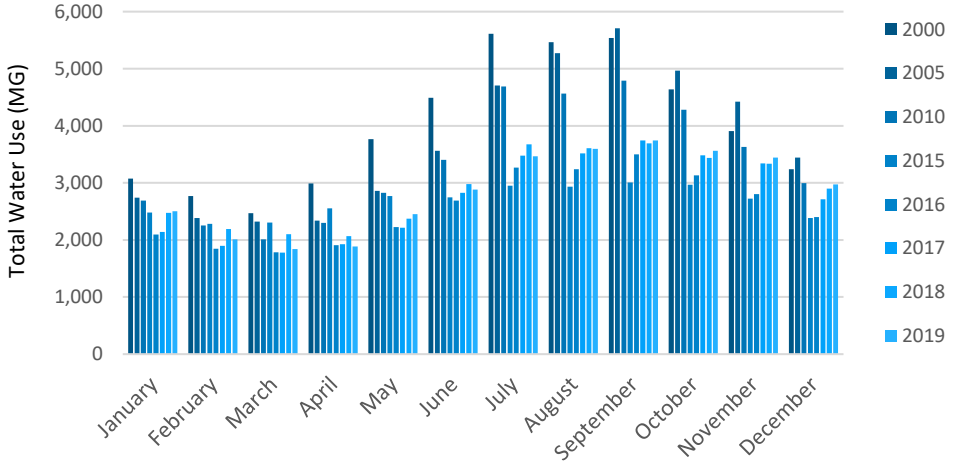
1. 2013 baseline water production from State Water Resources Control Board Urban Water Supplier Monthly Reports.
2. Water production, consumption, and population data reported by the retail agencies and provided by Valley Water.

San José Municipal Water System
Water Use Profile

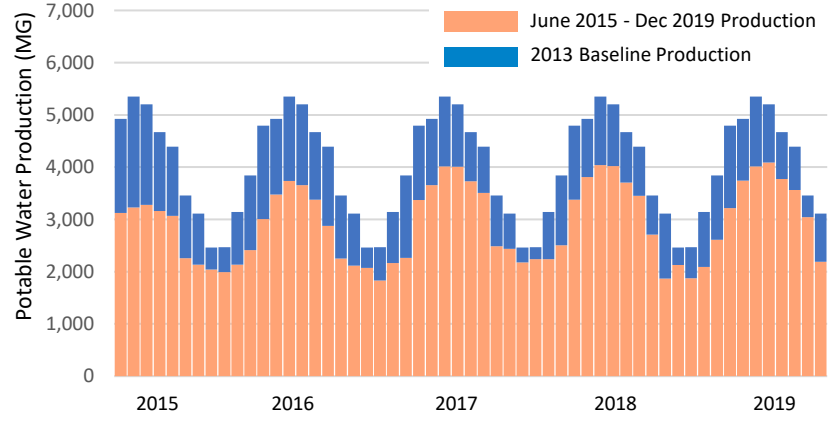
Valley Water
San Jose, CA
July 2021
EKI C00054.00
Figure 2-19

San Jose Water Company

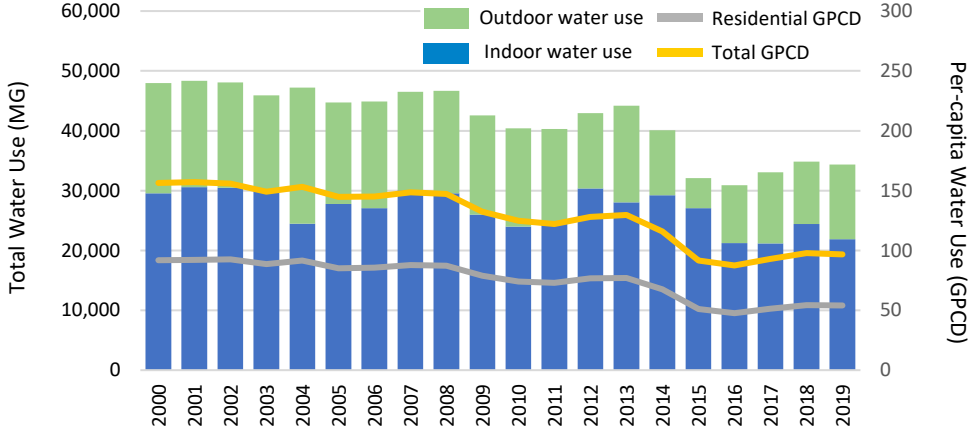
Total Monthly Water Use



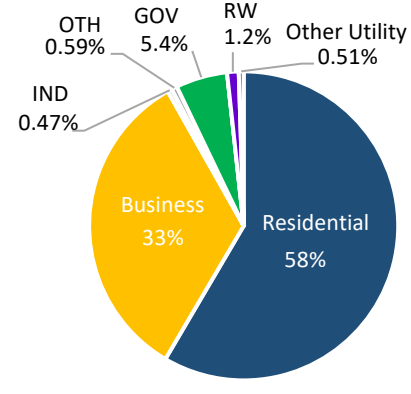
Drought Period Potable Water Production



Estimated Indoor and Outdoor Water Use



Water Use By Sector



Abbreviations

GOV = Government
GPCD = Gallons per capita per day
IND = Industry
MG = Million gallons
OTH = Other
RW = Recycled water

Notes

1. Annual indoor water use is estimated to be equal to the lowest monthly water usage observed, projected over the year. Outdoor water use is estimated to be the difference between total water use and estimated indoor use. Irrigation and recycled water are considered entirely as outdoor water use.
2. Total water use includes potable and recycled water use, excluding non-revenue water.
3. Date ranges presented are dependent on the data available for each agency.

Sources

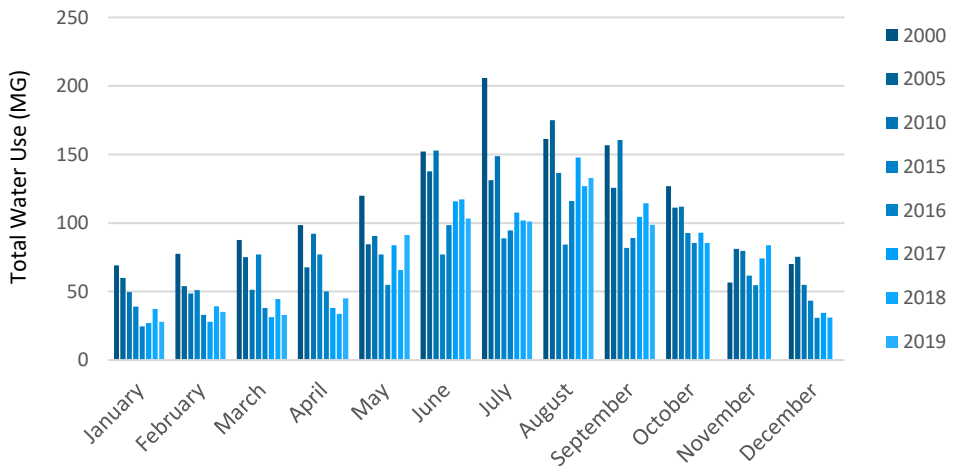
1. 2013 baseline water production from State Water Resources Control Board Urban Water Supplier Monthly Reports.
2. Water production, consumption, and population data reported by the retail agencies and provided by Valley Water.

San Jose Water Company
Water Use Profile

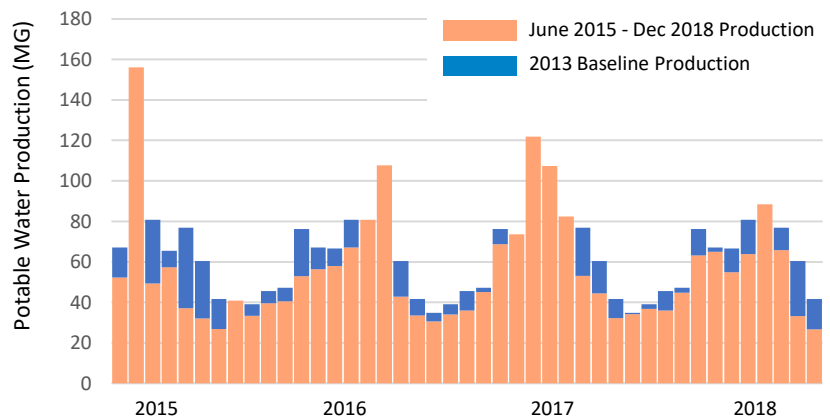
Valley Water
San Jose, CA
July 2021
EKI C00054.00
Figure 2-20

STANFORD UNIVERSITY

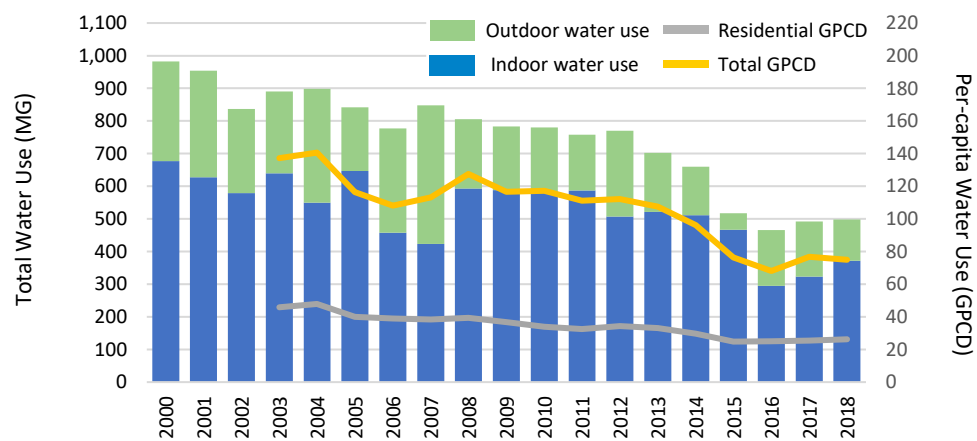
Total Monthly Water Use



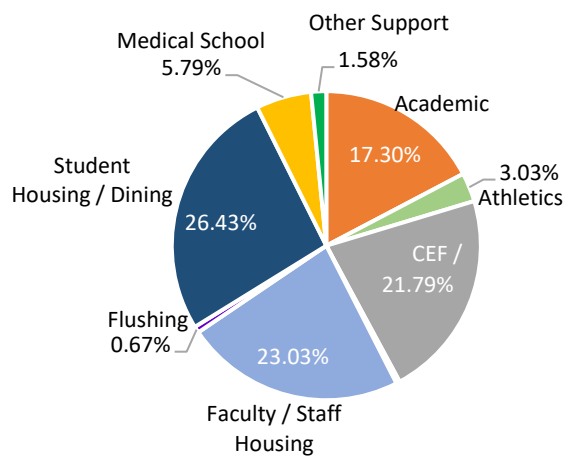
Drought Period Potable Water Production



Estimated Indoor and Outdoor Water Use



Water Use By Sector



Abbreviations

CEF = Central Energy Facility
Cogen = Cogeneration plant
GPCD = Gallons per capita per day
MG = Million gallons

Notes

1. Annual indoor water use is estimated to be equal to the lowest monthly water usage observed, projected over the year. Outdoor water use is estimated to be the difference between total water use and estimated indoor use. Irrigation and recycled water are considered entirely as outdoor water use.
2. Total water use includes potable and recycled water use, excluding non-revenue water.
3. Date ranges presented are dependent on the data available for each agency.
4. Increases in potable water production is from increased groundwater use during summer months.

Sources

1. 2013 baseline water production from State Water Resources Control Board Urban Water Supplier Monthly Reports.
2. Water production, consumption, and population data reported by the retail agencies and provided by Valley Water.

Stanford University
Water Use Profile

Valley Water
San Jose, CA
July 2021
EKI C00054.00
Figure 2-21

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2.3 Water Supply Sources

Sources of supply for the Valley Water include natural groundwater recharge, local surface water, imported surface water from the SWP and CVP, recycled and purified water, transfers, and exchanges. In addition, the SFPUC delivers water to eight retail agencies in the northern part of Santa Clara County; San Jose Water Company and Stanford have local surface water rights; and retail agencies deliver recycled water to customers throughout the County.

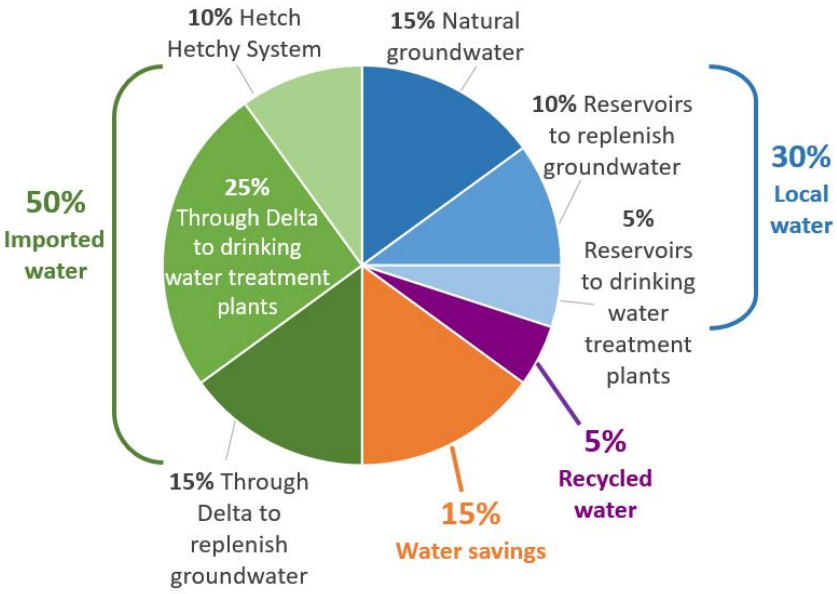


Figure 2-22 Santa Clara County Historical Water Use by Source

Approximately 50% of water in Santa Clara County is imported from outside the County, about 40% through SWP and CVP and provided to retailers by Valley Water (Valley Water, 2019b) and about 10% is delivered through SFPUC's Regional Water System. Of local supplies, about 15% is natural groundwater, 15% is local surface water, and 5% is recycled water (**Figure 2-22**). The recently updated Water Supply Master Plan 2040 (Valley Water, 2019b) projects baseline[13] water supply use by source in normal and dry-year conditions through 2040 for each of these supply sources.

Appendix A provides a description of each of Valley Water's supply sources and the key supply reliability issues relevant to each based on assessments provided in the Water Supply Master Plan 2040 (Valley Water, 2019b), Groundwater Management Plan (Valley Water, 2016), and the 2020 Urban Water Management Plan (Valley Water, 2021). Further below, Section 2.3 discusses supply reliability for Valley Water's system as a whole, and its ability to meet forecasted demands, which are identified in Section 2.2.

2.4 Supply Reliability Challenges Confronting Valley Water

Supply reliability for each of Valley Water's supply sources based on recent assessments are discussed in **Appendix A**. In addition, Valley Water is currently evaluating the ability of its existing water supplies to meet future County-wide demands through its Water Supply Master Plan 2040

[13] Baseline water supply consists of existing water supplies and infrastructure, including improvements to existing infrastructure to ensure continued efficacy, such as seismic retrofits of our reservoirs, pipeline rehab and improvement projects, and Rinconada Water Treatment Plant upgrades, as included in Valley Water's Capital Improvement Plan (Valley Water, 2019b).

and the associated Monitoring and Assessment Program. This assessment will take into account supply reliability issues, including those identified in **Appendix A**, and assess supply sufficiency for normal hydrologic periods and droughts lasting up to six years. The sections below discuss the key supply reliability issues that can affect Valley Water's system as a whole, and are being considered as part of Valley Water's Water Supply Master Plan's Monitoring and Assessment Program and other planning efforts, and which underscore the importance of both the long-term and short-term water conservation plans developed in this Strategic Plan.

2.4.1 Climate Change

The impacts of climate change are already being felt in the San Francisco Bay Area and northern California (Valley Water, 2019b). Average annual maximum temperatures have increased by 1.7°F since 1950, sea level has risen over eight inches in the last 100 years, and the 2012-2016 drought led to a 1-in-500 year low in Sierra snowpack and $2.1 billion in economic losses statewide (Valley Water, 2019b). These changes are projected to increase significantly in the coming decades, with the Bay Area likely seeing a significant temperature increase by mid-century (Valley Water, 2019b). Precipitation is anticipated to continue to exhibit high year-to-year variability, with very wet and very dry years. Average Sierra Nevada snowpack is projected to decline, up to 60% in mid-century under a high greenhouse gas emissions scenario (Valley Water, 2019b). Future increases in temperature will likely cause longer and deeper droughts. These impacts will affect the quantity and quality of available water supplies (Ackerly, et al., 2018).

Per the Water Supply Master Plan 2040, Valley Water's water supply vulnerabilities to climate change include:

- Decreases in the quantity of imported water supplies: More precipitation falling as rain and earlier snowmelt may exceed the storage and conveyance capabilities of the existing SWP and CVP reservoirs and conveyance system. Increases in temperature and evapotranspiration may also lead to a higher intensity of droughts, which can decrease imported water allocations. Rising air temperatures also increase the water temperatures, which can lead to increased evaporation rates and negative impacts to some native fish and wildlife, all of which can impact the availability of imported water supplies for Santa Clara County. Sea level rise may also have negative impacts on imported water supplies, largely because it will increase the amount of fresh water needed to flow through the Delta and into San Francisco Bay to prevent the saltwater from intruding into the Delta, making it unavailable for CVP and SWP use. Sea level rise will also put additional pressure on the fragile Delta levees, making them more susceptible to failure.
- Increases in seasonal irrigation demands: Higher temperatures may increase agricultural, residential, and commercial/institutional irrigation demands. It is estimated that about 40% of water use in the County is for irrigation.
- Increases in cooling water demands: The County has several energy plants, multiple data centers, and facilities with cooling towers. Higher temperatures may also increase demands by these users. At least some increases in cooling water demands may be offset

by technological improvements, which represents an area for potential water conservation opportunities.

- Decreases in the ability to utilize local surface water supplies: Shifts in the timing and intensity of rainfall and runoff could affect the ability to capture and use local surface water supplies. It is difficult to capture rainfall when it comes in a few intense storms because reservoirs are more likely to fill and spill or releases are needed to make room for the storm flows. When it is wet, there are typically lower demands for water, so the storm flows are difficult to put to immediate use. Thus, even if average annual rainfall stays the same, the ability to utilize local supplies may decrease.
- Decreases in water quality: Higher temperatures, wildfires, and changes in flow patterns could result in more algal blooms, increased turbidity, and increased salinity in imported and local surface water supplies. Sea level rise could also contribute to increased salinity in Delta conveyed supplies. At a minimum, changes in water quality will require additional monitoring. They may also require changes to treatment processes or result in the interruption of supplies.
- Increases in the severity and duration of droughts: Droughts are already Valley Water's greatest water supply challenge. Without additional supplies and demand management measures, Valley Water could need to call for more frequent and severe water use reductions. These actions can affect the economic and social well-being of the County.

2.4.2 Regulatory and Permit Requirements

Valley Water supplies have previously been affected by changes in regulatory requirements, and additional requirements are anticipated in the future.

2.4.2.1 Instream Recharge

According to the Water Supply Master Plan 2040, the greatest impact of regulations on local supplies has been on instream recharge operations. Historically, Valley Water constructed gravel dams to increase groundwater recharge within creeks and released water from reservoirs to maximize recharge. However, over the last 25 years, Valley Water has revised its instream recharge operations to comply with new regulatory requirements, including existing water rights orders, to better balance water supply operations with fishery and other environmental needs. Additional future changes are anticipated as Valley Water implements a Fish Habitat Restoration Plan based on the 2003 Settlement Agreement negotiated by entities participating in the Fish and Aquatic Habitat Collaborative Effort (FAHCE) (Valley Water, 2019b). These changes are anticipated to be included in future water rights orders for water operations in Coyote Creek, Guadalupe River and Stevens Creek watershed areas. These past and anticipated future changes limit Valley Water's ability to use creeks for conveying and recharging water, which in turn could reduce the flexibility of Valley Water to manage the local groundwater basins (Valley Water, 2019b). Groundwater recharge is a key component of Valley Water's conjunctive use program.

2.4.2.2 Regulations for Imported Surface Water Supply

Imported water supplies have also been affected by regulations related to environmental protection. Valley Water holds contracts with the DWR and U.S. Bureau of Reclamation (USBR)

for up to 252,500 AFY of supplies from the SWP and CVP, with actual deliveries subject to availability of water supplies and the satisfaction of regulatory constraints to protect fish, wildlife, and water quality in the Sacramento-San Joaquin Watershed and Delta (Valley Water, 2019b). These Delta-conveyed imported water deliveries from the SWP and CVP have been negatively impacted by significant restrictions on Delta pumping required by permits issued by the U.S. Fish and Wildlife Service, National Marine Fisheries Service, and California Department of Fish and Wildlife under the federal and California Endangered Species Acts and by water rights permits issued by the State Water Resources Control Board (SWRCB) under the Clean Water Act. Based on modeling projections provided by DWR, future average imported water deliveries could decrease with additional regulatory restrictions and impacts from climate change (Valley Water, 2019b).

The SWRCB approved amendments to the Water Quality Control Plan for the San Francisco/Sacramento-San Joaquin Delta Estuary (Bay-Delta Plan) in December 2018 that may result in reduced water supply availability for water users within the San Joaquin Basin (Basin), potentially reducing SFPUC supplies. Similar amendments could be adopted for water users in the Sacramento River watershed, potentially impacting SWP and CVP supplies. These amendments are discussed in **Appendix A**. SWRCB staff are working with Basin stakeholders to develop voluntary agreements that will achieve an equivalent level of environmental protection while reducing impacts on water supplies. If these voluntary agreements are not approved by the SWRCB as the implementation plan for the Bay-Delta Plan amendments, SFPUC, SWP, and CVP supplies may be reduced. The ultimate results of these negotiations and consequent impacts on future supply availability are unclear. Given these significant uncertainties, these potential impacts to supply reliability cannot be quantified at this point.

2.4.2.3 Local Regulations and Policies

According to the Water Supply Master Plan 2040, the greatest risk to natural groundwater recharge is a reduction in pervious surfaces due to an expanded urban footprint. Activities that keep water onsite and protect open spaces on the valley floor will help maintain natural groundwater recharge. Such activities are also advanced by the Municipal Regional Stormwater Permit New Development and Redevelopment Provision (C.3) as well as the Phase 2 Stormwater Permit provisions in South County which impose requirements to address stormwater runoff from new development and redevelopment projects through use of low impact development (LID) techniques. In addition, Valley Water actively participated in the development of a Stormwater Resource Plan for the Santa Clara Basin and developed a Stormwater Resource Plan for South County. These plans prioritize public parcels where green stormwater infrastructure could be implemented and makes projects included in the plan eligible for state funding. Prioritization criteria included benefits to water supply through groundwater recharge.

The quantity of SFPUC supplies used in the County could be reduced in the future. Of the retailers that receive SFPUC supplies, San José and Santa Clara are most at risk of experiencing reductions in SFPUC supply deliveries because these cities have interruptible contracts with SFPUC. The SFPUC, the cities, and Valley Water are looking at options to make San José and Santa Clara permanent SFPUC customers (Valley Water, 2019b). Valley Water continues to monitor SFPUC

supply risks that can change the water supply outlook and is working to influence key external decisions that have the potential to impact water supply reliability.

2.5 Water Conservation and Supply Reliability Objectives

The Water Supply Master Plan 2040 outlines a water supply strategy to provide a reliable supply of water to meet needs through 2040, which incorporates the following elements:

1. Secure existing supplies and infrastructure,
2. Increase water conservation and water reuse, and
3. Optimize the use of existing supplies and infrastructure.

Demand management (conservation), stormwater capture, and water reuse are critical elements of the Water Supply Master Plan 2040 water supply strategy (Element 2). These tools are beneficial under current climate conditions as well as with projected late-century climate change. Water reuse provides local supplies that are not directly hydrologically dependent, so they are resilient to extended droughts when Valley Water most needs additional supplies. They make efficient use of existing supplies, so they are considered sustainable. In addition, these activities are broadly supported by stakeholders.

The Water Supply Master Plan 2040 expanded the specific water conservation target of about 99,000 AFY of savings by 2030 to about 109,000 AFY of savings by 2040, which are the primary goals and drivers of this Strategic Plan. Conservation policies and targets that influence Valley Water's conservation program are discussed further in Section 3.

3 Water Conservation Policies and Targets

Valley Water's enabling legislation (the "Santa Clara Valley Water District Act" or "District Act") sets the powers and purposes of the District. Among its many powers and purposes, the District is enabled to "protect, save, store, recycle, distribute, transfer, exchange, manage, and conserve in any manner any of the waters" and to "conserve within or outside the district, water for any purpose useful to the district." The District Act further requires that Valley Water "do any and every lawful act necessary to be done that sufficient water may be available for any present or future beneficial use or uses of the land or inhabitants within the district" (Valley Water, 2019b). Valley Water Board policy also sets as a goal to "meet 100 percent of annual water demand during non-drought years and at least 80 percent of demand in drought years."

To achieve these goals, the Board of Directors commits to maximizing water use efficiency, water conservation, and demand management opportunities (Water Supply Objective 2.1.5). Relative to a 1992 water use efficiency baseline, Valley Water's long-term conservation targets of about 99,000 acre-feet per year (AFY) of savings by 2030 and about 109,000 AFY of savings by 2040 is the benchmark needed for meeting future water demand, to avoid water supply reliability issues, and to avoid severe short-term water reductions in periods of drought.[14] The conservation targets are complementary to other targets described in Valley Water's Water Supply Master Plan 2040.

Besides meeting long-term water reliability goals, water conservation programs help meet short-term demands placed on supply during critical dry periods. The Valley Water Board of Directors continues to call for water use reductions of 20% compared to 2013 water use (Valley Water, 2017d). The Board acknowledged that, although not in drought conditions currently, water conservation is a way of life for arid regions at risk for drought. Valley Water's Water Shortage Contingency Plan (WSCP) describes actions to manage water shortages (Valley Water, 2021).

In response to the 2012-2016 historic drought in California, Governor Brown issued an executive order titled "Making Water Conservation A California Way of Life". In 2018, Senate Bill (SB) 606 and Assembly Bill (AB) 1668 passed and state-wide implementation will follow in the next decade. The implications of this legislation for Valley Water are discussed in this section.

3.1 Conservation Policies and Interpretations of Policies

Valley Water has been and continues to be a leader in water conservation with innovative, effective, and comprehensive programs. This is consistent with Board Ends Policy E-2.4, which identifies as a water supply service end to "increase regional self-reliance through water conservation and reuse," including "maximize utilization of all demand management tools" and "incentivize water use efficiency and water conservation." Under Valley Water's form of Policy Governance, these "Ends" policies describe the mission, outcomes or results to be achieved by Valley Water staff. The Board Appointed Officers' (BAO's) Interpretations are the reasonable

[14] The long-term conservation targets include an additional 1,000 AFY of savings, for a total of 110,000 AFY of savings by 2040, which is expected to be met through stormwater management programs, rather than water conservation programs. Water savings are estimated from 1992 onward, with 1992 as the first-year savings are accrued.

interpretations regarding accomplishing the Board's Ends without exceeding set boundaries established in the Executive Limitations.

The BAO Interpretation of this policy statement requires that Valley Water implement the following strategies:

- Develop and implement water conservation outreach and communication plans;
- Develop partnerships with retail water agencies and others to implement conservation projects, programs and activities that collectively achieve conservation targets established in the most recent Urban Water Management Plan (UWMP); and
- Work with land use planning agencies to implement ordinances and water use reduction measures consistent with applicable water shortage contingency plans (Valley Water, 2019a).

Successful implementation of Ends Policy 2.4, based on the BAO interpretations, includes the is measured by the following two outcomes:

- About 99,000 acre-feet of annual County-wide water conservation savings by 2030; and
- Award up to $1 million to test new conservation activities through 2023.

These targets are incorporated into Valley Water's projected demands, as identified in Section 2.2. Both passive and active water savings are counted towards meeting the targets. Passive savings come from plumbing codes, appliance water use standards, and other regulations, such as the Model Water Efficient Landscape Ordinance (MWELO), that improve water use efficiency over time. These passive savings from plumbing code and market changes would be realized over time regardless of Valley Water or retail agency conservation programs. Active savings come from water conservation programs, such as plumbing fixture rebates, turf replacement rebates, and home water use reports and surveys run by Valley Water or its retail agencies.

3.2 Implications of "Making Water Conservation a California Way of Life"

In 2018, the California State Legislature enacted two policy bills, SB 606 and AB 1668, to establish a new foundation for long-term improvements in water conservation and drought planning to adapt to climate change and the resulting longer and more intense droughts in California. These two bills amend existing law to provide expanded and new authorities and requirements to enable permanent changes and actions for those purposes. The primary goals of the legislation are to improve water use efficiency, eliminate water waste, strengthen local drought resilience, and improve agricultural water use efficiency and drought planning.

The legislation requires California Department of Water Resources (DWR) and SWRCB to establish standards for: (1) indoor residential use; (2) outdoor residential use; (3) outdoor commercial, industrial, and institutional (CII) use with dedicated irrigation meters; and (4) distribution system water losses. The legislation also requires DWR and the SWRCB to establish performance measures for CII water use and appropriate variances for unique uses that can have a material effect on water use of an urban retail water supplier.

Based on the schedule identified in the legislation, urban retail water suppliers will be required to (DWR and SWRCB, 2018):

- Incorporate water loss standards in their UWMP by July 1, 2021;[15]
- Begin submitting annual reports on urban water use objective and actual use by November 1, 2023; and
- By January 1, 2024, incorporate demand management measures in UWMP to achieve urban water use objective by January 1, 2027 and other water use efficiency standards to by implemented by 2027.

As a wholesaler, Valley Water is not required to calculate or comply with the urban water use objectives, but each of its retail agencies that meet the threshold as an "urban retail water supplier" will.[16] The methodologies for calculating the urban water use objectives are still under development, and thus the degree of savings the retail agencies will need to achieve cannot be known. It is anticipated, however, that each agency will be required to continue to reduce its water use in the future to meet these regulatory targets.

3.3 Current Water Shortage Management Policies

Valley Water is required to update its WSCP every five years, concurrent with the UWMP update process, but may elect to update its WSCP more frequently. Valley Water's 2020 WSCP describes actions that Valley Water may take should water shortages occur (**Table 3-1**). The WSCP was expanded into a standalone document as part of Valley Water's 2020 UWMP effort, and identifies stages of action and corresponding water shortage management measures that Valley Water can implement at various levels of drought or other water shortage condition. Valley Water's Stages of Action are shown in Table 8-5 of the WSCP.

The WSCP response actions were activated during the 2012 to 2016 drought,[17] when Valley Water called for up to 30% water use reduction. The response to the 2012 to 2016 drought illustrates how Valley Water, municipalities, County, and retailers coordinate to reduce water use during water shortages. On February 25, 2014, the Valley Water Board of Directors approved a resolution setting a Countywide water use reduction target equal to 20% of 2013 water use through December 31, 2014, and recommended that retail water agencies, local municipalities and the County of Santa Clara implement mandatory measures as needed to achieve the 20% water use reduction target. On March 24, 2015, the Valley Water Board of Directors called for 30% water use reductions, and recommended that retail water agencies, municipalities and the

[15] DWR and SWRCB has not completed developing guidance for calculating retailer water loss standards, and thus this requirement is not likely to be achieved by the regulatory deadline.

[16] Per CWC § 10608.12.(t) "Urban retail water supplier" means a water supplier, either publicly or privately owned, that directly provides potable municipal water to more than 3,000 end users or that supplies more than 3,000-acre-feet of potable water annually at retail for municipal purposes. Stanford University and Purissima Hills Water District therefore are not considered to be urban retail water suppliers.

[17] As discussed further in Section 7, 2011 was the beginning of the dry weather period in Santa Clara County, although the majority of California did not face dry conditions until 2012. It is noted that Valley Water's supplies did not begin to be constrained until 2014 and thus significant drought response actions were taken over the 2014 to 2017 timeframe.

County implement mandatory measures as needed to accomplish the target, including a two day per week outdoor irrigation schedule. Valley Water's drought response actions to help assist the retailers, cities, and the County achieve the water use reduction targets included (Valley Water, 2021):

- Increased rebates for water-efficient landscape conversions, irrigation hardware upgrades, graywater laundry to landscape systems, and certain commercial fixtures.
- Created a Water Waste Reporting and Inspection Program.
- Increased staffing to support a water conservation call center.
- Developed several multimedia water conservation outreach campaigns, including "Brown is the New Green" and "Fight the Drought, Inside and Out".
- Hosted dozens of panels, forums, and presentations.
- Encouraged participation in conservation programs through direct mail letters.
- Reduced the amount of treated water that it supplied to retailers.

Table 3-1 Water Shortage Contingency Plan Stages of Action

Stage	Stage Title	Requested Short-Term Water Use Reduction	Actions
Stage 1	Normal	None	Valley Water continues ongoing outreach strategies aimed toward achieving long-term water conservation targets. Messages in this stage focus on services and rebate programs Valley Water provides to facilitate water use efficiency for residents, agriculture, and business. While other stages are more urgent, successful outcomes in Stage 1 are vital to long-term water supply reliability.
Stage 2	Alert	0 - 10%	This stage is meant to warn water users that current water use is tapping groundwater reserves. Work begins to coordinate ordinances with the County, cities, and retailers to prepare for Stage 3. Additional communication tools are employed to augment Stage 1 efforts, promote immediate behavioral changes, and set the tone for the onset of shortages. Specific implementation plans are developed in preparation of a drought deepening such as identifying supplemental funding to augment budgeted efforts and initiation of discussions with local, state, and federal agencies to call on previously negotiated options, transfers, and exchanges.
Stage 3	Severe	10 - 20%	Shortage conditions are worsening, requiring close coordination with the County, cities, retailers, large landscapers and agricultural users to implement ordinances and water use restrictions. Significant behavioral change is requested of water users. The intensity of communication efforts increases with the severity of the shortage. Messages are modified to reflect more dire circumstances. Water supplies are augmented through the implementation of options, transfers, exchanges, and withdrawals from groundwater banks.
Stage 4	Critical	20 - 40%	This is generally the most severe stage in a multi-year drought. Stage 3 activities are expanded, and Valley Water will encourage the County, cities, and retailers to increase enforcement of their water shortage contingency plans, which could include fines for repeated violations; and all water users to significantly reduce water use.
Stage 5	Emergency	40 - 50%	Stage 5 is meant to address an immediate crisis such as a major infrastructure failure but may also be needed in exceptional multi-year drought. Water supply may only be available to meet health and safety needs. Valley Water will encourage all water users to significantly reduce water use, activates its Emergency Operations Center, coordinates closely with municipalities and retailers, and provides daily updates on conditions.

3.4 Retail Agency Survey

Valley Water provides a variety of services to support its retail agencies and population within its service area, including a variety of water conservation programs, services, and coordination efforts. While Valley Water has its own drivers for increasing water conservation (discussed in Sections 3.1 through 3.3), as a wholesale water agency, Valley Water does not have a direct

relationship with water users, nor does it have the same water use targets and reporting requirements for UWMP purposes and SB 606/AB 1668 compliance as its retail agencies do.

Given that a key focus of Valley Water's water conservation services is to meet the needs of its retail agencies, a comprehensive survey was distributed in August 2020 to all 13 retail agencies to better quantify and understand: (1) what water conservation programs agencies and customers are utilizing, (2) what drives the agencies' and customers' needs to increase water conservation, and (3) what additional programs may be beneficial to the agencies and customers. This section presents the survey responses from the 11 retail agencies that responded to the survey. This information is intended to help Valley Water understand and identify programs and services that would be most valuable and responsive to the various water conservation drivers within its service area. A detailed analysis of the survey responses is in **Appendix B**.

Based on the results of this survey, the retail agencies are very supportive of Valley Water's conservation programs and efforts and have a broad interest in continuing existing or similar programs, as well as being open to new and different programs. The survey also provided key insight on opportunities for Valley Water to enhance or expand its support to its retail agencies:

- The survey highlighted a gap in knowledge among some retail agencies about the full scope of the current conservation program offerings. For example, many retail agencies were not aware that several programs existed, specifically, Pre-Rinse Sprayers, Our City Forest's Lawn Busters Program, and Landscape Maintenance Consultation Program.[18]
- Retail agencies considered Our City Forest's Lawn Busters and AMI Meters to be highly effective, but few agencies are currently participating in these programs.
- Retail agencies expressed interest in programs for leak detection/repair and water use survey/audits, but also already have high participation in current conservation programs that target these goals, such as Large Landscape Program, Water Waste Inspector Program, Water Wise Indoor Survey Do-it-Yourself (DIY) Kit, and Water Wise Outdoor Survey. Valley Water has the opportunity to promote similar programs with lower participation, including Home Water Use Reports and Landscape Maintenance Consultation Program.
- Retail agencies would like to understand why customers sometimes begin a rebate application, but do not fully complete and submit it.
- Retail agencies are generally unsure of their ability to meet forthcoming annual water use objectives, and identified several programs that they feel will help them to achieve these future objectives, including AMI, Large Landscape Program , recycled water, grant funding for staff, staff to assist with examining measurements, and commercial audit program.
- Retail agencies see the greatest potential for water conservation in outdoor residential and CII water use. Customer and distribution system water loss control and recycled water use are also seen as having significant conservation savings potential.

[18] The Landscape Maintenance Consultation Program is only targeted to properties that have completed the Landscape Rebate Program and thus is more challenging to market to only eligible customers.

- Retail agencies would like support from Valley Water to keep staff informed and trained on the most current offerings. Additionally, retail agencies would like better outreach to the community to advertise conservation programs, but to inform the retail agency before doing so in order for the retail agency to be well-informed and to coordinate with other non-Valley Water programs that they offer.

4 Current Conservation Programs and Additional Water Savings Needed to Achieve Long-Term Conservation Targets

As discussed in Section 3, Valley Water has been providing water conservation programs to its retail agency's customers for decades and offers a wide variety of programs to reach all customer sectors. In addition to Valley Water's extensive conservation programming efforts, code and market changes have caused many retail agency's customers to install water-efficient fixtures and appliances. The conservation that results from these latter causes is termed 'passive' conservation. This section describes Valley Water's conservation efforts to date and the estimated water savings that have resulted from those efforts and from the passive conservation.

4.1 Past Conservation Program Implementation

Valley Water offers a wide variety of water conservation programs, many of which began in the 1990s and continue today. **Table 4-1** summarizes the total participation in Valley Water's conservation programs through 2019, as well as an estimate of the cumulative savings achieved to date through these programs, adjusted for free ridership.[19] Across these 43 programs, it is estimated that 301,000 acre-feet (AF) of water have been saved. Taking into account program lifetimes, it is estimated that program implementation has resulted in 20,000 AFY of savings in 2019 towards Valley Water's water conservation targets relative to a baseline year of 1992.[20]

4.2 Passive Savings

Water demands in Santa Clara County have not only been reduced as a result of Valley Water's own conservation programs, but also due to water savings that are associated with plumbing and building code- and market-driven forces. California urban water agencies, including Valley Water, spearheaded many of these code requirements and market transformations through early adoption of technologies and support for key legislation. Key regulations and changes are summarized in **Table 4-2** and described below.[21]

Since 1992, water use efficiency and energy codes have set efficiency standards for several types of water-using fixtures, such that when older fixtures were replaced, they were replaced with higher efficiency fixtures. These include toilets, showerheads, faucet aerators, and clothes washers, among others. Since 2010, the magnitude of the passive toilet savings increased due to the enactment of AB 715. AB 715 mandated a portion of toilet replacements will be with High Efficiency Toilets (HETs) rather than Ultra-Low-Flush Toilets (ULFTs), which have been mandated since 1992. By 2014, all toilet replacements require HETs.

[19] Free ridership refers to customers who participate in a conservation program, but who would have taken the water saving action (e.g., replace a toilet) regardless of whether the conservation program incentive was available. Therefore, the proportion of savings associated with participants assumed to be free riders is included in the passive savings estimates in Section 4.2, and not active program savings.

[20] Water savings are estimated from 1992 onward, with 1992 as the first-year savings are accrued.

[21] Nearly all water using devices have become more efficient over time. The selected technologies identified here generally reflect the most common devices and technologies that are considered at the Federal level to be some of the more promising water- and energy-efficient technologies.

Table 4-1
Historical Participation and Water Savings in Conservation Programs
Valley Water, Water Conservation Strategic Plan

Program Name	Participation Period	Cumulative Savings Through 2019 (AF)	Annual Savings in 2019 (AFY)
Single Family Residential			
Aerators	1996 - present	927	20
AMI Leak Alert	2016 - present	2	1
AMI Leak Alert & Home Water Report	--	0	0
Home Water Use Reports	2015 - present	19,438	1,562
Residential HE Toilets, SFR	2004 - 2016	5,187	592
Residential HE Washer, SFR	1996 - 2009	21,815	632
Residential LF Showerhead, SFR	1993 - present	8,945	349
Residential Low WF HEW	2010 - 2018	14,048	1,587
Residential Surveys, SFR	1999 - 2017	2,926	82
Residential ULF Toilets Rebates, SFR	1993 - 2003	53,342	1,832
Water Softener Upgrade Rebate	2004 - 2011	246	17
Water Wise Indoor DIY Kit	2017 - present	34	13
Water Wise Outdoor Survey	2017 - present	22	12
	Subtotal	***126,932***	***6,699***
Multi-Family Residential			
Residential HE Toilets, MFR	2005 - present	5,546	708
Residential LF Showerhead, MFR	1993 - present	4,315	153
Residential Surveys, MFR	1999 - 2017	779	10
Residential ULF Toilets Rebates, MFR	1993 - 2003	59,931	2,209
	Subtotal	***70,571***	***3,080***
Commercial, Industrial, Institutional			
CII 1/2 Gallon Urinal	2007 - 2018	333	41
CII Aerators 1/2 gallon per minute	2015 - present	68	13
CII Food Steamer	2015	2	0
CII HE Toilet	2005 - present	5,017	426
CII Laundromat	2000 - 2017	5,531	203
CII Spray Rinse Valve	2003 - present	1,942	30
CII Surveys	2001 - 2011	1,297	0
CII ULF Toilet	1994 - 2005	3,091	102
Dipper Well Rebates	--	0	0
Residential Meter Installation	2001 - present	4,139	410
WET	1997 - present	14,830	173
	Subtotal	***36,250***	***1,399***

Table 4-1
Historical Participation and Water Savings in Conservation Programs
Valley Water, Water Conservation Strategic Plan

Program Name	Participation Period	Cumulative Savings Through 2019 (AF)	Annual Savings in 2019 (AFY)
Irrigation			
Flow Sensor/Dedicated Irrigation Meter	2013 - present	451	124
Graywater Programs	2015 - present	3	1
High efficiency nozzles for pop ups	2012 - present	1,140	228
Large Land. Irrigation Controller	2004 - present	12,920	832
Large Landscape Program	1995 - present	7,553	133
Large Landscape Water Budgets	2014 - present	11,790	3,439
Rain Barrel Rebate (40-199 gal)	2019 - present	0	0
Rain Cistern Rebate (200+ gal)	2019 - present	0	0
Rain Sensors	2012 - present	378	123
Residential Irrigation Controller, SFR	2008 - present	831	232
Rotor Sprinklers or Spray Bodies with Pressure Regulation and/or Check Valves	2012 - present	1,195	237
Small commercial landscape surveys	2011 - 2012	162	0
Turf Replacement	2006 - present	6,409	1,399
	Subtotal	***42,831***	***6,747***
Other			
Agriculture	1998 - present	24,700	2,000
	Subtotal	***24,700***	***2,000***
	TOTAL	**301,284**	**19,926**

Abbreviations:

AF = acre-feet
AFY = acre-feet per year
AMI = advanced metering infrastructure
CII = commercial, industrial, institutional
DIY = do-it-yourself
HE = high efficiency
HEW = high efficiency washer
L2L = laundry to landscape
LF = low flow
MFR = multi-family residential
SFR = single-family residential
ULF = ultra-low flow
WET = water efficient technologies

Notes:

(a) Estimated savings through 2019 is calculated as the sum of annual savings from 1990 through 2019. Savings estimates presented herein represent the amount of estimated active savings associated with program implementation, excluding free-ridership and passive savings.

The savings associated with each toilet replacement are estimated to be 25% larger than the corresponding ULFT replacement. In addition, the current market for water using appliances, including clothes washers and dishwashers, includes devices with a wide range of water efficiency ratings. While there are no similar codes mandating the replacement of residential clothes washers, it is assumed that a proportion of replacements will in fact be more water (and energy) efficient due to market forces. Thus, when a conventional model of any of these fixtures reaches the end of its useful life or is replaced for another reason, the replacement will be more water efficient.

Further, even beyond the regulatory minimum water efficiency standards, there are a range of higher efficiency devices available on the market, such as toilets ranging from 0.5 gpf to 1.28 gpf. Higher efficiency devices (specifically, toilets, faucets, showerheads, urinals, irrigation controllers, and sprinklers) carry the WaterSense certification. High Efficiency energy-using devices such as clothes washers, dishwashers, and commercial equipment, also carry the EPA EnergyStar label, which typically indicates both high energy and water efficiency. These labels serve to encourage efficiency-minded customers to choose those devices over the bare minimum. Valley Water's education and outreach programs are key to bringing awareness of the availability and importance of these devices to customers, which encourages and accelerates the benefits of passive savings.

Table 4-2 Summary of Key Device Efficiency Market Changes and Newer Technologies

Regulation/ Market Change	Key Changes
Regulation	
1992 Federal Energy Policy Act (H.R. 776; Toilets, Showerheads, Faucets) *effective January 1, 1994*	• Requires maximum water use of new toilets sold in the U.S. be 1.6 gallons per flush (gpf). • Requires maximum flow rate of new showerheads sold in the U.S. be 2.5 gallons per minute (gpm). • Requires maximum flow rate of faucets and aerators sold in the U.S. be 2.5 gpm.
Model Water Efficient Landscape Ordinance (California Code of Regulations [CCR] Title 23, §490-495; Landscaping) *Initially effective 1993, key updates effective 2010 and 2015*	• Requires local agencies to adopt ordinances setting minimum water efficiency standards for new and rehabilitated landscapes. Landscape size and other thresholds and requirements were updated in 2010 and 2015.
California Energy Commission (CEC) Clothes Washer Standards *Effective 2007, updated 2010*	• Sets a minimum water efficiency standard for clothes washers sold in California. In 2007 the standard was set at 8.5 gallons per cubic foot of washload (a water factor of 8.5), and in 2010 the standard was tightened to a water factor of 6.0.

Table 4-2 Summary of Key Device Efficiency Market Changes and Newer Technologies

Regulation/ Market Change	Key Changes
California Green Building Standards Code (CalGreen) *Effective August 1,2009, updated every 3 years thereafter*	• Requires newly constructed and renovated buildings to comply with a 20% reduced indoor water use through either a prescriptive or a performance method. Current efficiency standards under the prescriptive method require the following minimum efficiency standards: ≤2.0 gpm at 80 pounds per square inch (psi) showerheads [to be reduced to ≤1.8 gpm at 80 in January 2020]; ≤1.2 gpm lavatory faucets at 60 psi; ≤1.8 gpm kitchen faucets at 60 psi; ≤1.28 gpf toilets; and ≤0.5 gpf urinals. This is an optional program.
Assembly Bill (AB) 715 (Toilets and Urinals) *effective 1 January 2014*	• Requires 100% of toilets and urinals sold or installed in California be high efficiency (maximum of 1.28 gallons per flush for toilets and 0.5 gallons per flush for urinals).
SB 407 (Toilets, Urinals, Showerheads and Interior Faucets) *compliance by January 1, 2017 for SFR properties, January 1, 2019 for MFR and CII properties*	• Requires all residential and commercial property constructed before January 1994 to replace "non-compliant" plumbing fixtures with fixtures that meet or exceed current plumbing standards. • Requires that a seller or transferor of property disclose in writing the requirements, and whether or not the property includes non-compliant plumbing. There is currently no enforcement of this requirement.
California Plumbing Code, Chapter 15 (Alternate Water Sources for Nonpotable Applications) *Enacted 1992 and updated 2009*	• In response to AB 3518 (Graywater Systems for Single Family Residences Act of 1992), California adopted Graywater Standards to the Plumbing Code, making it legal to use graywater systems. • Since 2009, California Plumbing Code does not require a permit or inspection for clothes washer gray water systems, so long as Plumbing Code 1502.1.1 requirements are followed.
California Plumbing Code, Chapter 16 (Nonpotable Rainwater Catchment System) *Enacted 2012*	• AB 1750 (Rainwater Capture Act of 2012) allows rainwater to be captured and used without needing to obtain a permit. • California adopted guidelines for Nonpotable Rainwater Catchment Systems in the Plumbing Code.
Selected New Water Efficiency Technology	
Weather-Based Irrigation Controllers (WBICs) / Smart Irrigation Controllers	• WBICs are a newer technology that are gaining popularity and availability in recent years as part of the "smart home" movement. WBICs allow for automatic and remote adjustment of watering schedules to adapt to real-time weather changes. First generation WBICs used historical evapotranspiration data and were not widely available for the residential market.
Irrigation Sprinkler Nozzles and Drip Irrigation	• New sprinkler nozzle designs and drip irrigation systems result in increased irrigation water efficiency over the traditional fixed-spray irrigation nozzles. Newer multi-stream rotational sprinklers, for example, are widely available on the market and can reduce water use by over 50% with increased coverage.[22]

[22] Energy.gov, 2021. Water-Efficient Technology Opportunity: Multi-Stream Rotational Sprinkler Heads, https://www.energy.gov/eere/femp/water-efficient-technology-opportunity-multi-stream-rotational-sprinkler-heads.

Table 4-2 Summary of Key Device Efficiency Market Changes and Newer Technologies

Regulation/ Market Change	Key Changes
Premium HETs	• Premium HETs (PHETs) with water usage as low as 0.8 gpf are broadly available on the market to consumers. Toilets available on the market today typically range from 0.8 to 1.1 gpf. PHETs have become readily available to the general public primarily over the last five years.
Clothes Washers	• Clothes washers of higher efficiency than that set by the CEC are available on the market. The EPA Energy Star Program certifies high efficiency clothes washers available on the market. Clothes washers currently on the market must have a water factor of 3.2 or less for front-loading washers and a water factor of 4.3 or less for top-loading washers, for washers with a capacity of greater than 2.5 cubic feet.[23] Current certified washers have water factors as low as 2.7.

The water savings resulting from replacement of fixtures and changes in plumbing codes makes an important contribution to Valley Water's overall water conservation savings. As shown in **Figure 4-1**, it is estimated that passive savings accounts for approximately 54,000 AFY of savings in 2020 towards Valley Water's water conservation targets relative to a baseline year of 1992. The advent of new water-saving technology, and Valley Water's important role of educating the public about the availability of these technologies are also reflected in the future conservation programming being recommended by this Strategic Plan.

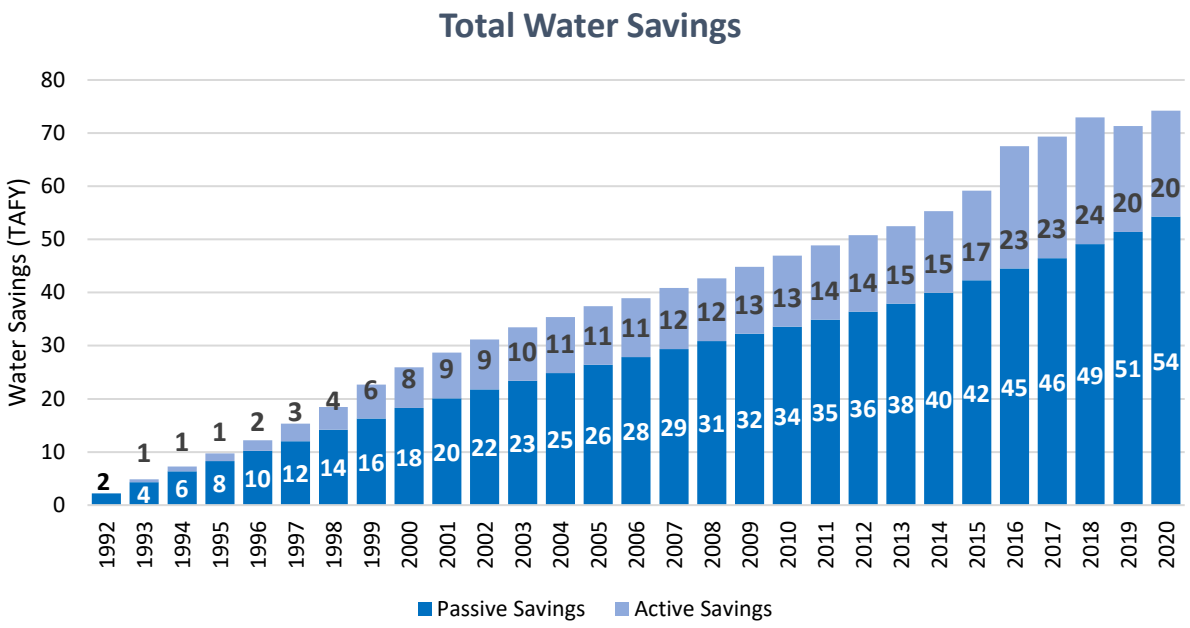


Figure 4-1 Historical Passive and Active Water Savings Relative to 1992 Baseline in Thousand Acre-Feet per Year (TAFY)

[23] Energystar.gov, 2021. ENERGY STAR Program Requirements Product Specification for Clothes Washers, https://www.energystar.gov/sites/default/files/ENERGY%20STAR%20Final%20Version%208.0%20Clothes%20Washer%20Partner%20Commitments%20and%20Eligibility%20Criteria.pdf.

4.3 Estimated Water Savings to Date

Through 2020, Valley Water has achieved 74,000 AFY of water savings relative to a 1992 baseline. The model estimates the need for an additional 25,000 AFY of water savings to be achieved by 2030 to meet its conservation target of about 99,000 AFY, and 35,000 AFY of savings to meet its conservation target of about 109,000 AFY in 2040. **Figure 4-1** shows the total passive and active savings achieved through 2020, based on Valley Water's Water Conservation Tracking Model (Valley Water, 2020c).

Figure 4-2 shows the breakdown of total savings achieved by sector in 2019. Approximately 76% of total water savings in 2019 was from residential water savings. Of the savings achieved to date, passive savings is the greatest contributor, with savings generally two to three times greater than active savings.

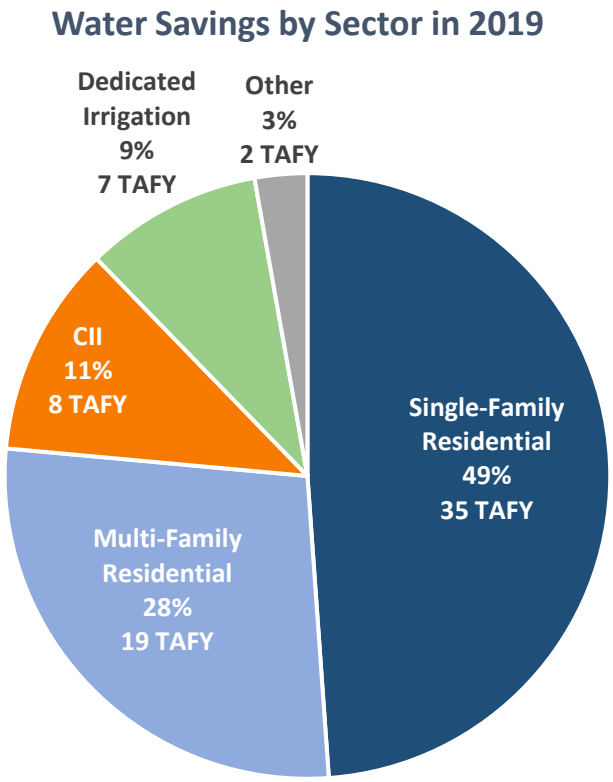


Figure 4-2 Water Savings by Sector in 2019

Figure 4-3 shows the estimated savings for the single-family and multi- family residential sectors by end use (i.e., toilets, showers, and clothes washers). The greatest passive water savings has been achieved through toilet replacement, followed by showers, and then clothes washers (**Figure 4-3)**. It is noted that changes in market availability of efficient fixtures in recent years appears to be accelerating passive savings at a rate greater than estimated in the 1990s and early 2000s. This corresponds to the increase in public outreach and education by Valley Water, and underscores the value and contribution of these programs towards meeting Valley Water's long-term conservation targets.

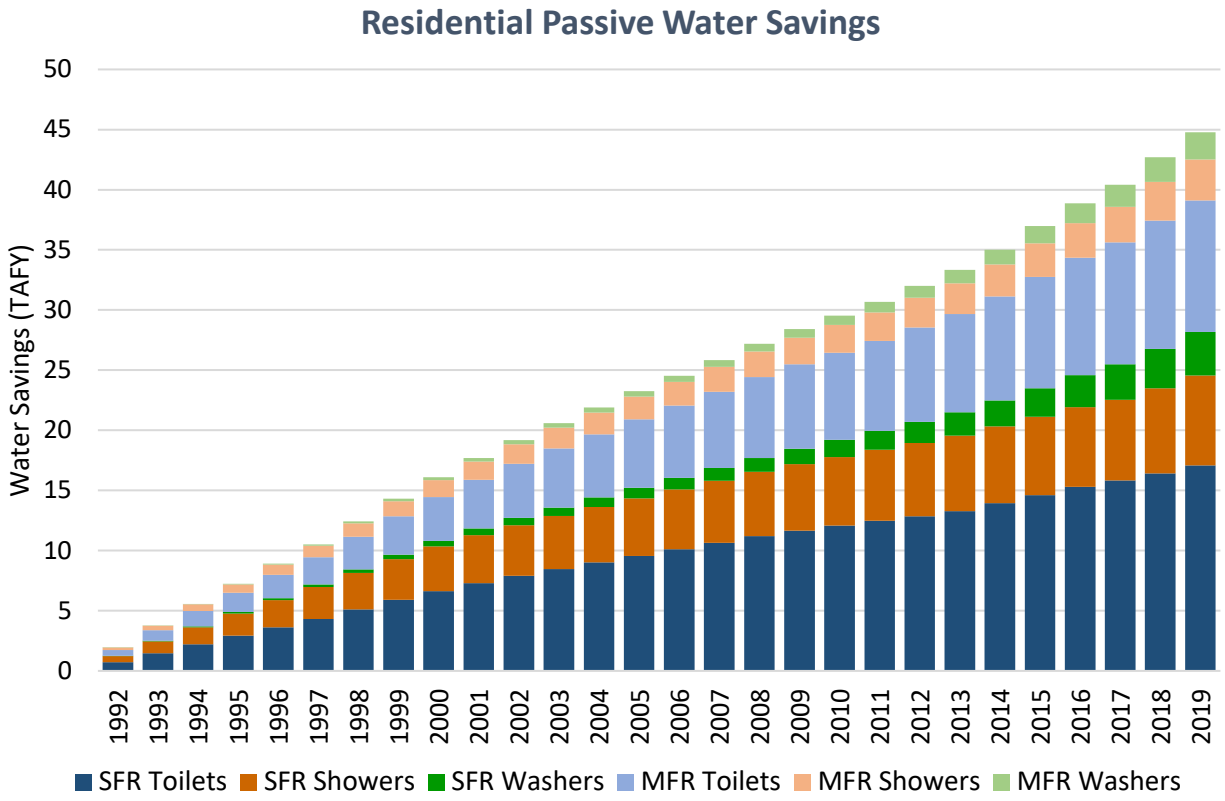


Figure 4-3 Residential Passive Water Savings

Water savings from active conservation was estimated to be 20,000 AFY in 2019, as shown in **Figure 4-4**. The water conservation programs are grouped by end use and device as follows:

- ULFT,
- HET,
- High Efficiency Urinals (HEU),
- High Efficiency Shower Heads (HESH),
- High Efficiency Washers (HEW),
- Aerators,
- Audits,[24]
- CII Kitchen,
- Irrigation (IRR),
- Meters,
- Water Efficient Technology (WET)[25], and
- Other.[26]

It is noted that water savings from device change-outs is not considered permanent, as devices have finite lifespans and can lose efficiency over time. Assumptions of device lifespans are included in the assumptions of active conservation savings, and thus savings in certain programs are reduced over time, as reflected in **Figure 4-4**.

[24] Audits include Residential and CII Surveys, Home Water Use Reports, AMI Leak Alert, and Water Wise Indoor DIY Kit and Outdoor Surveys.
[25] WET includes custom facility rebates that includes cooling tower improvements.
[26] Other includes Water Softener Upgrade Rebate and Agriculture programs.

Participation and related savings from Audit and Irrigation notably increased during the drought, with a 1,297% and 193% increase in water savings from 2011 to 2017, respectively.[27] However, only irrigation-focused programs continued to increase water savings after the drought, with a 31% increase in water savings from 2017 to 2019. The increase in savings from Audit programs is largely due to the introduction of Home Water Use Reports in 2015. From 2016-2018, the active savings from that program averaged 5,500 AFY. Since 2018, savings for the program decreased to 1,500 AFY.

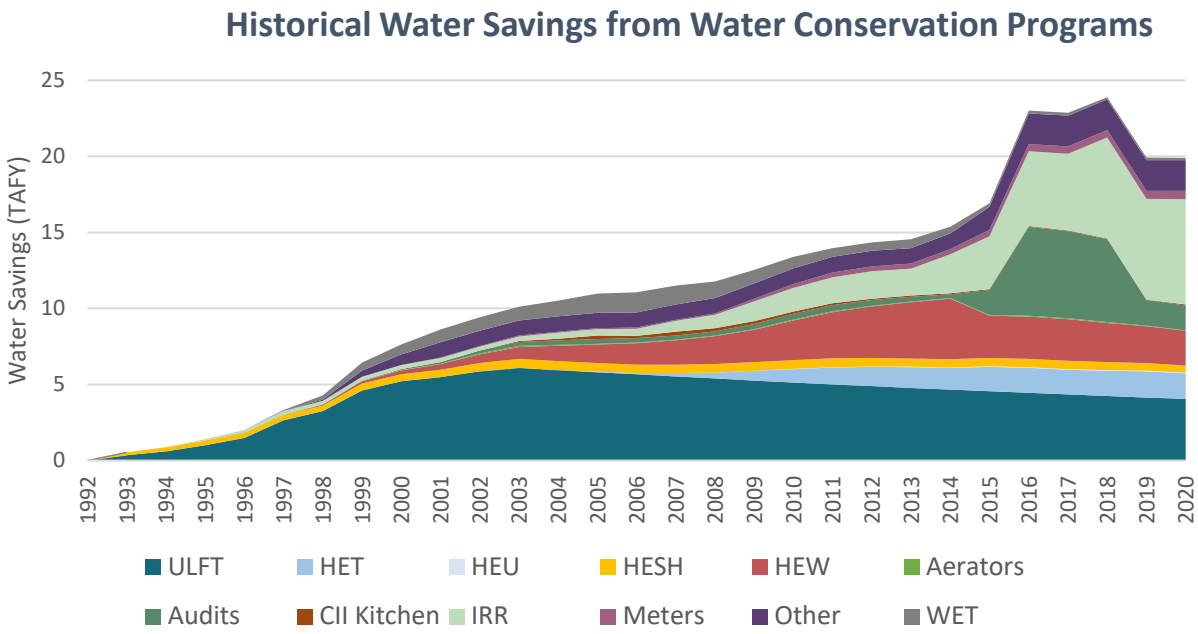


Figure 4-4 Historical Water Savings from Water Conservation Programs

Figure 4-5 below shows the estimate of indoor versus outdoor water savings achieved through 2020, inclusive of both active and passive savings. Thus far, indoor savings have been significantly greater than outdoor savings achieved, representing approximately 86% of the savings achieved in 2020. However, outdoor savings increased significantly over the course of the drought, from 3,400 AFY in 2011 to 11,000 AFY in 2017. Given this long-term successful savings achieved indoors, and the focus on irrigation as a component of the annual water use objectives that retailers will be expected to meet in the future (Section 3.2), outdoor water use appears to be a significant opportunity for future savings for Valley Water.

[27] For most of California, the drought period began in 2012. However, dry year conditions began in 2011 within Valley Water's service area.

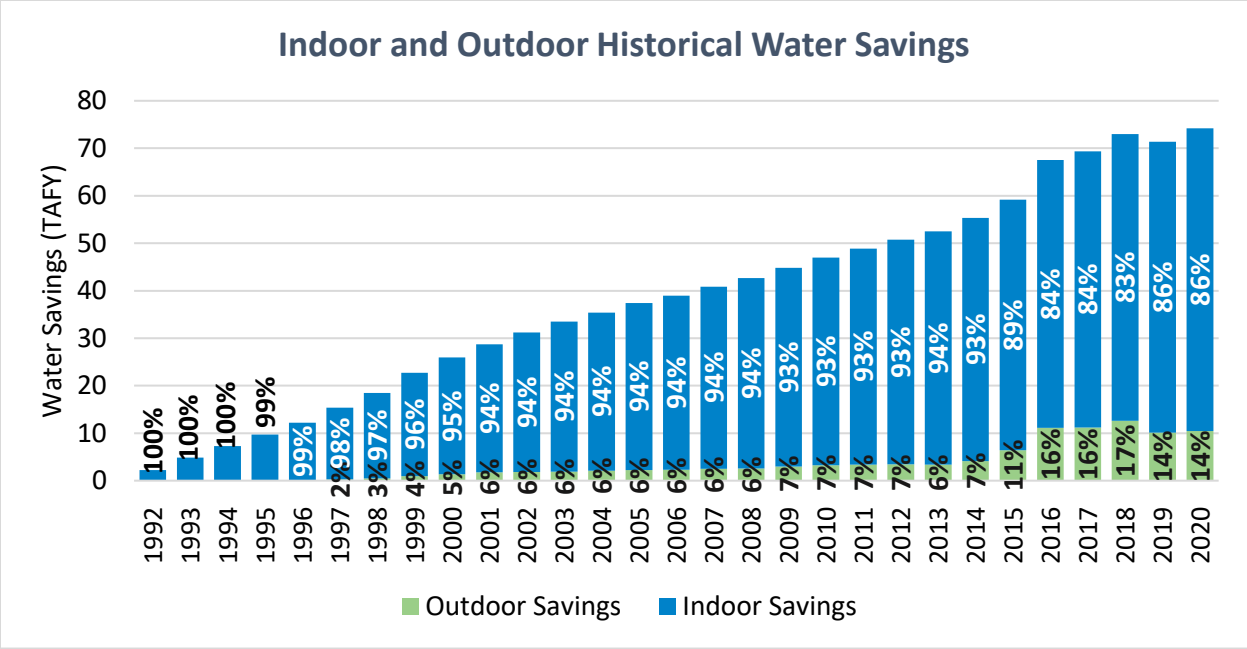


Figure 4-5 Indoor and Outdoor Historical Water Savings

4.4 Additional Conservation Needed to Achieve Valley Water Target

Figure 4-6 summarizes : (1) passive savings achieved to date, (2) active savings anticipated to persist based on program implementation to date,[28] (3) additional passive savings estimated to occur in the future, and (4) remaining active savings from new program implementation that would be required to achieve Valley Water's conservation targets (i.e., 99,000 AFY by 2030 and about 109,000 AFY by 2040). Based on this, Valley Water will need to achieve 37,000 AFY of additional savings by 2030 and a total of 50,000 by 2040. Based on the projections of passive savings and assuming that public education and outreach programs are continued to maintain passive savings at these levels, active conservation programs will be needed to achieve the remaining 15,000 AFY of savings by 2030 and 11,000 AFY by 2040.

[28] Savings from program participation is expected to decrease over time as a result of measure lifetimes (e.g., devices wearing out over time, landscape changes, etc.). Active conservation savings is estimated based on actual participation estimated through August 2020 and an estimate of participation through the remainder of 2020.

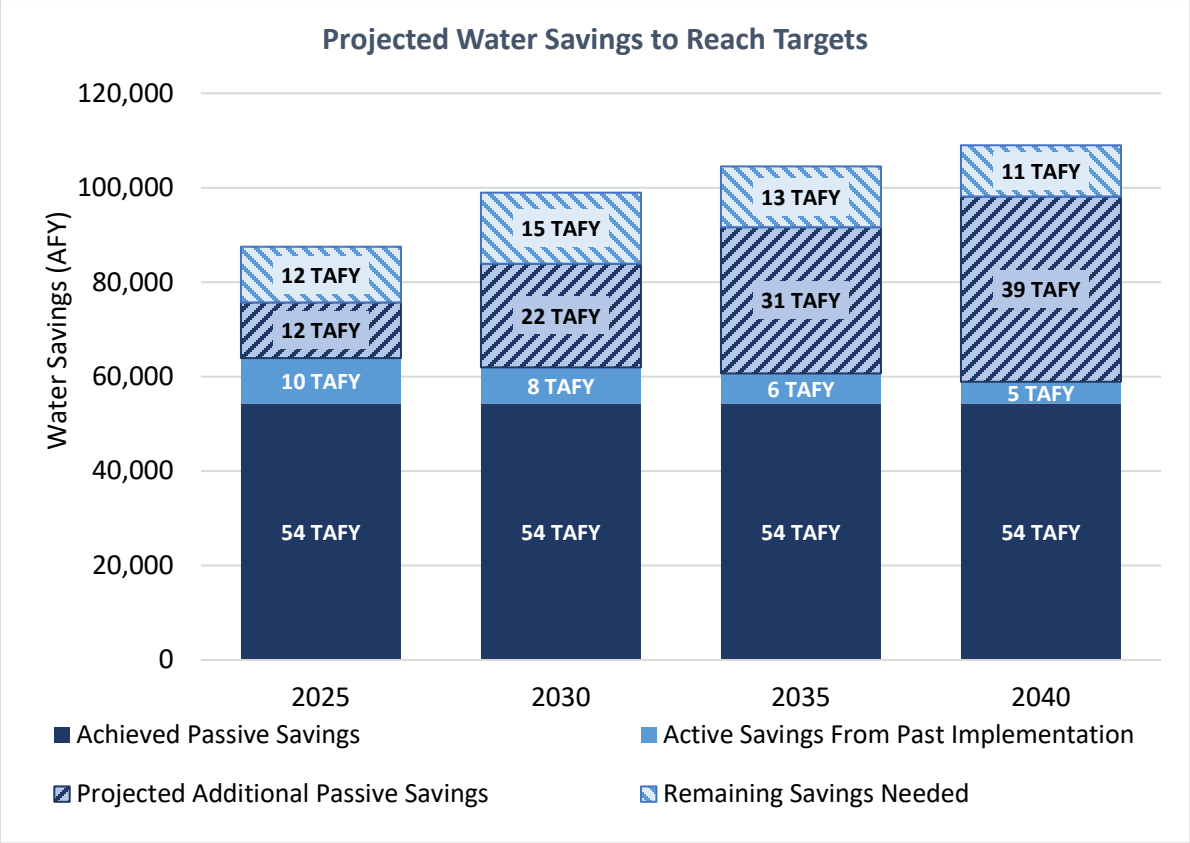


Figure 4-6 Projected Water Savings Needed to Reach Targets

5 Water Conservation Program Analysis

The following section evaluates past customer participation in five selected conservation programs, including participation trends based on customer demographics, property characteristics, and geography within the Valley Water service area. The goal of these analyses is to identify key participation drivers and help Valley Water better understand which customers are participating in which conservation programs. Valley Water can use this information to inform the strategic design, selection, and marketing of future conservation programs and services.

Customers in Valley Water's service area are offered a wide range of conservation programs, and the particular programs and suite of offerings are continually adapted in response to the needs of customers (**Table 4-1**). More details can be found at www.watersavings.org. The following five programs, which represent a subset of all programs offered, have been selected for the detailed geospatial, building stock, and customer demographic trend analyses presented herein:

1. Commercial and Multi-Family Dwelling High Efficiency Toilet Direct Installation Program (HET Program),
2. Graywater Laundry-to-Landscape Rebate and Direct Installation Programs (Graywater Programs),
3. Two elements of the Landscape Rebate Program (LRP):
    a. Landscape Conversion Rebate and
    b. Weather-Based Irrigation Controller (WBIC) Rebate,
4. Submeter Rebate Program (Submeter Program), and
5. Water Wise Indoor Survey Do-It-Yourself Kit and Water Wise Outdoor Survey (Water Wise Survey Program).

The programs selected for these analyses are described in detail in Section 5.1 below, including program design and eligibility, program participation, key program changes, and program marketing. Sections 5.2 through 5.4 present the results of the detailed analyses, specifically:

- Section 5.2 presents the analyses of participation rates over time and by customer retail agency, and a geographic analysis of participation density (i.e., a "hot spot" analysis). The temporal analysis is used to evaluate long-term trends in participation rates and differences in participation rates between the retail agencies. The participation density analysis is used to identify geographic areas within the Valley Water service area with higher and lower participation density and to make comparisons across the selected programs.
- Section 5.3 presents the analysis of building characteristics throughout the Valley Water service area. Building age and size can illuminate trends in water use and indicate opportunities for additional water conservation.
- Section 5.4 presents the analyses of certain demographic characteristics of conservation program participants. These analyses provide insight into how programs are effectively targeting a diverse customer base across income levels, age, and rentership.

The key findings across all of these analyses for each program are summarized and discussed in Section 5.5. These findings are included as a method that could be used by Valley Water to encourage increased in program participation, as part of the Long-Term Conservation Plan (Section 6.2.3).

The participation data used for the analyses in this section are limited to those for which customer and participation attributes are complete, including where participation dates are known, location information is known or could be readily attributed, and associated Census or County Assessor's parcel data are available, as necessary for each set of analysis. Thus, the program participation numbers reflected in the following sections may vary based on the available location and other attribute data and therefore may be lower than total participation reflected in **Table 4-1**.

5.1 Selected Conservation Programs

The programs selected for detailed analyses are a subset of all conservation program offerings and are described in detail below.

5.1.1 Commercial and Multi-Family Dwelling High Efficiency Toilet Direct Installation Program

- *Program Design and Eligibility:* Valley Water offered direct installation of HETs and urinals to commercial, industrial, and institutional (CII) sites and Multi-Family Dwellings (MFDs; fourplexes and above). This program began in 2004 and operated at no cost to the customer. The program was initially designed to replace 3.5 gallons per flush (gpf) and above toilets with 1.28 gpf toilets and/or replaces 1.0 gpf and above urinal flush valves with 0.5 gpf urinal flush valves, but as indicated below, is being revised to use even higher efficiency fixtures. The program does not require an application and evaluation process, but does require participants to sign participant agreements.
- *Program Participation:* From October 2004 to September 2020 there were 35,000+ toilets and urinal flush valves installed. The program has ended, but is being replaced by a comparable new program, as described in the following bullet.
- *Program Changes:* The program is currently evolving to include more fixtures into a program that will be called "Fixture Replacement Program". This new program will include:
    - Replacement of 1.6 gpf and above toilets with 1.28 gpf or lower WaterSense-certified Ultra-High Efficiency Toilets (UHET) or HETs;[29]
    - Replacement of 1.0 gpf and above urinals with 0.125 gpf or lower WaterSense-certified urinals or retrofit with 0.125 gpf or lower piston-style flush valves;
    - Replacement of 2.0 Gallons per Minute (gpm) and above showerheads with 1.5 gpm WaterSense-certified showerheads;

[29] Specifically, 75% of toilets will be replaced with 0.8 gpf toilets, and 25% will be WaterSense-certified toilets between 1.1 gpf and 1.28 gpf, depending on property type and building constraints. Additionally, 3.5 gpf toilets in correctional facilities will also be replaced with 1.6 gpf Icon Momentum Plumbing Control System Toilets, although this is expected to represent a minimal proportion of the toilets replaced through this program.

  - Replacement of 2.2 gpm and above faucet aerators with 1.5 gpm aerators in commercial kitchens, 1.0 gpm aerators in residential units, and 0.5 gpm or lower aerators in non-kitchen faucets; and
  - Replacement of 1.6 gpm and above pre-rinse spray valves in commercial kitchens with 1.15 gpm or lower pre-rinse spray valves.

- *Program Marketing:* Most of the marketing and outreach for the program is conducted by the contractor working to implement the program for Valley Water. Marketing by Valley Water includes identification of the program in its water conservation program flyer and on its website, and with the launch of the new program will likely include additional marketing methods such as direct mail outreach.

5.1.2 Graywater Laundry-to-Landscape Rebate and Direct Installation Programs

- *Program Design and Eligibility:* Valley Water offers currently offers rebates for graywater systems on residential properties, and previously offered direct installation of graywater systems. For either rebates or the former direct installation program, participants must be the homeowner, adhere to Chapter 15 of the California Plumbing Code, and install a laundry-to-landscape graywater system (permit exempt). Eligible project locations are those that are: (1) in areas where seasonally high groundwater is five-feet or deeper below the ground surface, (2) at least five feet from any septic tanks or leach field, and (3) at least 100 feet from wells, riparian areas, or other water sources. Given the eligibility criteria and the requirements that the graywater must be used on the property, program participants are almost entirely single-family residential (SFR) properties.[30] Program applicants who qualify as disabled, US veteran, 60 years or older, or low-income are eligible for the direct installation version of this program. In order to facilitate the program, Valley Water worked with a small business to carry the specialized equipment needed for installing graywater systems and intends to similarly work with other irrigation suppliers and retailers.

- *Program Participation:* The rebate program began in August 2014. Between August 2014 and September 2020, 55 rebates were distributed.[31] The direct installation version of the program was offered from January 2019 to June 2020. During this time period, 71 direct installations were performed, which resulted in 31,662 square feet (sq ft) of formerly potable irrigated landscape being converted to graywater irrigated landscape.

- *Program Changes:* The initial rebate value was $100 per customer, but the rebate was almost immediately increased to $200 due to the drought. Beginning around 2018, Valley Water entered into a cost-share agreement with selected retail agencies and the rebate was increased to $400. Currently, a $400 rebate is offered to participants in the service areas of Cupertino, Morgan Hill, Palo Alto, and San José Municipal due to the cost-share agreement. The rebate application was initially very involved, requiring customers to

[30] To date, all participant locations except one have been single-family residential homes. The exception was a duplex townhome. By law, graywater must be used on the parcel in which it is produced, which is generally single family homes, duplexes, and smaller multi-family properties that have clear individual landscape spaces (i.e., not common areas).

[31] Total square footage of greywater-irrigated landscape for rebate participants is not known.

answer pre-screening questions before receiving an application, have an on-site pre-inspection, install the project, and then conduct a successful post-inspection. The application process has been streamlined to include an online application, responses to pre-inspection questions and photos of key project elements in lieu of an on-site pre-inspection, and submission of a simple sketch of the project plan. The direct installation version of the program was offered at a flat fee that could be waived if the customer assisted with some of the manual labor required as part of the project.

- *Program Marketing:* Initial promotion efforts through in-person workshops generated low yield of completed rebate projects. Initially, the rebate program was marketed solely through a flyer that advertised all available water conservation programs. Now, the program has its own marketing rack card, yard sign for completed projects, promotional stickers to hand out at events, postcards sent to eligible areas, in a county-wide mailer, and in some newsletters sent by cities/retailers. The direct installation version of the program is also featured on flyers at local garden nurseries, irrigation stores, community centers, and libraries. More recently, Valley Water began promoting the program through social media, with NextDoor having the strongest results for workshop attendance and rebate interest. Social media, primarily from NextDoor, has also generated more than two thirds of the interest in the direct installation program. Additionally, Valley Water staff are trained on the program and cross-promote it to participants in the Landscape Rebate Program and Water Wise Outdoor Survey. Valley Water's Community-Based Social Marketing (CBSM) project indicated support for more dynamic use of social media to showcase implemented graywater projects, to make it easier to find equipment, to make it easier to install more-complex graywater systems requiring permits (which is beyond the current program scope), and to offer incentives for graywater systems that require permits (e.g., shower and bathroom sink systems).

5.1.3 Landscape Rebate Program: Landscape Conversion and Weather Based Irrigation Controller Rebates

Valley Water has many offerings through their Landscape Rebate Program (LRP), including Landscape Conversion Rebates, Irrigation Equipment Upgrade Rebates, and Rainwater Capture Rebates. The two LRP elements included in the analyses in subsequent sections are the LRP Landscape Conversion Rebates and Weather-Based Irrigation Controller (WBIC) Rebates.

- *Program Design and Eligibility:* LRP Landscape Conversion rebates are offered to convert high water use landscape (specifically lawns and pools) to low water using plants, mulch, permeable surfaces, and low volume drip irrigation or hand watering, which results in an estimated savings of on average at least 36 gallons per year (gpy) per square foot replaced. All LRP Landscape Conversion Rebate participants must conduct a pre-inspection, submit an application, and obtain approval prior to starting the project. Retroactive rebates are not eligible for landscape conversion projects started before receiving a Notice to Proceed. LRP WBIC rebates are offered to replace an existing standard irrigation controller with a U.S. Environmental Protection Agency (US EPA) WaterSense-certified WBIC (also known as a "smart irrigation controller"). An onsite rain sensor was until recently required for all controllers that do not receive weather data from an onsite weather station. Both Landscape Conversion and WBIC rebates are

available to all property owners within Santa Clara County, including SFR, Multi-Family Residential (MFR), and CII properties.

- *Program Participation:* Valley Water has offered Landscape Conversion Rebates since 2006. As of September 2020, approximately 13,013,331 sq ft of high water use landscape have been replaced. Valley Water has also offered WBIC rebates since 2006. Between 2009 and September 2020, 5,527 WBIC devices were distributed.[32]
- *Program Changes:* In July 2010, LRP Landscape Conversion Rebate participants were required to add 50% plant coverage, as determined from the Water Use Classification of Landscape Species (WUCOLS) plant list. In July 2017, the application was moved to an online application portal. The rebate value is based on the square footage of the conversion area and has varied over time and with various cost-share agreements between Valley Water and selected retail agencies, as summarized below.
    - From 2006 to 2013 – $0.75/sq ft (with $0.75/sq ft additional for cost-sharing areas),
    - From January to April 2014 – $1.00/sq ft (with $1.00/sq ft additional for cost-sharing areas) from January to April 2014,
    - From April 2014 to June 2016 – $2.00/sq ft (with $1-2/sq ft additional for cost-sharing areas), and
    - From July 2016 to September 2020 – $1.00/sq ft (with $1.00/sq ft additional for cost-sharing areas).

  The LRP WBIC rebate amounts have also varied over time:

    - Prior to April 2014 – $300 for 1-12 station controllers, $700 for 13-24 stations, and $1,000 for 25+ stations, and
    - April 2014 to present – $300 for 1-12 stations, $1,000 for 13-24 stations, and $2,000 for 25+ stations.
- *Program Marketing:* Marketing efforts are geared towards the full LRP and include additional elements beyond Landscape Conversion and WBIC rebates. However, most of the outreach for the greater LRP specifically highlights the Landscape Conversion Rebate element. Marketing has included an annual summer water conservation campaign (including radio, print, billboards, social media, direct mailers, bus, etc.); program fliers; and rack cards distributed to garden nurseries, irrigation supply stores, retailers; and events, blog posts, workshops, speaking events, tabling at outreach events, and through word-of-mouth. WBIC rebates are also included in the marketing for LRP, but the observed uptick in the past few years is considered to primarily be due to the fact that there are now WiFi enabled controllers available in the market. Valley Water is currently developing the WaterNow project to develop an outreach plan to increase participation by CII customers.

[32] The exact number of devices distributed from 2006 through 2009 is not known.

5.1.4 Submeter Rebate Program

- *Program Design and Eligibility*: Valley Water's Submeter Rebate Program is offered to MFR customers and mobile home parks, and allows individual tenants to pay for their own water usage, which results in an estimated savings of 4,585 gpy per participant. The requirements for the program include properties that: (1) have at least two units onsite (duplex or greater), (2) share a single master meter, and (3) have an individual water connection to each unit. Large sites with an irrigation system must have an individual irrigation water meter that is not connected to the master meter. Additionally, participating sites must comply with the Uniform Plumbing Code, obtain permits from the local city office if needed, and contact the Santa Clara County Department of Weights & Measures for meter certification.
- *Program Participation:* Over the lifespan of the program, from 2000 to September 2020, Valley Water has issued rebates for 7,188 submeters.
- *Program Changes:* From 2000 to 2002, the program was initiated as a pilot program for mobile home parks. The program resumed in 2008, and now includes MFR sites. The rebate amount was $56 per submeter from 2000 to 2002, $100 per submeter from 2008 to 2013, $150 per submeter from 2013 to 2020. Valley Water currently has a cost-sharing agreement with the City of Palo Alto to provide an additional $150 per submeter to customers within Palo Alto.
- *Program Marketing:* The program has been marketed towards mobile home parks and MFR sites through mailed letter notifications. The program is on Valley Water's website and on rack cards throughout the County. Presentations have promoted this program at MFR site events (e.g., homeowner association meetings) and Valley Water events.

5.1.5 Water Wise Survey Program

- *Program Design and Eligibility*: Valley Water offers the Water Wise Indoor Survey Do-It-Yourself Kit and Water Wise Outdoor Survey (Water Wise Survey Program) to residential customers to learn more about their water use in their landscape and home and to become eligible to receive free high-efficiency fixtures from Valley Water.
    - The Indoor Survey Do-It-Yourself (DIY) Kits include a step-by-step guide to teach SFR and MFR customers how to check for sink/shower flow rates, meter leaks, and toilet leaks, and provides general indoor leak information. The kit includes all the supplies needed to conduct the tests, including toilet leak detection dye tablets, a flow rate bag, and a Practical Plumbing guide. Initially, customers were required to complete a Water Wise survey and submit their results online or by mail to Valley Water in order to receive high efficiency fixtures. Large MFR sites were required to complete the Water Wise survey for a percentage of their units (about 5-10%) in order to be eligible to request fixtures for the entire complex. However, this requirement is currently being removed and Valley Water is implementing a new "shopping cart" tool where customers will be allowed to order efficient fixtures directly through a Valley Water website. The Indoor Survey DIY Kits are estimated to save approximately 4,094 gpy per participant.

- The Water Wise Outdoor Survey (WWOS) is an in-house program wherein Valley Water sends a trained irrigation professional to evaluate the customer's irrigation system. The trained irrigation professional completes the evaluation and a detailed written report is prepared for each customer. The properties must be no larger than one-half-acre in size and exclude San Jose Water Company customers, which have a separate program offered through their retailer. Some exceptions have been made for larger SFR sites where a "representative" survey can be provided. Case-by-case exceptions may be made for smaller MFR and CII sites. However, larger MFR and CII sites are encouraged to apply for participation in Valley Water's Large Landscape Program. The WWOS are estimated to save 8,322 gpy per participant.

- *Program Participation:* The WWOS program was initiated in 2016 and the Indoor Survey DIY Kit program was initiated in April 2017. Both programs are ongoing. As of September 2020, Valley Water has distributed 942 Indoor Survey DIY Kits mailed directly to customers, 1,067 DIY kits to retailers via bulk order, and conducted more than 700 WWOSs.
- *Program Changes:* Prior to implementation of the Water Wise Survey Program, Valley Water contracted with a vendor to implement a similar program called the Water Wise House Call Program.
- *Program Marketing:* The Water Wise Survey Program is marketed through bill inserts, rack cards, mailers, agency talks, blog posts, and social media. In addition, retailers promote the program to customers who have high water bills. The Water Wise Indoor Survey has been translated to Spanish, Vietnamese, and Chinese to increase accessibility.

5.2 Temporal and Spatial Trends in Program Participation

The Valley Water service area covers approximately 1,300-square miles. Given the large amount of participation data spread across such a large area, it can be difficult to ascertain whether participation in these programs has been evenly distributed across the service area and how the distribution in participation has changed over time. This section presents the analysis of the temporal and spatial trends in program participation.

Table 5-1 through **Table 5-8b** summarize the annual program participation rates for each of the five programs within each retail agency. Program participants located outside of retail agency boundaries are indicated in the tables as "No Retail Agency," and presumably rely on private groundwater wells for their water supply. The green shading in the tables is provided as a visual mechanism to compare relative participation rates, where darker green indicates a higher level of participation in a given year or retail agency, and white or light green indicate a lower level of participation.

As further shown in **Table 5-1** through **Table 5-8b**, for each program, a high-level approximation of the participation rate was calculated relative to the total number of eligible parcels by sector, based on Santa Clara County Assessor's data (Santa Clara County, 2020). This analysis is meant as a high-level estimate of program saturation since it does not account for eligibility restrictions beyond location, sector and land use type, and because, particularly for the MFR and CII sectors, multiple eligible customers may be present on a single parcel.

In order to assess program participation density for conservation programs across the County, a geostatistical spatial analysis was then performed.[33] This analysis identifies participation "hot spots," which are areas where a higher density of participation is observed than would be expected by randomly distributed participation. Similarly, "cold spots," or areas of lower than expected participation, are identified. The analyses are limited to areas of the County with parcels of the eligible sector(s) for each program. High density participation areas are identified in red and low density participation areas are identified in blue on **Figure 5-1** through **Figure 5-9**. The size of the cluster analysis hexagonal cells is a function of the amount of participation data included in the analysis; therefore, larger grid cells are shown in the attached figures for programs with lower overall participation.

5.2.1 Commercial and Multi-Family Dwelling High Efficiency Toilet Direct Installation Program

Table 5-1 presents a summary of participation in the Commercial and Multi-Family Dwelling HET Direct Installation Program (HET Program), which began in October 2004. Overall the program has had 1,747 participants through August 2020, and has replaced over 35,000+ toilets and urinal flush valves. Total participation represents approximately 2.1% of the CII and MFR parcels in the service area.[34] The highest levels of participation occurred in the first three years of the program (i.e., from 2004 to 2007). Following 2015, there has been a notable decrease in number of participants per year. However, as shown in **Table 5-2**, the number of toilets and urinals replaced through this program has remained fairly consistent, indicating that a large number of units are being replaced per customer. The agencies with the highest participation rates have been the Cities of Palo Alto, Sunnyvale, and Santa Clara, and the lowest participation rates have been in the Great Oaks Water Company, San José Municipal Water System, California Water Service (CWS) Los Altos, and Stanford service areas.

[33] The ESRI ArcGIS 10.8 Optimized Hot Spot Analysis tool was used for spatial hot spot analysis of program participation. The hot spot analysis calculates a Getis Ord GI* statistic for each cell. This statistical z-score evaluates how the event (in this case, participation in the program) clusters spatially, by looking at the cell in the context of the neighboring cells. For the purposes of this study, hot and cold spots are identified as cells with a 90% or greater level of statistical confidence.

[34] Multi-family customers in buildings with four or more dwelling units are eligible for the program. However, the County Assessor's data groups parcels with three and four unit buildings together into a single category. Therefore, for purposes of this analysis, participation is estimated relative to all three and four unit parcels. This high level analysis compares the number of participants to the number of parcels, although it is noted that multiple participants may reside on one parcel.

Table 5-1 Summary of Participation in HET Program

Retail Agency	Year														Total	Percentage of CII and MFR Parcels
	Pre-2008	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Jan - Aug 2020		
CWS - Los Altos	10	2	2	3	6	0	1	3	4	0	0	1	1	0	**33**	0.80%
City of Gilroy	17	4	7	0	12	0	3	0	1	0	0	0	0	0	**44**	2.6%
City of Milpitas	40	1	2	3	6	3	2	3	2	0	0	0	0	0	**62**	1.2%
City of Morgan Hill	5	4	2	4	3	5	3	3	0	0	3	2	0	0	**34**	1.5%
City of Mountain View	3	14	19	8	43	7	9	4	1	0	4	2	2	1	**117**	2.0%
City of Palo Alto	33	28	17	10	19	7	23	6	0	0	1	1	1	0	**146**	4.7%
City of Santa Clara	62	18	9	5	28	23	11	11	5	2	2	4	0	0	**180**	2.9%
City of Sunnyvale	61	17	19	11	18	14	2	13	23	2	7	0	3	0	**190**	3.0%
Great Oaks Water Company	5	1	1	1	1	2	0	0	1	1	0	0	0	0	**13**	0.50%
Purissima Hills Water District	0	0	0	0	0	0	0	2	0	1	0	0	0	0	**3**	2.8%
San José Municipal Water System	7	0	6	1	1	1	0	3	0	0	1	1	0	0	**21**	0.70%
San Jose Water Company	459	63	79	31	35	29	41	78	39	11	9	8	9	0	**891**	2.4%
Stanford University	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0%
No Retail Agency	3	2	0	2	1	1	0	3	0	1	0	0	0	0	**13**	0.30%
Total	**705**	**154**	**163**	**79**	**173**	**92**	**95**	**129**	**76**	**18**	**27**	**19**	**16**	**1**	**1,747**	**2.1%**

Table 5-2 Summary of Toilets and Urinals Distributed Through HET Program

Retail Agency	Year														Total
	Pre-2008	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Jan - Aug 2020	
CWS - Los Altos	154	13	7	224	11	0	3	45	34	0	0	24	43	0	**558**
City of Gilroy	113	91	146	0	102	0	5	0	57	0	0	0	0	0	**514**
City of Milpitas	1,063	2	4	132	403	71	4	15	216	0	0	0	0	0	**1,910**
City of Morgan Hill	73	13	4	45	36	36	93	33	0	0	9	61	0	0	**403**
City of Mountain View	5	710	603	510	571	132	40	218	6	0	33	4	3	43	**2,878**
City of Palo Alto	389	502	214	201	127	16	138	63	0	0	24	767	52	0	**2,493**
City of Santa Clara	1,296	369	21	160	653	472	123	142	70	518	106	20	0	0	**3,950**
City of Sunnyvale	944	1,434	958	1,776	744	61	6	76	127	27	491	0	817	0	**7,461**
Great Oaks Water Company	162	21	2	9	9	11	0	0	20	105	0	0	0	0	**339**
Purissima Hills Water District	0	0	0	0	0	0	0	75	0	96	0	0	0	0	**171**
San José Municipal Water System	95	0	45	10	13	12	0	287	0	0	29	1,381	0	0	**1,872**
San Jose Water Company	2,332	1,655	880	1,046	312	227	641	2,512	1,607	477	390	859	459	0	**13,397**
Stanford University	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
No Retail Agency	126	50	0	14	23	4	0	7	0	0	0	0	0	0	**224**
Total	**6,752**	**4,860**	**2,884**	**4,127**	**3,004**	**1,042**	**1,053**	**3,473**	**2,137**	**1,223**	**1,082**	**3,116**	**1,374**	**43**	**36,170**

Figure 5-1 shows the results of the participation density analysis for the HET Program. The program shows areas of high participation in the corridor generally between Highway 101 and El Camino Real, as well as areas of San José. Based on this, significant opportunities to increase participation in this program appear to remain in areas that have had a historically lower rate of participation, such as customers located outside of the Highway 101 and El Camino corridor, and in the California Water Service (Cal Water or CWS) Los Altos District, Great Oaks Water Company, and San José Municipal Water System areas.

Valley Water's Water Conservation Tracking Model also provides an estimate of efficient fixture saturation within the County. This includes estimates of fixtures replaced through conservation programs and as a result of natural change out of fixtures (i.e., passive savings). As shown in **Table 5-3** below, it is estimated that only 15% of MFR and 18% of CII toilets and 56% of CII urinals in the County remain inefficient (i.e., 3.5 gpf and greater for toilets, greater than 1 gpf for urinals). Therefore, based on this estimate, less opportunity remains for toilet and urinal change-outs than suggested by the program participation levels identified in **Table 5-1**, and it may be more challenging to reach these remaining customers.

Table 5-3 Estimated Water Efficient Fixture Saturation Through 2020

Fixture (a)	Single Family Residential (b)	Multi-Family Residential	Commercial, Industrial, Institutional
Efficient Toilets	**72%**	**85%**	**82%**
3.5+ gpf	28%	15%	18%
ULFT	51%	53%	48%
HET	21%	32%	34%
Efficient Showerheads	**95%**	**96%**	**--**
Efficient Washers (c)	**66%**	**51%**	**92%**
Efficient Urinals	**--**	**--**	**44%**
>=1 gpf	--	--	56%
0.5 gpf	--	--	17%
0.25 gpf	--	--	0%
0.125 gpf	--	--	24%
0 gpf	--	--	2.5%

Abbreviations

gpf = gallons per flush
gpl = gallons per load
gpm = gallons per minute

Notes

(a) Fixtures are considered efficient if they meet the following criteria:

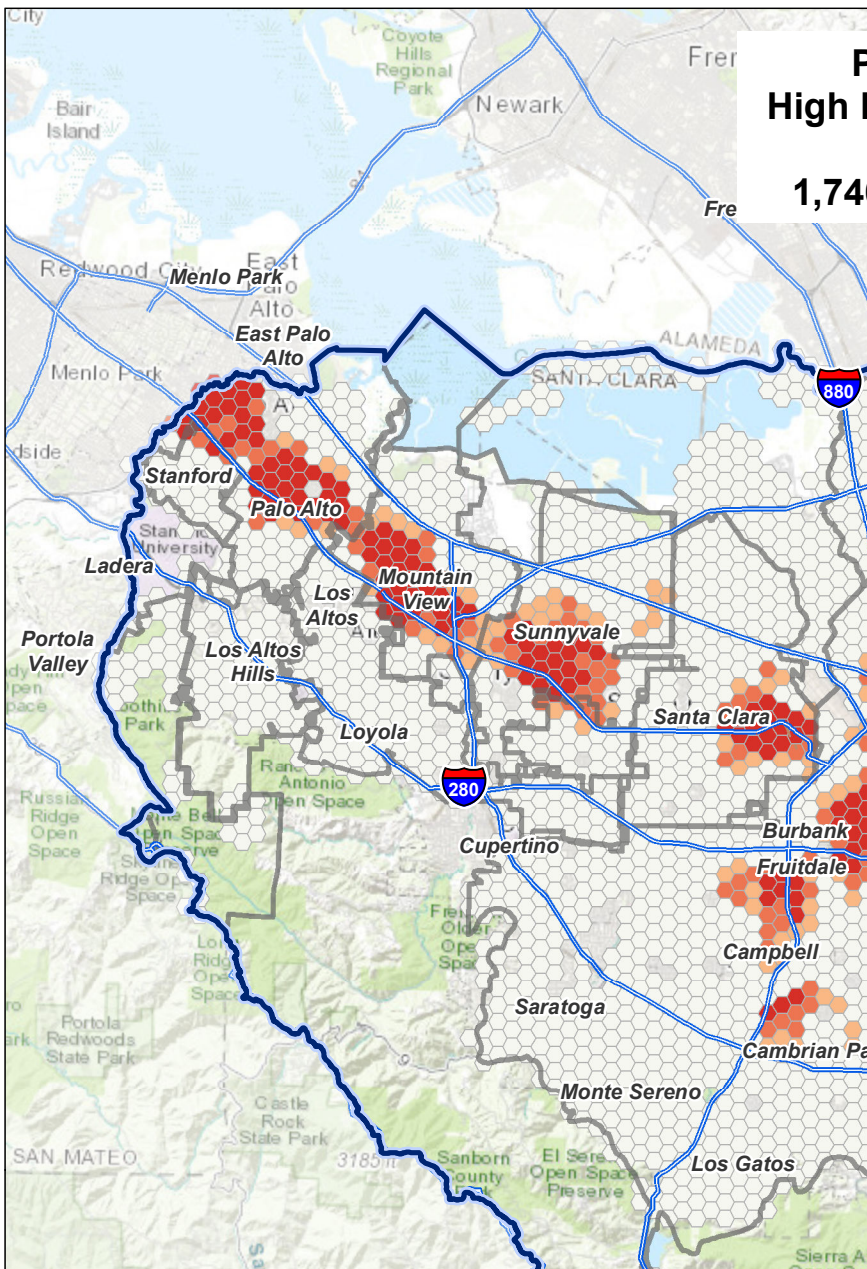
- Toilet gpf <= 1.6 gallons
- Urinal gpf <= 0.5 gallons
- Showerhead gpm <= 2.2 gallons
- Washer gpl <= 30 gallons

An estimated breakdown of efficiency for toilets and urinals (including those not considered efficient) is also provided.

(b) Single Family residential includes mobile home parks.

(c) Multi-Family residential washers includes in-unit and common washers. Commercial, industrial, and institutional washers includes laundromat washers only.

Participation Density
High Efficiency Toilet Program
2004-2020
1,746 Participants Analyzed



Legend

- Valley Water Boundary
- Retail Agency
- High Efficiency Toilet Program Participation

Participation Hot and Cold Spots

- Cold Spot - 99% Confidence
- Cold Spot - 95% Confidence
- Cold Spot - 90% Confidence
- Not Significant
- Hot Spot - 90% Confidence
- Hot Spot - 95% Confidence
- Hot Spot - 99% Confidence

Notes

1. All locations are approximate.
2. Program participation hot and cold spots were evaluated using the Esri ArcGIS 10.8.0 Optimized Hot Spot Analysis tool, which calculates a Getis-Ord GI* statistic. This statistic is a measure of the spatial distribution of incidents (participation) relative to a random, equally-spaced distribution.
3. Participants included in this analysis are limited to those for which detailed participation records and location data are available.

Sources

1. Conservation program data provided by Valley Water, September 2020.
2. Basemaps provided by ESRI and Stamen Design, under CC BY 3.0. Data by OpenStreetMap, under ODbL.

N

0 4 8

Miles

Participation Density: High Efficiency Toilet Program

Valley Water
Water Conservation Strategic Plan
July 2021
C00054.00

Figure 5-1

eki environment & water

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5.2.2 Graywater Laundry to Landscape Rebate and Direct Installation Programs

Table 5-4 presents the participation in the Graywater Programs. From inception through August 2020, there have been a total of 125 participants, which represents approximately 0.07% of the total SFR parcels in the County, and compared to other programs has had a relatively low level of overall participation.[35,36] Participation rates in all retail agencies are below 0.2%.

Table 5-4 Summary of Participation in Graywater Programs

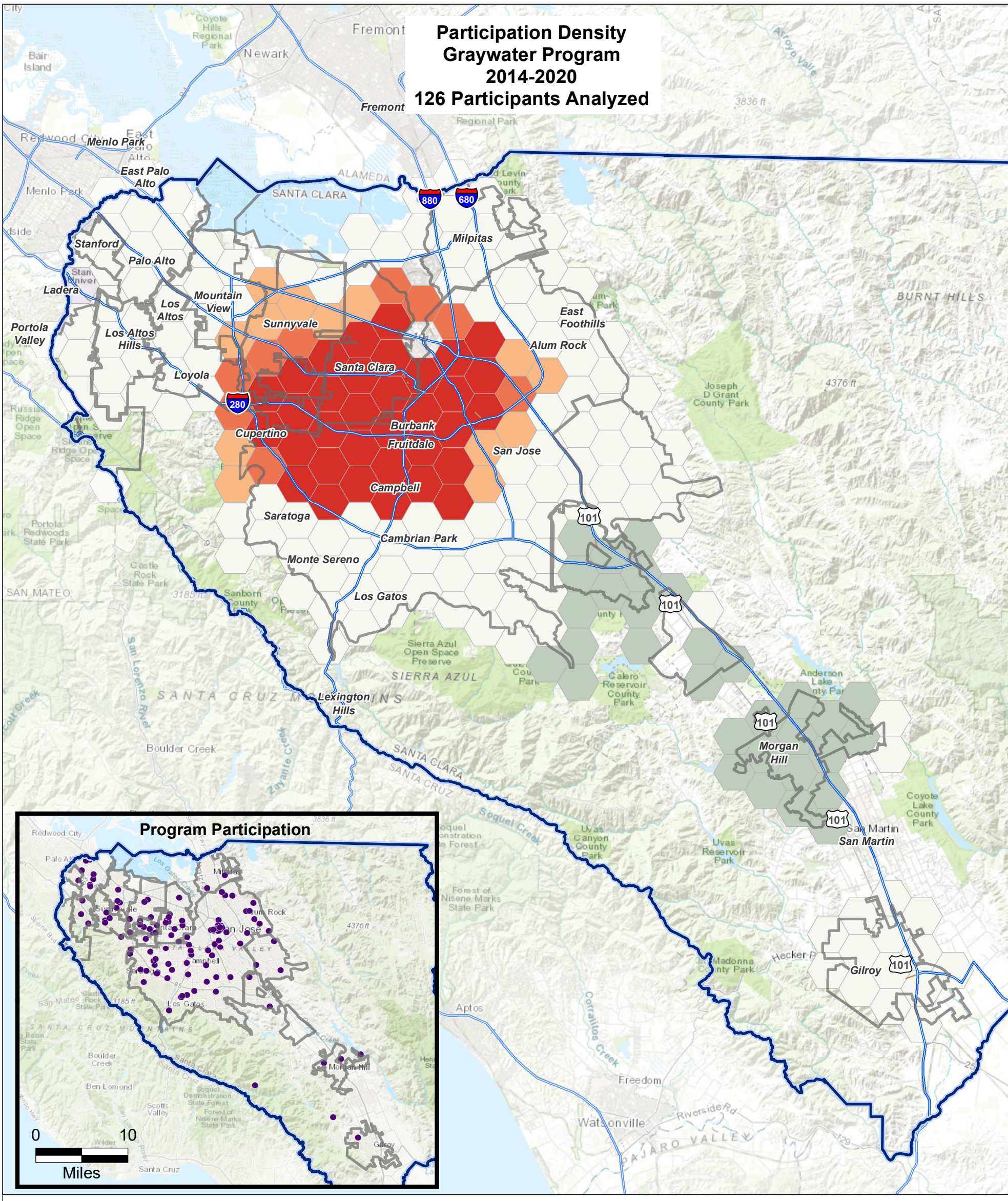
Retail Agency	Year							Total	Percentage of SFR Parcels
	2014	2015	2016	2017	2018	2019	Jan - Aug 2020		
CWS - Los Altos	0	2	0	0	1	5	0	**8**	0.04%
City of Gilroy	0	0	0	0	0	0	1	**1**	0.01%
City of Milpitas	1	0	0	0	0	1	0	**2**	0.02%
City of Morgan Hill	0	1	0	1	0	0	1	**3**	0.03%
City of Mountain View	1	0	1	0	0	2	0	**4**	0.05%
City of Palo Alto	0	0	0	0	0	3	0	**3**	0.02%
City of Santa Clara	1	1	0	0	0	9	0	**11**	0.06%
City of Sunnyvale	0	4	3	1	0	5	0	**13**	0.09%
Great Oaks Water Company	0	0	0	0	0	0	1	**1**	0.01%
Purissima Hills Water District	0	1	0	0	0	2	0	**3**	0.16%
San José Municipal Water System	0	0	0	0	1	0	2	**3**	0.02%
San Jose Water Company	2	5	4	4	3	39	5	**62**	0.04%
Stanford University	0	0	0	0	0	0	1	**1**	0.15%
No Retail Agency	3	4	0	0	0	3	0	**10**	0.07%
Total	**8**	**18**	**8**	**6**	**5**	**69**	**11**	**125**	**0.04%**

Figure 5-2 shows the results of the participation density analysis for the Graywater Programs for SFR customers. Given the relatively low level of participation in this program compared to the overall size of the County, the statistical robustness of this analysis is more limited than others. However, this analysis suggests that the highest density participation has been in the San José and Santa Clara areas, and notably lower participation density in the south San José and Morgan Hill areas. Given that the program has overall had a low rate of participation to date, many significant opportunities remain to reach SFR customers across the County with this program. It should be noted that installing a graywater system is far more complex a project than, for example, changing out an existing fixture, and thus the overall potential for customer adoption is generally lower than other conservation programs.

[35] It is noted that this is a slight underestimation of participation rates, as not all SFR parcels are eligible for the Graywater Programs due to restrictions that parcels cannot have seasonally high groundwater, be near surface water sources, or be near septic tanks. **Figure C-1** provided in **Appendix C** shows the parcels within Santa Clara County that are eligible for a graywater system given the eligibility restrictions described in the Section 5.1.2. Based on a review of Figure C-1, the vast majority of SFR parcels in the County are eligible for this program, thus the participation rates are considered only a slight underestimate. **Figure C-2** in **Appendix C** identifies areas where Graywater Program-eligible parcels are likely to be located physically near other eligible parcels.

[36] The date of participation for one of the participants was not available and was not included in **Table 5-4**.

Participation Density
Graywater Program
2014-2020
126 Participants Analyzed



Legend

- Valley Water Boundary
- Retail Agency Boundaries
- Graywater Program Participation

Participation Hot and Cold Spots

- Cold Spot - 99% Confidence
- Cold Spot - 95% Confidence
- Cold Spot - 90% Confidence
- Not Significant
- Hot Spot - 90% Confidence
- Hot Spot - 95% Confidence
- Hot Spot - 99% Confidence

Abbreviations

SFR = single family residential

Notes

1. All locations are approximate.
2. Program participation hot and cold spots were evaluated using the Esri ArcGIS 10.8.0 Optimized Hot Spot Analysis tool, which calculates a Getis-Ord GI* statistic. This statistic is a measure of the spatial distribution of incidents (participation) relative to a random, equally-spaced distribution.
3. Participants included in this analysis are limited to those for which detailed participation records and location data are available.

Sources

1. Conservation program data provided by Valley Water, September 2020.
2. Basemaps provided by ESRI and Stamen Design, under CC BY 3.0. Data by OpenStreetMap, under ODbL.

Participation Density: Graywater Programs

Valley Water
Water Conservation Strategic Plan
July 2021
C00054.00

Figure 5-2

eki environment & water

Path: X:\C00054\Maps\2021\07\Fig5-2_SFR_GrayWater.mxd

5.2.3 Landscape Rebate Program: Landscape Conversion Rebate and Weather Based Irrigation Controller Rebate

Table 5-5 presents the participation in the Landscape Conversion Rebate and WBIC Rebate portions of the LRP. The program has had 11,024 participants from inception through August 2020, which represents 2.7% of the residential parcels in the County.[37] Of this, 60% of the total program participation has been through WBIC rebates and 40% through Landscape Conversion rebates. The program had an increased level of participation from 2014-2019, particularly in 2015 and 2016. Relative to the overall number of residential parcels in each retail service area, the greatest participation rate has been in the Cities of Palo Alto, Mountain View, Sunnyvale, as well as Stanford University. The lowest participation rates have been in the Cities of Gilroy and Milpitas.

Table 5-5 Summary of Participation in LRP Landscape Conversion Rebates and WBIC Rebates

Retail Agency	Year												Total	Percentage of Residential Parcels
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Jan - Aug 2020		
CWS - Los Altos	10	9	13	23	19	50	161	161	71	39	28	20	**604**	2.4%
City of Gilroy	1	0	1	2	4	15	39	67	22	20	23	13	**207**	1.6%
City of Milpitas	2	2	10	4	4	21	50	55	22	20	19	13	**222**	1.3%
City of Morgan Hill	9	8	5	2	7	29	111	129	49	37	23	15	**424**	3.6%
City of Mountain View	6	10	13	11	18	37	136	113	45	30	45	21	**485**	3.7%
City of Palo Alto	45	32	29	48	50	134	306	154	63	72	48	19	**1,000**	5.7%
City of Santa Clara	3	6	13	3	13	49	110	122	76	64	51	31	**541**	2.2%
City of Sunnyvale	6	15	6	9	22	68	245	222	127	68	60	36	**884**	4.3%
Great Oaks Water Company	1	2	2	9	15	30	79	86	50	32	36	20	**362**	1.9%
Purissima Hills Water District	2	0	2	1	10	11	13	11	5	6	3	4	**68**	3.6%
San José Municipal Water System	5	0	1	5	4	23	114	151	75	50	51	19	**498**	2.6%
San Jose Water Company	41	81	50	87	152	409	1,328	1,422	716	530	491	241	**5,548**	2.7%
Stanford University	3	4	1	2	1	18	28	4	3	1	2	1	**68**	10%
No Retail Agency	5	1	1	2	0	12	42	37	6	4	2	1	**113**	0.66%
Total	**139**	**170**	**147**	**208**	**319**	**906**	**2,762**	**2,734**	**1,330**	**973**	**882**	**454**	**11,024**	**2.7%**

[37] There were an additional 533 participants, however, the participation dates for these program participants were not available and were therefore not included in **Tables 5-5** through **5-5d**.

Table 5-6a and **Table 5-6b** show LRP Landscape Conversion Rebate participation broken out by SFR and MFR participants, respectively. Based on this, overall participation has been 1.8% and 0.44% of SFR and MFR parcels, respectively. Relative to the number of SFR parcels, the highest level of participation has been in the City of Palo Alto, City of Sunnyvale, City of Mountain View, and Stanford University, and the lowest level of participation has been in the Cities of Milpitas and Gilroy. Relative to the number of MFR parcels, the highest level of participation has been in San José Municipal Water System, and the lowest level of participation has been in Purissima Hills Water District, Stanford University, and Great Oaks Water Company.

Figures 5-3 and **5-4** show the participation density for LRP Landscape Conversion Rebates by SFR and MFR customers, respectively. LRP Landscape Conversion Rebates have had a substantially higher density of participation by SFR customers in the area generally west of Highway 101 and east of Interstate 280 and Highway 85 than it has in the eastern, western, and southernmost portions of the County (**Figure 5-3**). This program has had lower participation overall by MFR customers, and as shown in **Figure 5-4**, no specific high or low density participation areas are identified by this analysis for MFR customers.

Table 5-6a LRP Landscape Conversion Rebate Participation by SFR by Year

Retail Agency	Year												Total	Percentage of SFR Parcels
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Jan - Aug 2020		
CWS - Los Altos	6	6	7	5	6	32	98	121	31	12	12	8	**344**	1.6%
City of Gilroy	0	0	1	0	1	10	31	46	11	4	3	5	**112**	0.94%
City of Milpitas	0	2	7	2	1	6	30	35	6	5	4	1	**99**	0.78%
City of Morgan Hill	7	6	2	1	3	21	72	85	25	6	4	5	**237**	2.4%
City of Mountain View	4	9	6	4	10	23	85	69	20	7	10	4	**251**	3.4%
City of Palo Alto	39	22	18	28	24	84	201	105	24	28	15	8	**596**	3.9%
City of Santa Clara	2	5	5	1	7	27	71	73	30	14	13	6	**254**	1.4%
City of Sunnyvale	4	12	6	6	11	48	164	167	53	13	14	8	**506**	3.5%
Great Oaks Water Company	1	2	1	6	0	21	63	67	26	6	9	3	**205**	1.2%
Purissima Hills Water District	1	0	1	1	8	8	12	9	3	2	0	0	**45**	2.4%
San José Municipal Water System	5	0	0	3	1	14	64	90	28	14	14	5	**238**	1.4%
San Jose Water Company	37	62	38	34	64	258	882	1,005	336	170	122	61	**3,069**	1.8%
Stanford University	2	4	1	1	1	3	12	3	2	0	1	1	**31**	4.7%
No Retail Agency	1	0	1	1	0	7	27	24	4	3	0	0	**68**	0.49%
Total	**109**	**130**	**94**	**93**	**137**	**562**	**1,812**	**1,899**	**599**	**284**	**221**	**115**	**6,055**	**1.8%**

Table 5-6b LRP Landscape Conversion Rebate Participation by MFR by Year

Retail Agency	Year												Total	Percentage of MFR Parcels
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Jan - Aug 2020		
CWS - Los Altos	0	0	1	0	1	1	5	1	2	0	0	0	**11**	0.31%
City of Gilroy	1	0	0	0	0	0	0	1	0	0	0	0	**2**	0.19%
City of Milpitas	0	0	0	1	1	4	4	2	1	1	0	0	**14**	0.29%
City of Morgan Hill	0	0	0	0	0	1	1	4	0	0	0	0	**6**	0.35%
City of Mountain View	0	0	1	1	0	2	11	10	1	2	2	1	**31**	0.54%
City of Palo Alto	3	1	1	0	0	0	10	3	1	1	0	0	**20**	0.89%
City of Santa Clara	0	0	1	0	1	1	6	8	3	1	0	0	**21**	0.35%
City of Sunnyvale	0	0	0	0	0	1	11	8	3	1	1	0	**25**	0.41%
Great Oaks Water Company	0	0	0	0	0	0	2	0	0	0	0	0	**2**	0.08%
Purissima Hills Water District	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0%
San José Municipal Water System	0	0	0	1	0	4	17	14	6	0	0	0	**42**	1.8%
San Jose Water Company	2	3	1	0	3	12	45	41	15	10	11	3	**146**	0.42%
Stanford University	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0%
No Retail Agency	1	1	0	0	0	0	3	1	0	0	0	0	**6**	0.19%
Total	**7**	**5**	**5**	**3**	**6**	**26**	**115**	**93**	**32**	**16**	**14**	**4**	**326**	**0.44%**

Table 5-6c and **Table 5-6d** show LRP WBIC Rebate participation broken out by SFR and MFR participants, respectively. Based on this, overall participation has been 1.1% and 0.26% of SFR and MFR parcels, respectively. As with LRP Landscape Conversion Rebates, relative to the number of SFR parcels, the highest level of participation has been in the City of Mountain View, City of Palo Alto, City of Sunnyvale, and Stanford University, and the lowest level of participation has been in the City of Gilroy and City of Milpitas. Participation in the Great Oaks Water Company service area differs, however, with a much higher level of participation in LRP Landscape Conversion Rebates than LRP WBIC Rebates.

Relative to the number of MFR parcels, the highest level of participation in the LRP has been in the Cities of Gilroy and Morgan Hill, and the lowest level of participation has been in the Great Oaks Water Company.[38]

[38] This analysis also reflects as low level of participation in the Purisima Hills Water District and Stanford University areas, however, it should be noted that these areas do not have any parcels classified by the County Assessor's office as being MFR of 3 or more units.

Figures 5-5 and **5-6** show the participation density for WBIC Rebates by SFR and MFR customers, respectively. Participation by SFR customers in the WBIC Rebates portion of the LRP shows more limited areas of high program participation, generally centered on the City of Palo Alto, areas west of El Camino Real in Los Altos, Mountain View, and Sunnyvale, and certain areas of Saratoga, Cupertino and San José (**Figure 5-5**). As with the Landscape Conversion Rebate portion of the LRP, the WBIC Rebate has had lower overall participation by MFR customers than SFR customers. However, as shown in **Figure 5-6**, some areas of high density participation are present in areas of Mountain View, Sunnyvale, and San José. Valley Water previously analyzed participation density for the LRP as a whole (see **Appendix C**). Findings from that effort are generally consistent with those shown in **Figures 5-3** through **5-6**, although this analysis also indicates areas of relatively higher participation in the western portion of the County and lower participation in the eastern portion of the County.

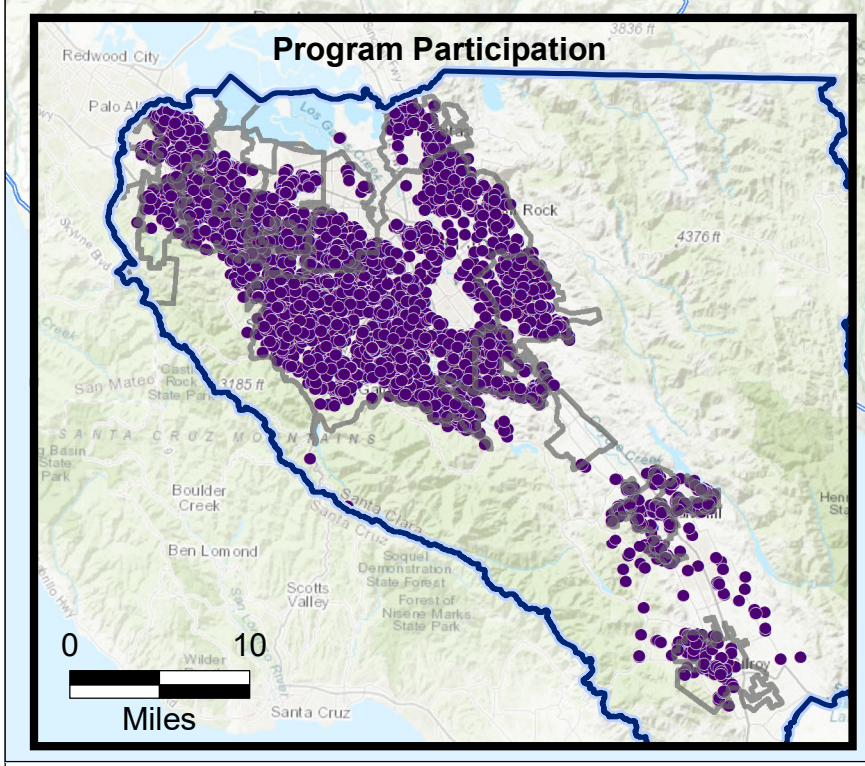
Table 5-6c LRP WBIC Rebate Participation by SFR by Year

Retail Agency	Year												Total	Percentage of SFR Parcels
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Jan - Aug 2020		
CWS - Los Altos	0	2	4	7	10	14	57	37	34	27	16	12	**220**	1.0%
City of Gilroy	0	0	0	1	0	2	4	11	7	16	19	8	**68**	0.57%
City of Milpitas	0	0	2	0	0	1	7	11	15	13	13	12	**74**	0.59%
City of Morgan Hill	0	0	0	1	3	3	19	28	21	30	18	8	**131**	1.3%
City of Mountain View	0	1	3	3	8	6	31	23	23	21	27	15	**161**	2.2%
City of Palo Alto	0	9	8	16	20	38	71	36	30	41	30	11	**310**	2.0%
City of Santa Clara	0	1	3	1	2	7	15	26	39	47	37	23	**201**	1.1%
City of Sunnyvale	0	3	0	0	7	11	50	33	58	52	45	26	**285**	1.9%
Great Oaks Water Company	0	0	0	2	3	7	5	11	21	26	25	17	**117**	0.69%
Purissima Hills Water District	1	0	0	0	2	1	1	2	2	4	3	4	**20**	1.1%
San José Municipal Water System	0	0	1	0	2	2	19	31	36	35	37	13	**176**	1.0%
San Jose Water Company	0	11	8	26	56	110	319	329	333	336	345	170	**2,043**	1.2%
Stanford University	0	0	0	1	0	15	15	1	1	0	0	0	**33**	5.0%
No Retail Agency	0	0	0	0	0	3	9	9	1	1	2	0	**25**	0.18%
Total	**1**	**27**	**29**	**58**	**113**	**220**	**622**	**588**	**621**	**649**	**617**	**319**	**3,864**	**1.1%**

Table 5-6d LRP WBIC Rebate Participation by MFR by Year

Retail Agency	Year												Total	Percentage of MFR Parcels
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Jan - Aug 2020		
CWS - Los Altos	0	0	0	2	1	2	0	0	1	0	0	0	**6**	0.17%
City of Gilroy	0	0	0	1	1	2	0	3	1	0	0	0	**8**	0.76%
City of Milpitas	1	0	1	1	1	3	4	1	0	1	0	0	**13**	0.27%
City of Morgan Hill	0	1	2	0	0	2	3	2	0	1	1	0	**12**	0.70%
City of Mountain View	1	0	2	2	0	2	5	6	0	0	2	0	**20**	0.35%
City of Palo Alto	0	0	1	1	0	3	4	1	0	0	0	0	**10**	0.45%
City of Santa Clara	1	0	1	0	1	3	6	4	2	0	1	1	**20**	0.33%
City of Sunnyvale	0	0	0	0	1	1	12	2	3	1	0	1	**21**	0.34%
Great Oaks Water Company	0	0	0	0	0	0	1	0	0	0	0	0	**1**	0.04%
Purissima Hills Water District	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0%
San José Municipal Water System	0	0	0	1	1	0	1	6	0	0	0	1	**10**	0.43%
San Jose Water Company	2	2	1	1	5	7	13	11	9	10	5	4	**70**	0.20%
Stanford University	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0%
No Retail Agency	0	0	0	0	0	1	0	0	0	0	0	0	**1**	0.03%
Total	**5**	**3**	**8**	**9**	**11**	**26**	**49**	**36**	**16**	**13**	**9**	**7**	**192**	**0.26%**

Participation Density
LRP Landscape Conversion Rebates for SFR Customers
2009-2020
6,369 Participants Analyzed



Legend

- Valley Water Boundary
- Retail Agency Boundaries
- LRP Landscape Conversion Rebates for SFR Customers Program Participation

Participation Hot and Cold Spots

- Cold Spot - 99% Confidence
- Cold Spot - 95% Confidence
- Cold Spot - 90% Confidence
- Not Significant
- Hot Spot - 90% Confidence
- Hot Spot - 95% Confidence
- Hot Spot - 99% Confidence

Abbreviations

LRP = landscape rebate program
SFR = single family residential

Notes

1. All locations are approximate.
2. Program participation hot and cold spots were evaluated using the Esri ArcGIS 10.8.0 Optimized Hot Spot Analysis tool, which calculates a Getis-Ord GI* statistic. This statistic is a measure of the spatial distribution of incidents (participation) relative to a random, equally-spaced distribution.
3. Participants included in this analysis are limited to those for which detailed participation records and location data are available.

Sources

1. Conservation program data provided by Valley Water, September 2020.
2. Basemaps provided by ESRI and Stamen Design, under CC BY 3.0. Data by OpenStreetMap, under ODbL.

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Miles

Participation Density: LRP Landscape Conversion Rebates for SFR Customers

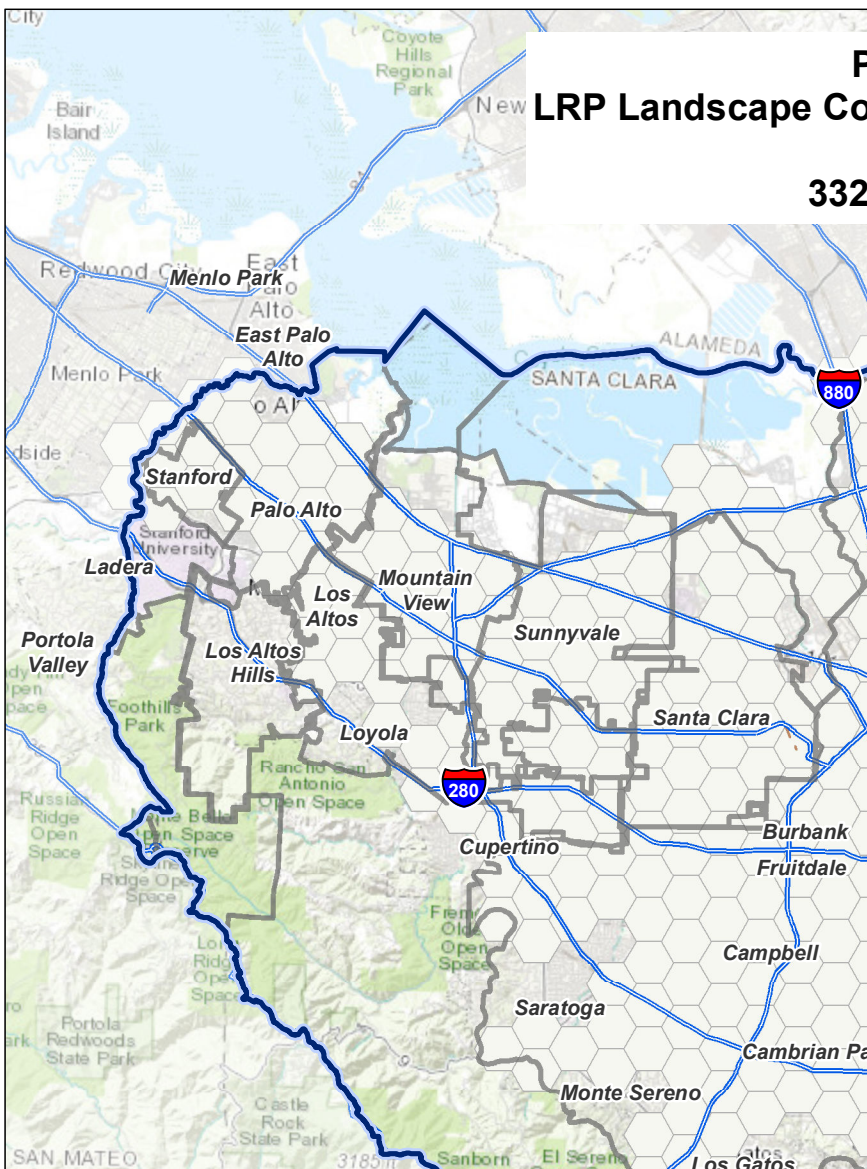
Valley Water
Water Conservation Strategic Plan
July 2021
C00054.00

Figure 5-3

eki environment & water

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Participation Density
LRP Landscape Conversion Rebates for MFR Customers
2009-2020
332 Participants Analyzed



Legend

- Valley Water Boundary
- Retail Agency Boundaries
- LRP Landscape Conversion Rebates for MFR Customers Program Participation

Participation Hot and Cold Spots

- Cold Spot - 99% Confidence
- Cold Spot - 95% Confidence
- Cold Spot - 90% Confidence
- Not Significant
- Hot Spot - 90% Confidence
- Hot Spot - 95% Confidence
- Hot Spot - 99% Confidence

Abbreviations

LRP = landscape rebate program
MFR = multi-family residential

Notes

1. All locations are approximate.
2. Program participation hot and cold spots were evaluated using the Esri ArcGIS 10.8.0 Optimized Hot Spot Analysis tool, which calculates a Getis-Ord GI* statistic. This statistic is a measure of the spatial distribution of incidents (participation) relative to a random, equally-spaced distribution.
3. Participants included in this analysis are limited to those for which detailed participation records and location data are available.

Sources

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2. Basemaps provided by ESRI and Stamen Design, under CC BY 3.0. Data by OpenStreetMap, under ODbL.

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Miles

Participation Density: LRP Landscape Conversion Rebates for MFR Customers

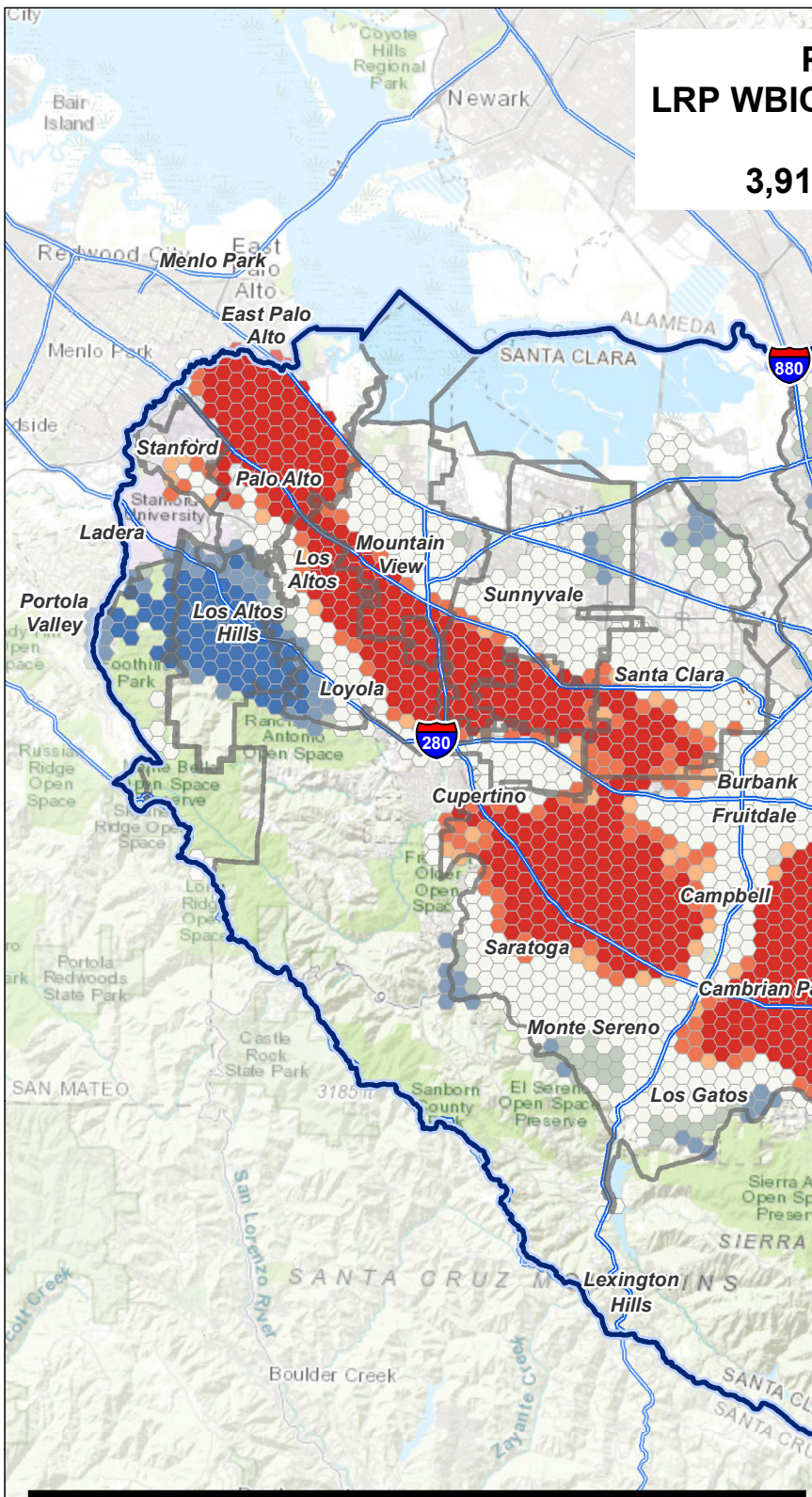
Valley Water
Water Conservation Strategic Plan
July 2021
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Figure 5-4

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Participation Density
LRP WBIC Rebates for SFR Customers
2009-2020
3,916 Participants Analyzed



Legend

- Valley Water Boundary
- Retail Agency
- LRP WBIC Rebates for SFR Customers Program Participation

Participation Hot and Cold Spots

- Cold Spot - 99% Confidence
- Cold Spot - 95% Confidence
- Cold Spot - 90% Confidence
- Not Significant
- Hot Spot - 90% Confidence
- Hot Spot - 95% Confidence
- Hot Spot - 99% Confidence

Abbreviations

LRP = landscape rebate program
SFR = single family residential
WBIC = weather-based irrigation controller

Notes

1. All locations are approximate.
2. Program participation hot and cold spots were evaluated using the Esri ArcGIS 10.8.0 Optimized Hot Spot Analysis tool, which calculates a Getis-Ord GI* statistic. This statistic is a measure of the spatial distribution of incidents (participation) relative to a random, equally-spaced distribution.
3. Participants included in this analysis are limited to those for which detailed participation records and location data are available.

Sources

1. Conservation program data provided by Valley Water, September 2020.
2. Basemaps provided by ESRI and Stamen Design, under CC BY 3.0. Data by OpenStreetMap, under ODbL.

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Miles

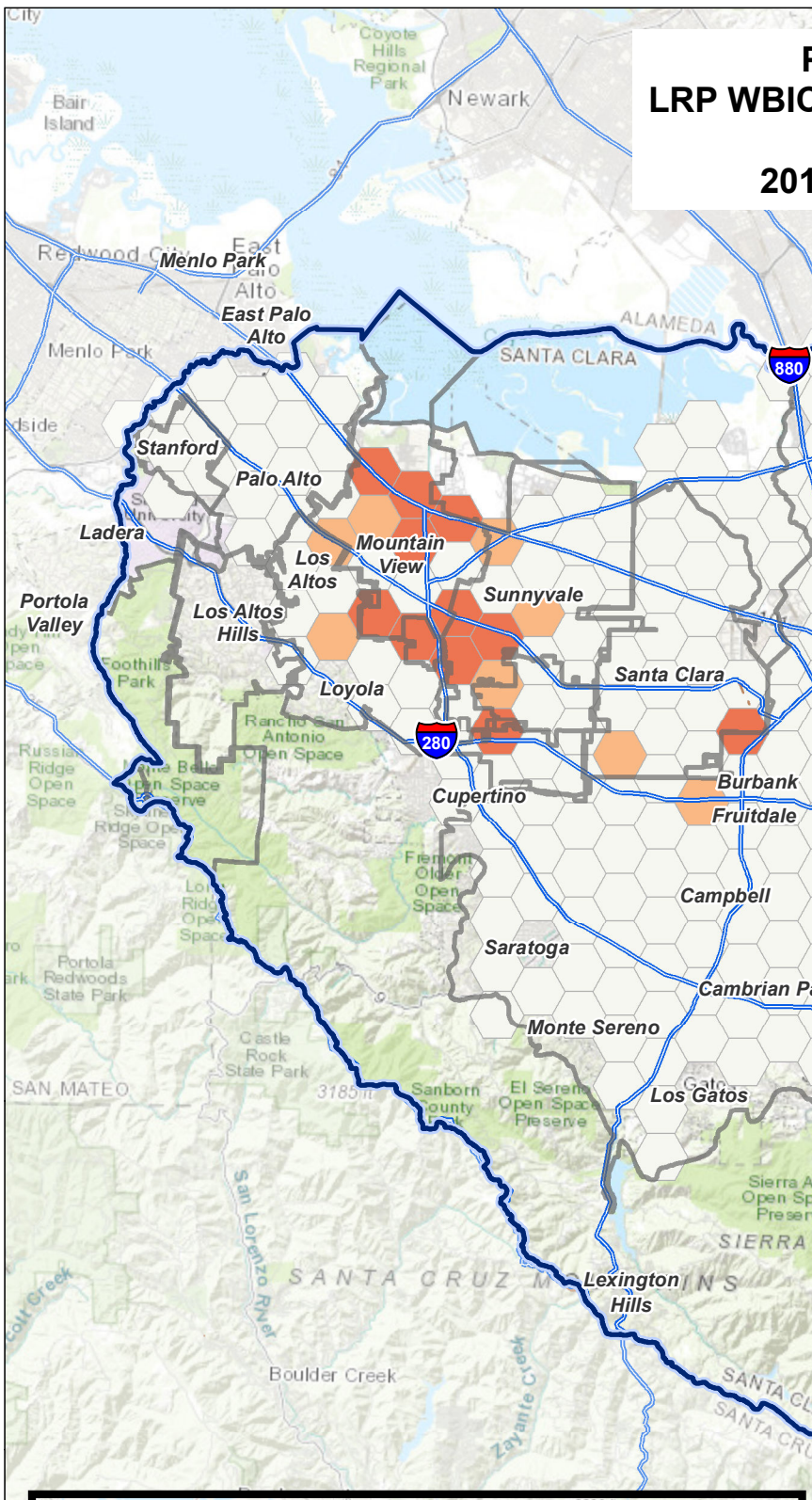
Participation Density: LRP WBIC Rebates for SFR Customers

Valley Water
Water Conservation Strategic Plan
July 2021
C00054.00
Figure 5-5

eki environment & water

Path: X:\C00054\Maps\2021\07\Fig5-5_SFR_WBIC.mxd

Participation Density
LRP WBIC Rebates for MFR Customers
2009-2020
201 Participants Analyzed



Legend

- Valley Water Boundary
- Retail Agency
- LRP WBIC Rebates for MFR Customers Program Participation

Participation Hot and Cold Spots

- Cold Spot - 99% Confidence
- Cold Spot - 95% Confidence
- Cold Spot - 90% Confidence
- Not Significant
- Hot Spot - 90% Confidence
- Hot Spot - 95% Confidence
- Hot Spot - 99% Confidence

Abbreviations

LRP = landscape rebate program
MFR = multi-family residential
WBIC = weather-based irrigation controller

Notes

1. All locations are approximate.
2. Program participation hot and cold spots were evaluated using the Esri ArcGIS 10.8.0 Optimized Hot Spot Analysis tool, which calculates a Getis-Ord GI* statistic. This statistic is a measure of the spatial distribution of incidents (participation) relative to a random, equally-spaced distribution.
3. Participants included in this analysis are limited to those for which detailed participation records and location data are available.

Sources

1. Conservation program data provided by Valley Water, September 2020.
2. Basemaps provided by ESRI and Stamen Design, under CC BY 3.0. Data by OpenStreetMap, under ODbL.

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Participation Density: LRP WBIC Rebates for MFR Customers

Valley Water
Water Conservation Strategic Plan
July 2021
C00054.00

Figure 5-6

eki environment & water

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5.2.4 Submeter Rebate Program

Table 5-7 presents the participation in the Submeter Rebate Program. This program has had 44 MFR participants from 2000 through August 2020, with the greatest level of participation in 2009. Relative to the total number of MFR parcels in the County, this represents a participation rate of 0.06%. It should be noted that the total count of MFR parcels may include those that are already submetered, and thus the total participation rate estimated herein likely underestimates the overall percentage of submetered MFR parcels. Relative to the total number of MFR parcels, the highest level of participation has been by customers in the City of Sunnyvale, City of Morgan Hill, and San José Municipal Water system areas. All other service areas have had relatively minimal participation.[39]

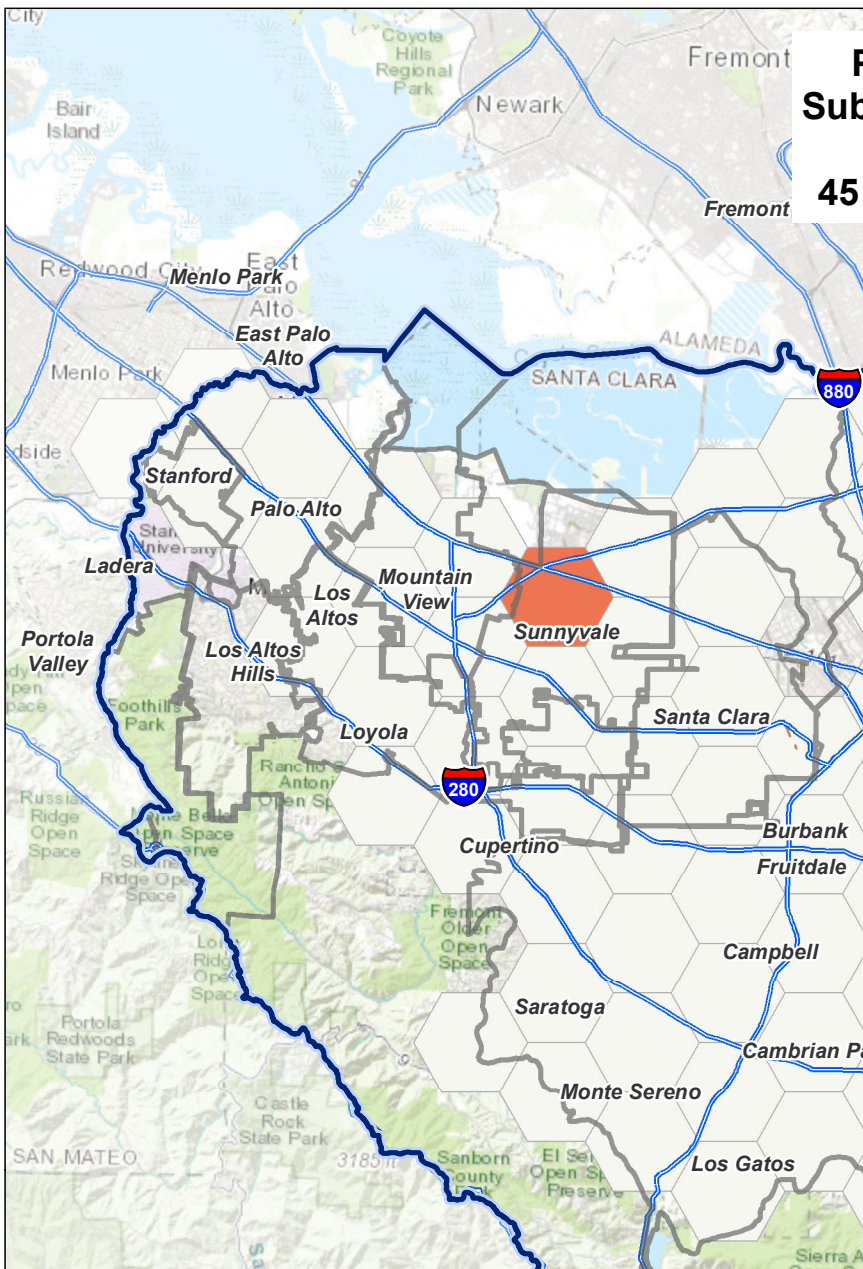
Table 5-7 Summary of Participation in Submeter Rebate Program

Retail Agency	Year														Total	Percentage of MFR Parcels
	Pre-2008	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Jan - Aug 2020		
CWS - Los Altos	0	0	0	0	0	0	0	1	0	1	0	0	0	0	**2**	0.06%
City of Gilroy	0	0	0	0	0	0	0	0	0	0	1	0	0	0	**1**	0.09%
City of Milpitas	0	0	0	0	0	0	0	0	0	0	0	1	1	0	**2**	0.04%
City of Morgan Hill	0	1	0	0	0	0	0	0	0	0	0	1	0	0	**2**	0.12%
City of Mountain View	0	0	1	1	1	0	0	0	0	1	0	0	0	0	**4**	0.07%
City of Palo Alto	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0%
City of Santa Clara	0	0	0	0	0	0	0	0	0	0	1	0	0	0	**1**	0%
City of Sunnyvale	1	0	6	0	0	0	1	0	0	0	0	1	0	0	**9**	0.15%
Great Oaks Water Company	0	0	0	0	0	0	0	0	0	1	0	0	0	0	**1**	0.04%
Purissima Hills Water District	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0%
San José Municipal Water System	0	0	0	1	1	1	0	0	0	0	0	0	0	0	**3**	0.13%
San Jose Water Company	4	3	1	3	0	1	1	0	2	0	0	3	0	1	**19**	0.05%
Stanford University	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0%
No Retail Agency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	0%
Total	**5**	**4**	**8**	**5**	**2**	**2**	**2**	**1**	**2**	**3**	**2**	**6**	**1**	**1**	**44**	**0.06%**

[39] The Santa Clara County Assessor's Office groups mobile home parks within the MFR of 5 or more units classification, and thus mobile home parks cannot be readily identified in the assessor dataset.

Figure 5-7 shows the results of the participation density analysis for the Submeter Rebate Program, which is available for MFR and mobile home park customers. While program participation has been limited, a higher density of participation is observed in the portion of San José served by the San Jose Water Company and in a portion of the City of Sunnyvale.

Participation Density
Submeter Rebate Program
2000-2020
45 Participants Analyzed



Legend

- Valley Water Boundary
- Retail Agency Boundaries
- Submeter Rebate Program Participation

Participation Hot and Cold Spots

- Cold Spot - 99% Confidence
- Cold Spot - 95% Confidence
- Cold Spot - 90% Confidence
- Not Significant
- Hot Spot - 90% Confidence
- Hot Spot - 95% Confidence
- Hot Spot - 99% Confidence

Abbreviations

MFR = multi-family residential

Notes

1. All locations are approximate.
2. Program participation hot and cold spots were evaluated using the Esri ArcGIS 10.8.0 Optimized Hot Spot Analysis tool, which calculates a Getis-Ord GI* statistic. This statistic is a measure of the spatial distribution of incidents (participation) relative to a random, equally-spaced distribution.
3. Participants included in this analysis are limited to those for which detailed participation records and location data are available.

Sources

1. Conservation program data provided by Valley Water, September 2020.
2. Basemaps provided by ESRI and Stamen Design, under CC BY 3.0. Data by OpenStreetMap, under ODbL.

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Participation Density: Submeter Rebate Program

Valley Water
Water Conservation Strategic Plan
July 2021
C00054.00

Figure 5-7

eki environment & water

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5.2.5 Water Wise Survey Program

Table 5-8a and **Table 5-8b** present the participation in the Water Wise Indoor Survey DIY Kit and WWOS Programs, respectively. From 2017 through August 2020, there have been 682 Water Wise DIY Indoor Kit participants, and 714 WWOS participants. Relative to the total residential parcels in the County, including both SFR and MFR parcels, this represents a participation rate of 0.17% for both the indoor and outdoor portions of the Water Wise Survey Program.

The distribution of participation between the Water Wise Indoor Survey DIY Kit and WWOS have been very consistent. Relative to the total number of residential parcels, the highest levels of participation in both the indoor and outdoor portions have been by customers in the City of Mountain View, City of Palo Alto, Milpitas, and Stanford University, and the lowest has been in the Cal Water Los Altos District, City of Gilroy, San Jose Water Company (which has its own similar program), and Great Oaks Water Company. The only notable difference in participation on a percentage of parcel basis has been in the City of Mountain View, where customers have participated in the WWOS at approximately twice the level of Water Wise DIY Kit.

Table 5-8a Summary of Participation in Water Wise DIY Indoor Kit

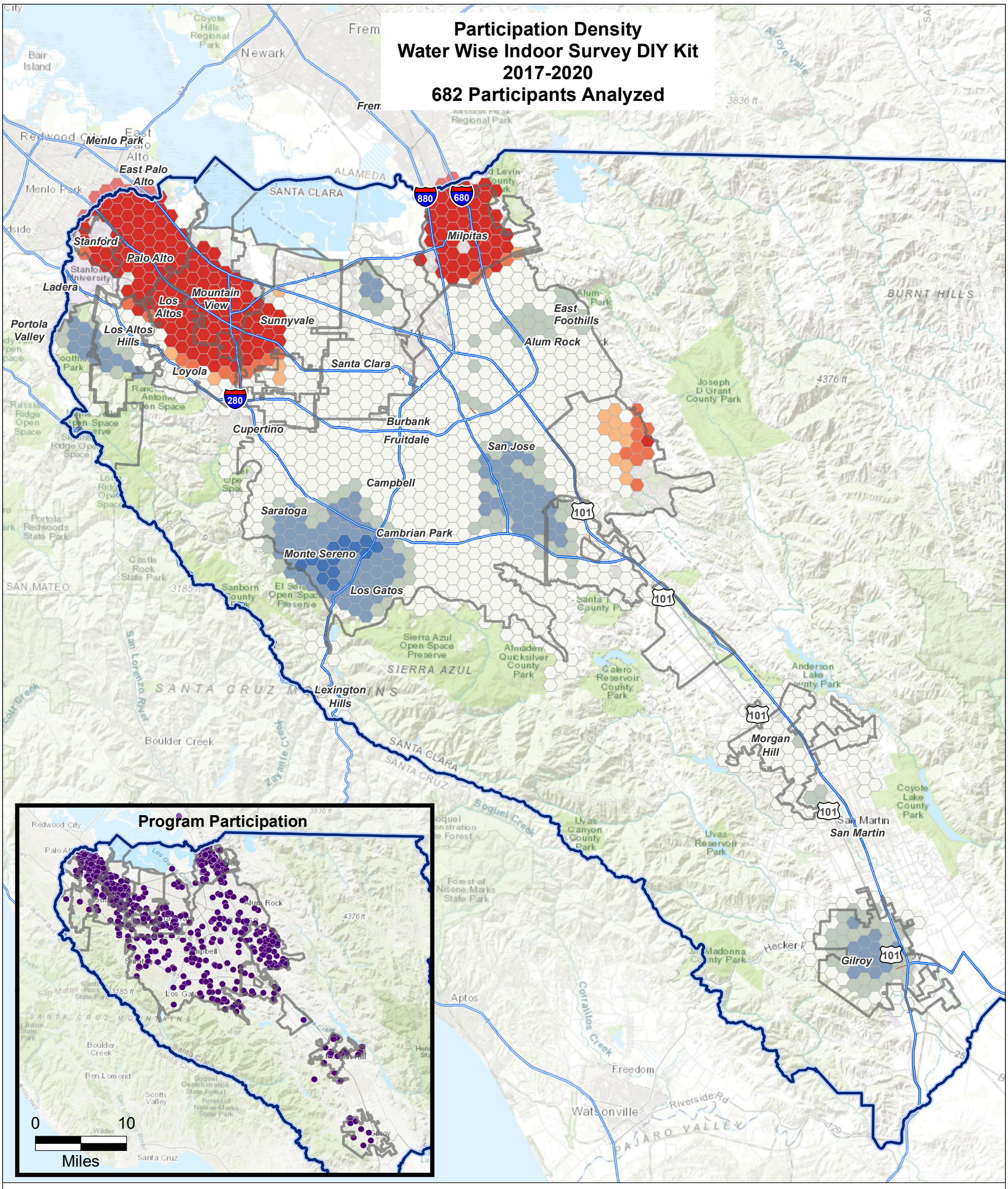
Retail Agency	Year				Total	Percentage of Residential Parcels
	2017	2018	2019	Jan - Aug 2020		
CWS - Los Altos	8	3	5	3	**19**	0.07%
City of Gilroy	5	2	0	1	**8**	0.06%
City of Milpitas	50	16	10	10	**86**	0.49%
City of Morgan Hill	7	2	8	4	**21**	0.18%
City of Mountain View	39	31	25	2	**97**	0.74%
City of Palo Alto	71	18	8	20	**117**	0.67%
City of Santa Clara	13	14	12	5	**44**	0.18%
City of Sunnyvale	12	9	5	4	**30**	0.14%
Great Oaks Water Company	10	2	3	3	**18**	0.09%
Purissima Hills Water District	2	0	2	0	**4**	0.21%
San José Municipal Water System	12	29	12	5	**58**	0.30%
San Jose Water Company	63	43	23	31	**160**	0.08%
Stanford University	5	0	0	0	**5**	0.74%
No Retail Agency	10	4	0	1	**15**	0.09%
Total	**307**	**173**	**113**	**89**	**682**	**0.17%**

Table 5-8b Summary of Participation in Water Wise Outdoor Survey

Retail Agency	Year				Total	Percentage of Residential Parcels
	2017	2018	2019	Jan - Aug 2020		
CWS - Los Altos	9	9	21	5	**44**	0.17%
City of Gilroy	6	3	3	0	**12**	0.09%
City of Milpitas	27	28	19	4	**78**	0.45%
City of Morgan Hill	11	7	17	4	**39**	0.33%
City of Mountain View	41	92	51	9	**193**	1.5%
City of Palo Alto	49	34	19	9	**111**	0.64%
City of Santa Clara	16	26	12	2	**56**	0.23%
City of Sunnyvale	13	7	16	4	**40**	0.19%
Great Oaks Water Company	8	1	6	4	**19**	0.10%
Purissima Hills Water District	3	2	1	1	**7**	0.37%
San José Municipal Water System	17	49	29	7	**102**	0.53%
San Jose Water Company	2	1	1	0	**4**	0%
Stanford University	3	0	2	2	**7**	1.0%
No Retail Agency	0	0	1	1	**2**	0.01%
Total	**205**	**259**	**198**	**52**	**714**	**0.17%**

Figure 5-8 and **Figure 5-9** show the results of the participation density analysis for the Water Wise Indoor Survey DIY Kit and WWOS, respectively. WWOS are not offered to customers of San Jose Water Company, and thus this area was excluded from the analysis in **Figure 5-9**. Overall, both the indoor and outdoor portions of the program show similar areas of higher participation density, with areas of high participation centered generally in the Cities of Mountain View, Palo Alto, Sunnyvale, Milpitas, and east San José. Both programs had low participation in the Cities of Los Altos and Gilroy, southeastern San José, and northern Santa Clara. The WWOS also had low participation in the City of Morgan Hill and northern Sunnyvale.

Participation Density
Water Wise Indoor Survey DIY Kit
2017-2020
682 Participants Analyzed



Legend

- Valley Water Boundary
- Retail Agency
- Water Wise Indoor Survey DIY Kit Program Participation

Participation Hot and Cold Spots

- Cold Spot - 99% Confidence
- Cold Spot - 95% Confidence
- Cold Spot - 90% Confidence
- Not Significant
- Hot Spot - 90% Confidence
- Hot Spot - 95% Confidence
- Hot Spot - 99% Confidence

Abbreviations

DIY = Do-It-Yourself

Notes

1. All locations are approximate.
2. Program participation hot and cold spots were evaluated using the Esri ArcGIS 10.8.0 Optimized Hot Spot Analysis tool, which calculates a Getis-Ord GI* statistic. This statistic is a measure of the spatial distribution of incidents (participation) relative to a random, equally-spaced distribution.
3. Participants included in this analysis are limited to those for which detailed participation records and location data are available.

Sources

1. Conservation program data provided by Valley Water, September 2020.
2. Basemaps provided by ESRI and Stamen Design, under CC BY 3.0. Data by OpenStreetMap, under ODbL.

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Participation Density: Water Wise Indoor Survey DIY Kit

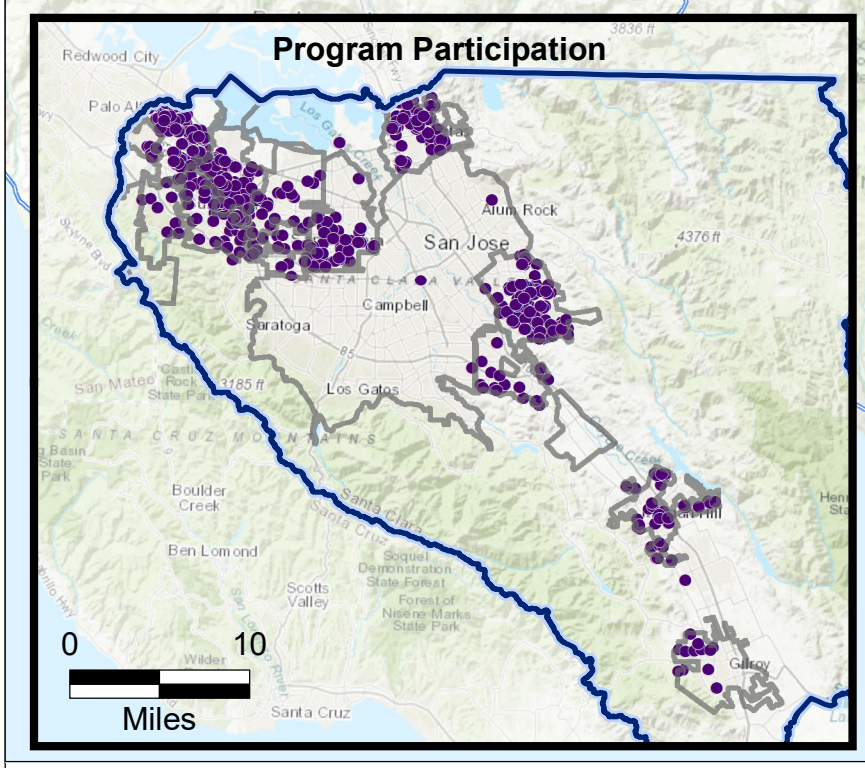
Valley Water
Water Conservation Strategic Plan
July 2021
C00054.00

Figure 5-8

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Participation Density
Water Wise Outdoor Survey Program
2017-2020
713 Participants Analyzed



Legend

- Valley Water Boundary
- Retail Agency Boundaries
- Water Wise Outdoor Survey Participation

Participation Hot and Cold Spots

- Cold Spot - 99% Confidence
- Cold Spot - 95% Confidence
- Cold Spot - 90% Confidence
- Not Significant
- Hot Spot - 90% Confidence
- Hot Spot - 95% Confidence
- Hot Spot - 99% Confidence

Notes

1. All locations are approximate.
2. Program participation hot and cold spots were evaluated using the Esri ArcGIS 10.8.0 Optimized Hot Spot Analysis tool, which calculates a Getis-Ord GI* statistic. This statistic is a measure of the spatial distribution of incidents (participation) relative to a random, equally-spaced distribution.
3. Participants included in this analysis are limited to those for which detailed participation records and location data are available. Water Wise Outdoor Surveys are not offered to customers within the San Jose Water Company service area, and are thus the service area is excluded from this analysis.

Sources

1. Conservation program data provided by Valley Water, September 2020.
2. Basemaps provided by ESRI and Stamen Design, under CC BY 3.0. Data by OpenStreetMap, under ODbL.

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Participation Density: Water Wise Outdoor Survey

Valley Water
Water Conservation Strategic Plan
July 2021
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Figure 5-9

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5.3 Building Stock Characteristics

Certain characteristics related to buildings and lots can influence, or at least be correlated with, water use. In general, older homes and businesses tend to have higher water using fixtures that were installed prior to the passage of key changes to the federal and California plumbing, energy, and building codes; these customers represent an opportunity to increase water use efficiency. Homes and businesses on larger lots tend to use more water because they have larger irrigated landscaped areas. Similarly, larger homes may have more occupants and, therefore, more water use.

In order to assess the distribution of housing stock and other key water use characteristics, conservation program participation rates were evaluated based on key data extracted from the Santa Clara County Assessor parcel dataset.[40] These data include lot and building sizes, as well as the building construction date, and are summarized in **Table 5-9** for residential building stock and **Table 5-10** for CII building stock.

5.3.1 Residential Building Stock

Across the Valley Water service area, the average residential lot size is 11,532 sq ft (0.26 acres), and ranges on average from 5,664 sq ft (0.13 acres, City of Milpitas) to 63,410 sq ft (1.5 acres, Purissima Hills Water District), as shown in **Figure 5-10** below. This suggests that there may be a significant range of outdoor water use savings opportunities depending on where specific residential conservation programs are implemented. For example, participation in the LRP by Purissima Hills Water District customers was low; however, this area tends to have the largest lot sizes of any of the retail service areas.

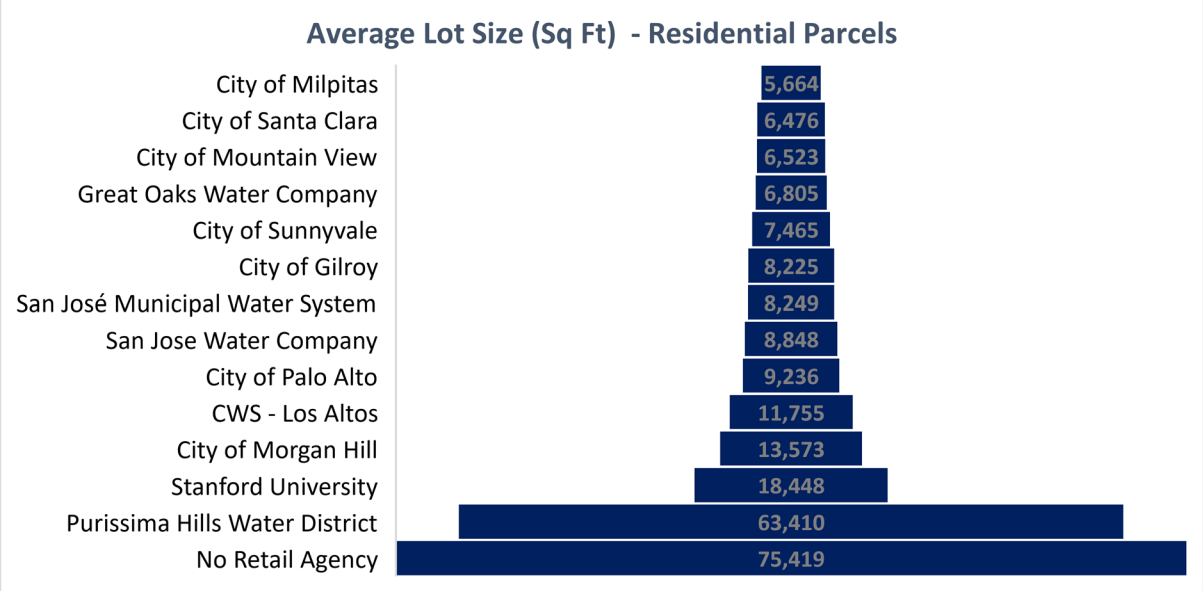


Figure 5-10 Average Lot Size for Residential Parcels

[40] Assessor's parcel number (APN) is tracked by Valley Water as part of program participation records for some programs. For participation records without known APN records, for purposes of this analysis, APNs were assigned based on property address, where possible.

Across the Valley Water service area, the average residential building interior size is 2,206 sq ft, and ranges on average from 1,850 sq ft (Great Oaks Water Company) to 4,006 sq ft (Purissima Hills Water District), as shown in **Figure 5-11** below. This suggests that residential building interior sizes are more similar between retail agencies than lot size.

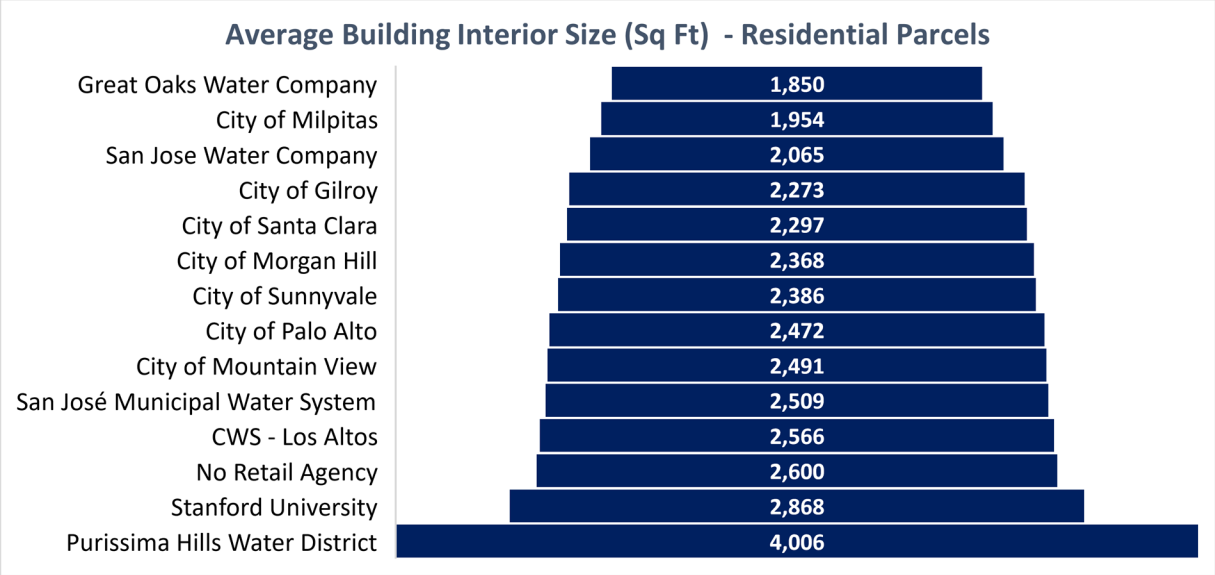
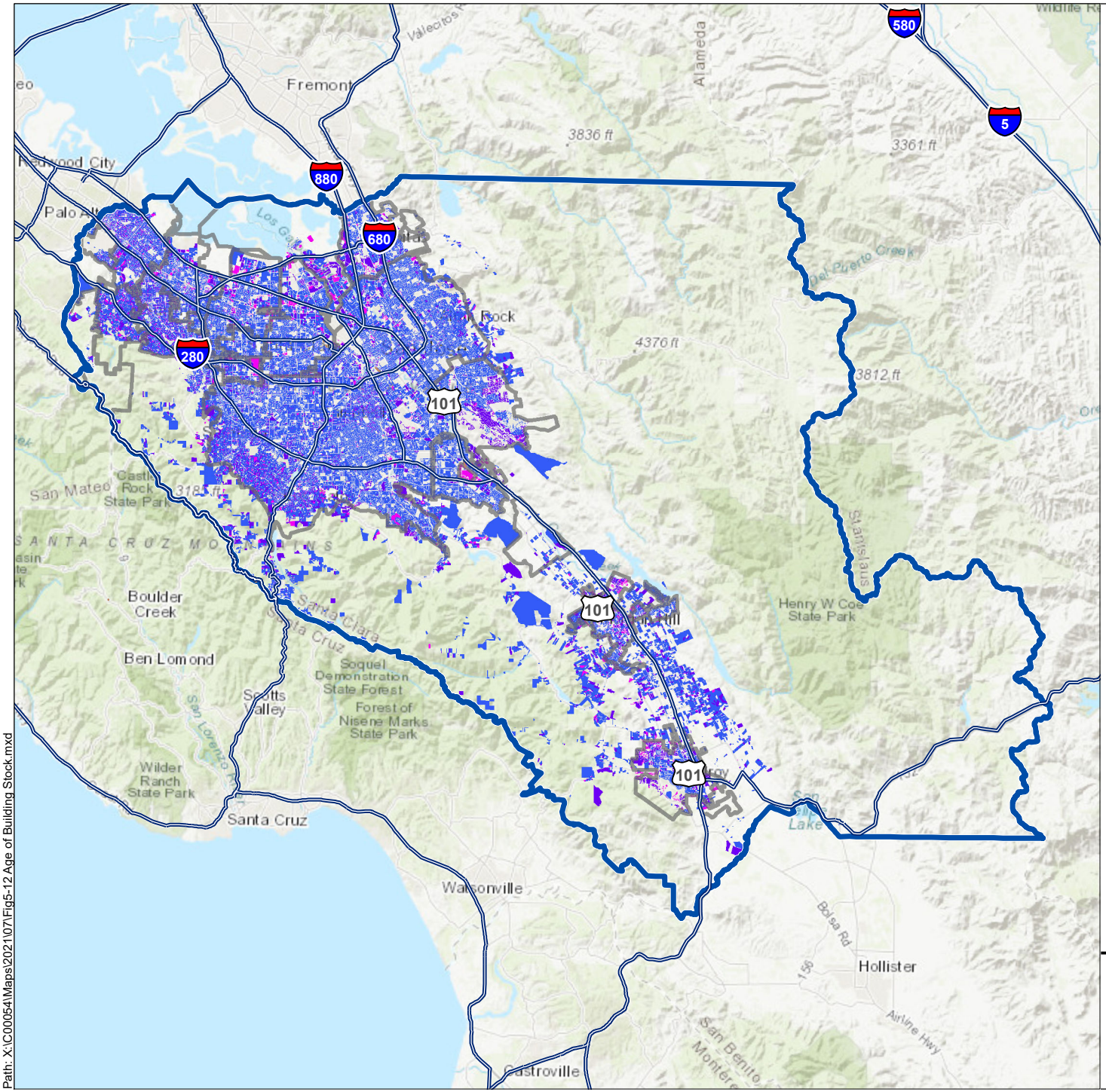


Figure 5-11 Average Building Interior Size for Residential Parcels

Figure 5-12 presents a map of building age across the Valley Water service area. Across the service area, the average year of construction for residential buildings is 1972, while the average year of construction in each retail agency ranges from 1967 (Stanford University, City of Palo Alto, City of Santa Clara) to 1990 (City of Morgan Hill).



Legend

- Valley Water Boundary
- Retail Agency Boundaries

Date of Construction

- Pre-1994 (373,474 parcels)
- 1994 - 2009 (65,576 parcels)
- 2010 and Later (26,007 parcels)

Notes

1. All locations are approximate.
2. Construction date is based on effective year built, where available, per Reference 1.

Sources

1. Santa Clara County, 2020. Santa Clara County Assessor Parcel Data, provided via Valley Water, 22 September 2020.

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Age of Building Stock

Valley Water
Water Conservation Strategic Plan
San Jose, CA
July 2021
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Figure 5-12

Path: X:\C00054\Maps\2021\07\Fig5-12 Age of Building Stock.mxd

Figure 5-13 below shows the percentage of residential parcels constructed before 1994, from 1994 and 2009, and 2010 or later.[41] Approximately 70% or more of the residential building stock within the majority of retail agency service areas was constructed prior to 1994, with the exceptions being the City of Sunnyvale, Gilroy, and Morgan Hill. Based on this, conservation programs that target fixture and appliance change outs would be expected to have greater benefits in the retail agencies with high proportions of pre-1994 homes than in others.

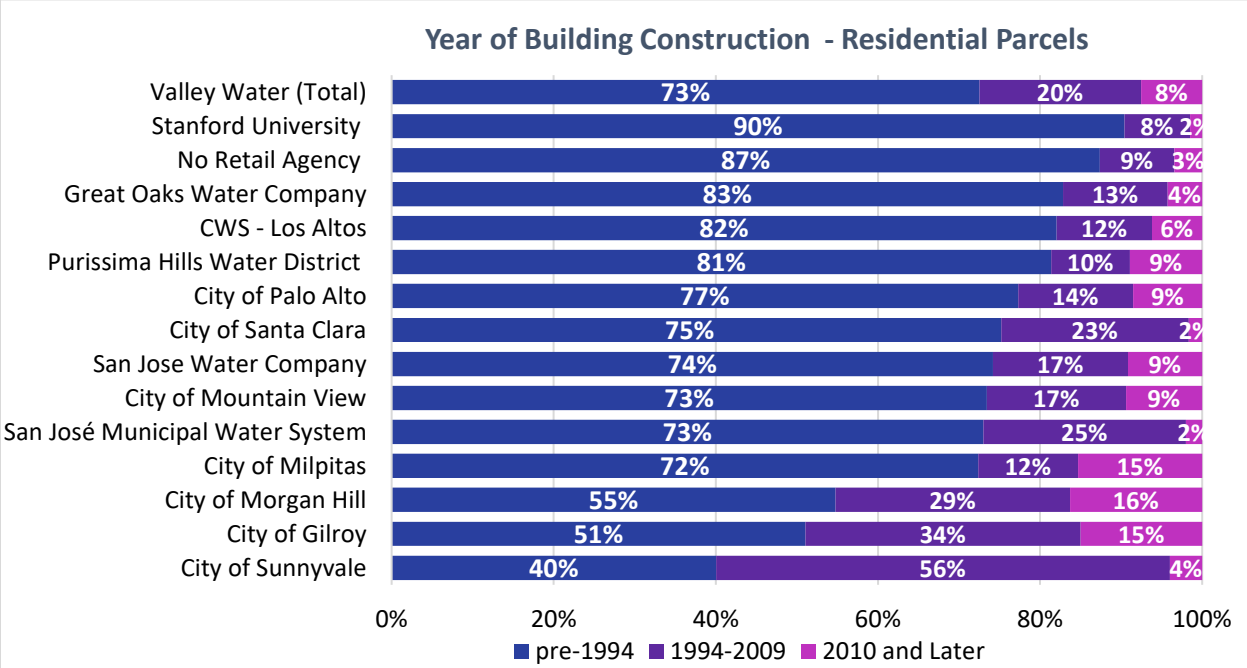


Figure 5-13 Year of Building Construction for Residential Parcels

5.3.2 CII Building Stock

Across the Valley Water service area, the average CII lot size is 97,419 sq ft (2.2 acres), and ranges on average from 53,860 sq ft (1.2 acres, San Jose Water Company) to 488,318 sq ft (11 acres, Stanford University),[42] as shown in **Figure 5-14** below. This suggests that there may be a significant range of outdoor water use savings opportunities depending on the where specific CII conservation programs are implemented. It is noted that the extent of landscaping on CII parcels tends to be more variable than residential parcels, and thus lot size may not be as strong an indicator of potential outdoor savings as it is for residential parcels. That is, a CII parcel may be very large, but almost entirely paved or covered by building footprints, with very little landscaped area.

[41] 1994 was selected as a breakpoint for this analysis, because this the year that the 1992 Federal Energy Policy Act (H.R. 776) that first set efficiency standards for toilets, showerheads and faucets went into effect. 2010 was selected as a breakpoint for this analysis because this is a year significant changes were made to Model Water Efficient Landscape Ordinance requirements (CCR Title 23, §490-495).

[42] Because of its nature as a college campus, the parcel lot size for Stanford University would be expected to be an outlier. This is also expected for parcels in the No Retail Agency category, as they are generally located in rural areas and have larger lot sizes.

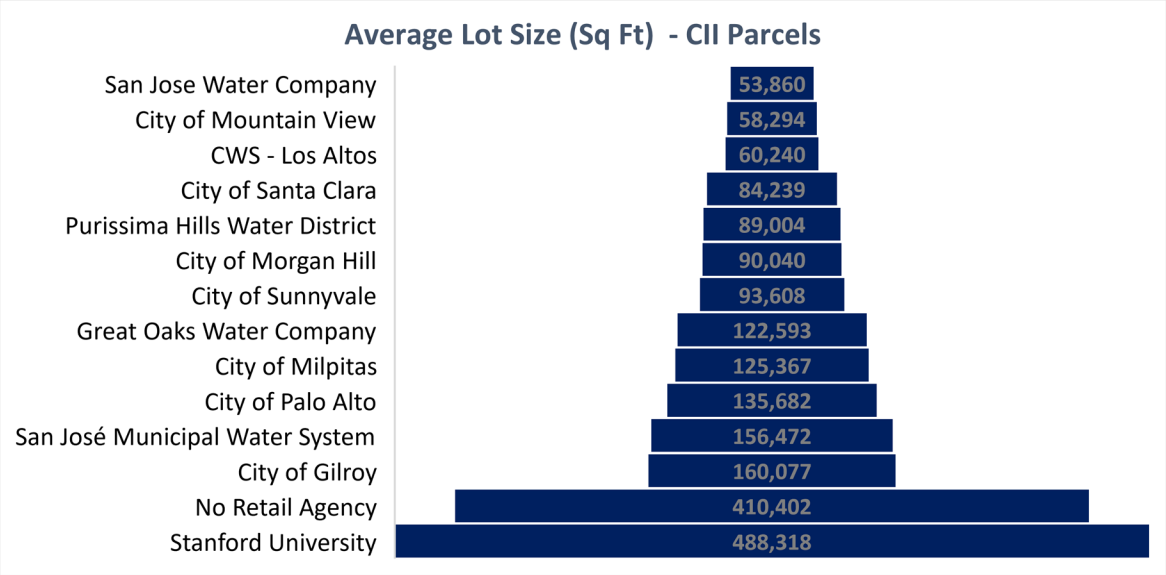


Figure 5-14 Average Lot Size for CII Parcels

Across the Valley Water service area, the average CII building interior size is 18,111 sq ft, and ranges on average from 1,696 sq ft (Stanford University) to 54,406 sq ft (San José Municipal Water System), as shown in **Figure 5-15** below. This suggests that there may be a significant range of indoor water use savings opportunities depending on where specific CII conservation programs are implemented and the exact nature of the CII use.

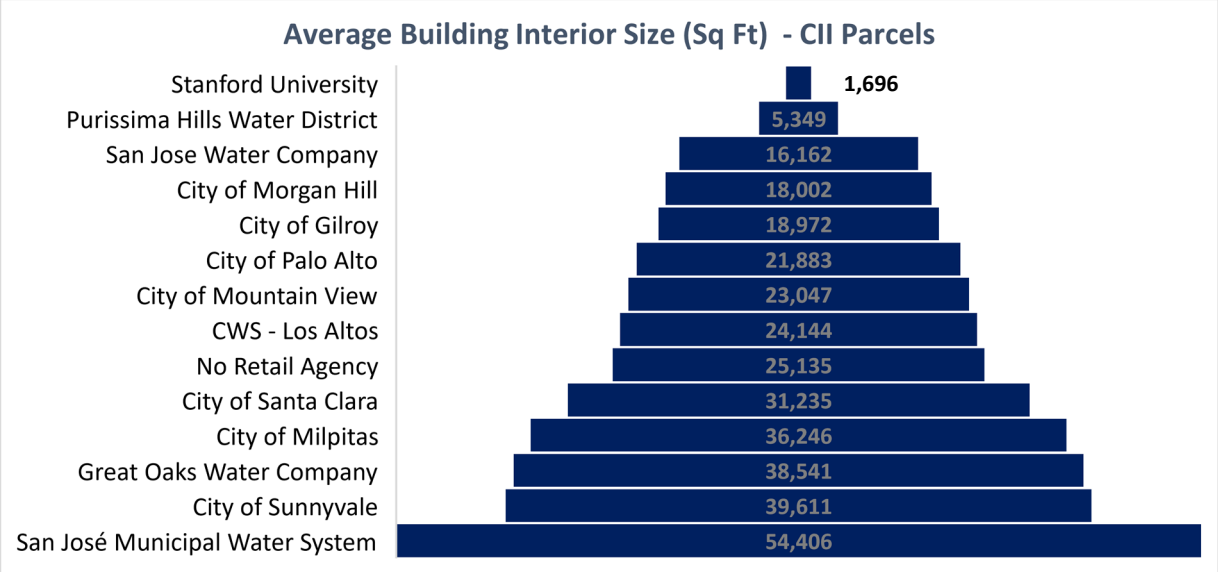


Figure 5-15 Average Building Interior Size for CII Parcels

Across the Valley Water service area, the average year of construction for CII parcels is 1968, and the average year ranges from 1904 (Stanford University) to 1988 (Great Oaks Water Company). **Figure 5-16** below shows the percentage of CII buildings constructed before 1994, from 1994 and

2009, and 2010 or later.[43] Approximately 70% or more of the CII building stock within the majority of retail agency service areas was constructed prior to 1994, with the exceptions being the San José Municipal Water System, Great Oaks Water Company, and the City of Morgan Hill. Based on this, conservation programs that target fixture and appliance change outs would be expected to have greater benefits in the retail agencies with high proportions of pre-1994 CII buildings than in others.

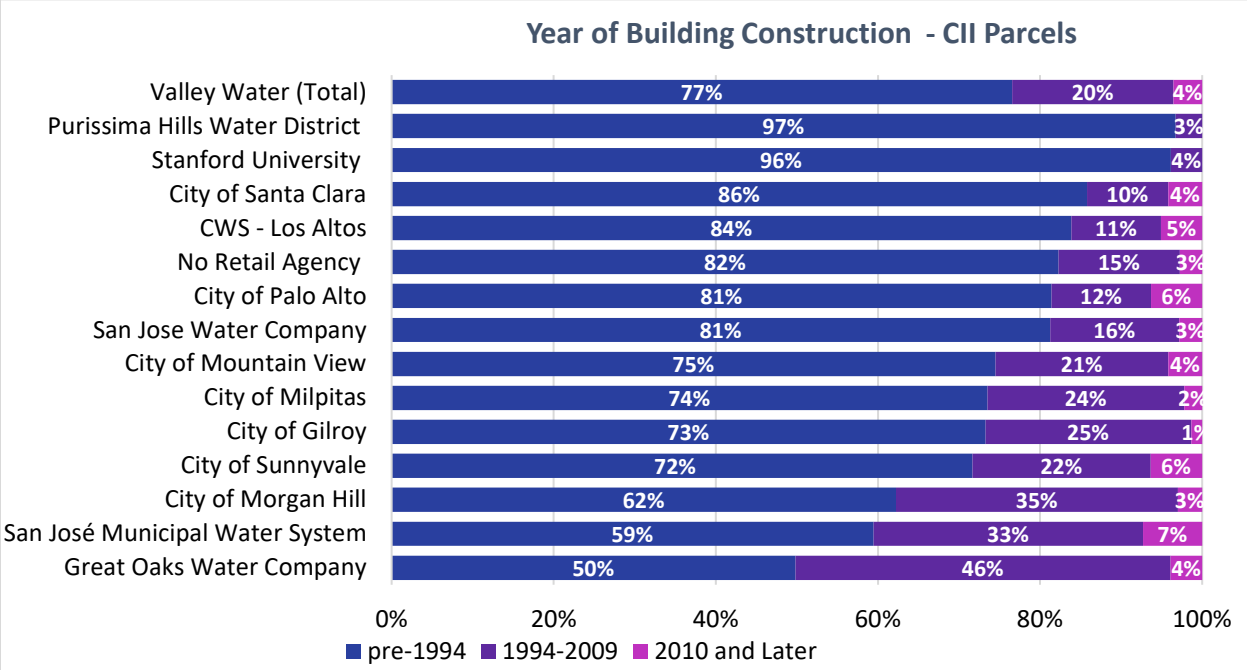


Figure 5-16 Year of Building Construction for CII Parcels

5.3.3 Program Participation by Building Stock Characteristics

5.3.3.1 Residential Program Participants

Building stock characteristics for SFR and MFR program participants for each of the five selected conservation programs are summarized in **Table 5-11**. The first chart shows the total number of participants for each program by age of building construction, while the second chart shows the results after controlling for the relative number of residential parcels within each building age category. The table also summarizes the average lot size, average building interior size, average year built, and distribution of building age for the residential participants in the five programs.

Building interior and lot size vary significantly between programs, as participants represent a range of SFR and MFR homes. Participants in the Graywater Programs overall tended to have older, smaller homes (building interior size) than participants in other programs, but generally consistent lot sizes. The average year of construction for participants in each program ranges

[43] 1994 was selected as a breakpoint for this analysis, because this the year that the 1992 Federal Energy Policy Act (H.R. 776) that first set efficiency standards for toilets, showerheads and faucets went into effect. 2010 was selected as a breakpoint for this analysis because this is a year significant changes were made to Model Water Efficient Landscape Ordinance requirements (CCR Title 23, §490-495).

from 1964 to 1976, with the majority of participation (78% or more) for all programs associated with homes constructed prior to 1994.[44]

When the relative proportion of number of parcels within each building age group is controlled for, customer participation by building age indicated the following:

- Participants in the HET and Submeter Rebate programs in homes constructed prior to 1994 tend to participate at higher rates than those with newer homes, as would be expected based on HET Program eligibility requirements and the fact that only newer MFR developments tend to have been designed with individual meters. This indicates that the HET and Submeter Rebate programs have been effective at reaching those customers who, given the building age, are expected to receive the highest benefit from these programs.
- Participants in the Graywater and LRP in homes constructed prior to 1994 also tend to participate at higher rates than those with newer homes. Unlike the programs such as the HET Program that replace older fixtures, customers in newer homes also have the potential to benefit from the Graywater Programs and LRP. However, based on participation to date, it appears that that potential is not being fully tapped. Thus, this indicates an opportunity to increase participation in the Graywater Programs and LRP for customers in newer homes.
- In the Water Wise Survey Program, participants in homes constructed from 1994 to 2009 tend to participate at a higher rate than those with newer or older homes. Given that this program is designed to help customers identify areas where they can increase water efficiency, those in homes constructed prior to 1994 and to a lesser extent, in 2010 or later, would also be expected to receive a similar benefit. Thus, this represents an opportunity to increase participation in this program, particularly among customers with older homes.

For additional reference, the differences of program participation rates relative to residential building stock characteristics between and across retail agencies are presented in **Appendix C**.

5.3.3.2 CII Program Participants

Table 5-12 presents building stock characteristics for the two programs applicable for CII customers, i.e., the HET Program and LRP. The first chart shows the total number of participants by program by age of building construction, while the second chart shows the results after controlling for the relative number of parcels within each age category. The table also summarizes the average lot size, average building interior size, average year built, and distribution of building age for the CII participants in the two programs.

For both programs, the majority of participants were in buildings constructed prior to 1994. However, when the relative proportion of number of parcels within each building age group is controlled for, CII customer participation by building age indicated the following:

[44] Although not reflected in **Table 5-5**, it is noted that building characteristics for participants in the Landscape Conversion and WBIC Rebate portions of the program were generally similar, as were the characteristics for participants in the indoor and outdoor portions of the Water Wise Survey program.

- HET Program (CII customers) – customers in older buildings participated at the highest rates, as would be expected given the program eligibility parameters. This indicates that this program has been effective at reaching its target customers.
- LRP (CII customers) – customers in buildings constructed between 1994 and 2009 have had the highest rate of participation (by 13%), and customers in buildings constructed prior to 1994 and in 2010 or later appear to be underrepresented by 8.2% and 5%, respectively. This indicates an opportunity to increase participation in the LRP for CII customers in both older and newer buildings.

For additional reference, the differences in program participation rates relative to CII building stock characteristics between and across retail agencies are presented in **Appendix C**.

Table 5-9
Residential Building Stock Characteristics by Retail Agency
Valley Water, Water Conservation Strategic Plan

Retail Agency	Number of Parcels	Avg Lot Size (sq ft)	Avg Building Interior Size (sq ft)	Avg Year Built	Year of Construction		
					pre-1994	1994-2009	2010 and Later
CWS - Los Altos	25,572	11,755	2,566	1972	82%	12%	6%
City of Gilroy	12,915	8,225	2,273	1986	51%	34%	15%
City of Milpitas	17,474	5,664	1,954	1983	72%	12%	15%
City of Morgan Hill	11,691	13,573	2,368	1990	55%	29%	16%
City of Mountain View	13,076	6,523	2,491	1975	73%	17%	9%
City of Palo Alto	17,408	9,236	2,472	1967	77%	14%	9%
City of Santa Clara	24,119	6,476	2,297	1967	75%	23%	2%
City of Sunnyvale	20,726	7,465	2,386	1970	40%	56%	4%
Great Oaks Water Company	19,404	6,805	1,850	1976	83%	13%	4%
Purissima Hills Water District	1,868	63,410	4,006	1979	81%	10%	9%
San José Municipal Water System	19,309	8,249	2,509	1984	73%	25%	2%
San Jose Water Company	209,037	8,848	2,065	1968	74%	17%	9%
Stanford University	675	18,448	2,868	1967	90%	8%	2%
No Retail Agency	17,076	75,419	2,600	1982	87%	9%	3%
Valley Water (Total)	**410,350**	**11,532**	**2,206**	**1972**	**73%**	**20%**	**8%**

Abbreviations:

Avg = average
CWS = California Water Service - Los Altos District
sq ft = square feet

Notes:

(a) Residential parcels include both single-family and multi-family parcels.
(b) Average lot size, building interior space, and year of construction are based on "USABLE_SQ_," "TOTAL_AREA," and "EFFECTIVE_BUILT" per Source 1.

Sources:

1. Santa Clara County, 2020. Santa Clara County Assessor Parcel Data, provided via Valley Water, 22 September 2020.

Table 5-10
CII Building Stock Characteristics by Retail Agency
Valley Water, Water Conservation Strategic Plan

Retail Agency	Number of Parcels	Avg Lot Size (sq ft)	Avg Building Interior Size (sq ft)	Avg Year Built	Year of Construction		
					pre-1994	1994-2009	2010 and Later
Great Oaks Water Company	382	122,593	38,541	1988	50%	46%	4%
San José Municipal Water System	826	156,472	54,406	1983	59%	33%	7%
City of Morgan Hill	962	90,040	18,002	1974	62%	35%	3%
City of Sunnyvale	1,307	93,608	39,611	1981	72%	22%	6%
City of Gilroy	1,202	160,077	18,972	1968	73%	25%	1%
City of Milpitas	928	125,367	36,246	1983	74%	24%	2%
City of Mountain View	1,212	58,294	23,047	1975	75%	21%	4%
San Jose Water Company	12,076	53,860	16,162	1966	81%	16%	3%
City of Palo Alto	1,368	135,682	21,883	1963	81%	12%	6%
No Retail Agency	2,089	410,402	25,135	1936	82%	15%	3%
CWS - Los Altos	978	60,240	24,144	1963	84%	11%	5%
City of Santa Clara	1,912	84,239	31,235	1976	86%	10%	4%
Stanford University	85	488,318	1,696	1904	96%	4%	0%
Purissima Hills Water District	111	89,004	5,349	1910	97%	3%	0%
Valley Water (Total)	**25,438**	**97,419**	**18,111**	**1968**	**77%**	**20%**	**4%**

Abbreviations:

Avg = average
CII = commercial, industrial, and institutional
CWS = California Water Service - Los Altos District
sq ft = square feet

Notes:

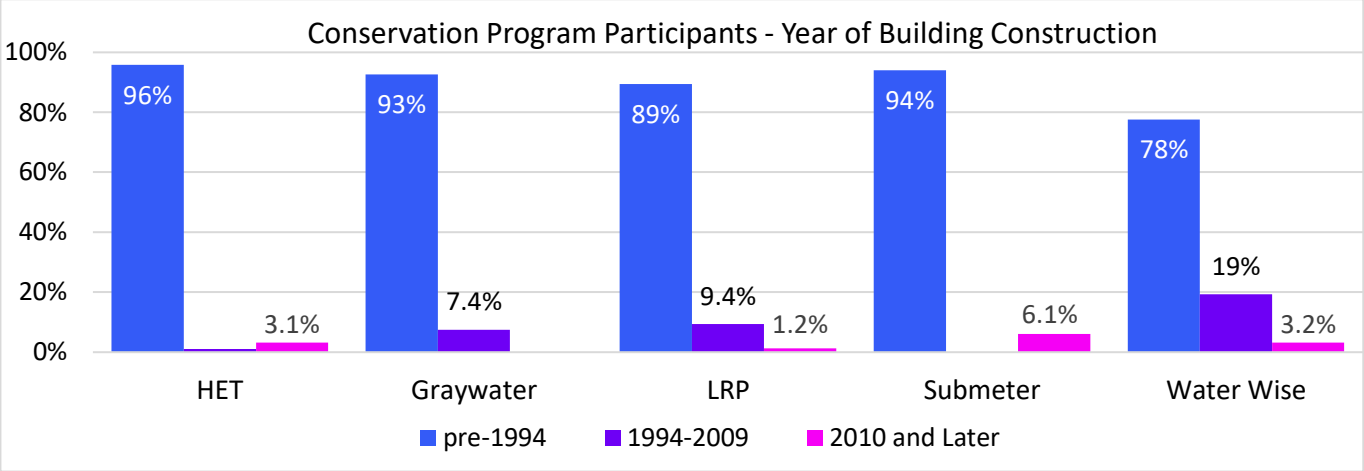
(a) CII parcels include the following use types: shopping centers, other shopping areas, other urban, manufacturing, public and quasi-public buildings and uses, and public and quasi-public open space.
(b) Average lot size, building interior space, and year of construction are based on "USABLE_SQ_," "TOTAL_AREA," and "EFFECTIVE_BUILT" per Source 1.

Sources:

1. Santa Clara County, 2020. Santa Clara County Assessor Parcel Data, provided via Valley Water, 22 September 2020.

Table 5-11
Residential Building Stock Characteristics for Program Participants
Valley Water, Water Conservation Strategic Plan

Water Conservation Program (a)	Avg Year Built	Avg Lot Size (sq ft)	Avg Building Interior Size (sq ft)	Year of Construction		
				pre-1994	1994-2009	2010 and Later
HET Program	1967	88,848	37,827	96%	1.0%	3.1%
Graywater Programs	1959	15,348	1,817	93%	7.4%	0%
LRP Landscape Conversion and WBIC Rebates	1968	13,645	2,971	89%	9.4%	1.2%
Submeter Rebate Program	1972	570,595	2,985	94%	0.0%	6.1%
Water Wise Survey Program	1974	10,577	2,666	78%	19%	3.2%



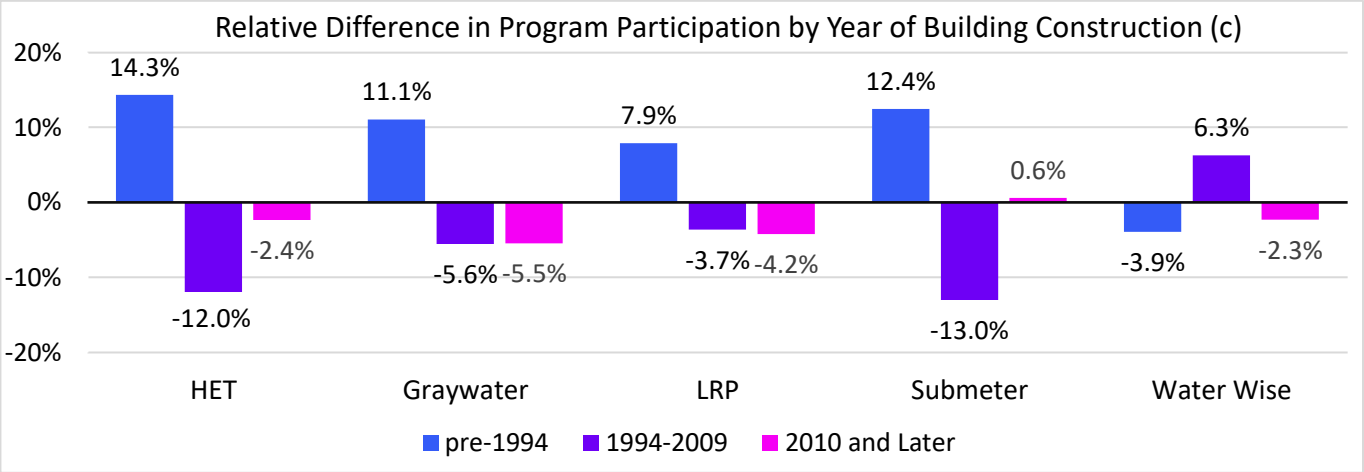


Table 5-11
Residential Building Stock Characteristics for Program Participants
Valley Water, Water Conservation Strategic Plan

Abbreviations:

ac = acre
avg = average
DIY = do it yourself
HET = high efficiency toilets
LRP = Landscape Rebate Program
MFD = multi-family dwelling
sq ft = square feet
WBIC = weather-based irrigation controller

Notes:

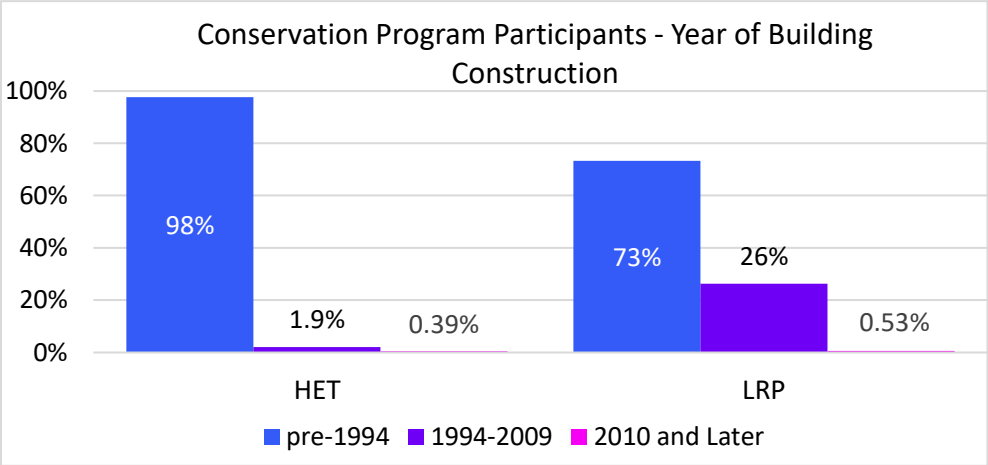
(a) Residential customers include both single-family and multi-family customers. Program participants included in this analysis are limited to those for which relevant parcel data are available.
(b) Several programs have had limited participation. The small sample size should be considered when evaluating these results. Specifically, the Graywater Rebate and Direct Installation Program had 126 participants and the Submeter Rebate Program had 45 participants.
(c) Relative difference is calculated as the percentage of program participation by year of construction minus the overall percentage of residential customers by year of construction within the service area.

Sources:

1. Santa Clara County, 2020. Santa Clara County Assessor Parcel Data, provided via Valley Water, 22 September 2020.

Table 5-12
CII Building Stock Characteristics for Program Participants
Valley Water, Water Conservation Strategic Plan

Water Conservation Program (a)	Avg Year Built	Avg Lot Size (sq ft)	Avg Building Interior Size (sq ft)	Year of Construction		
				pre-1994	1994-2009	2010 and Later
HET Program	1972	120,082	34,221	98%	1.9%	0.39%
LRP Landscape Conversion and WBIC Rebates	1983	321,914	82,465	73%	26%	0.53%



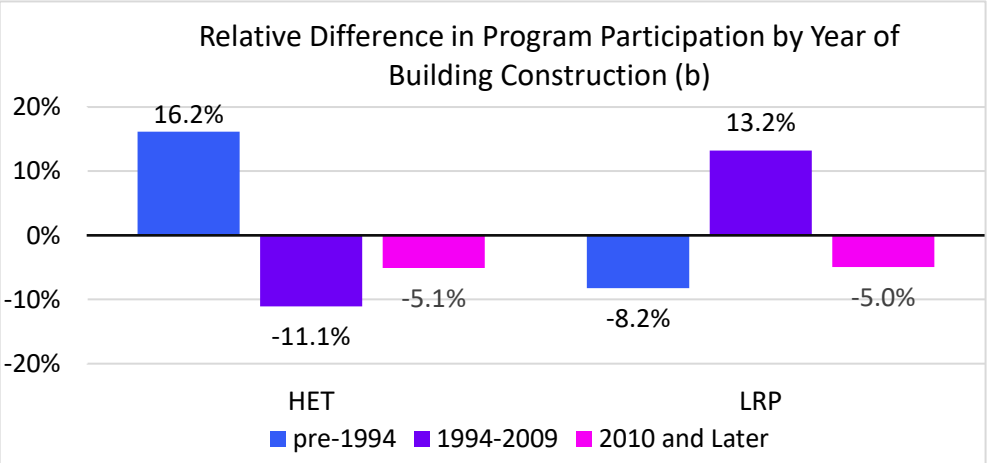


Table 5-12
CII Building Stock Characteristics for Program Participants
Valley Water, Water Conservation Strategic Plan

Abbreviations:

ac = acre
avg = average
CII = commerical, industrial, and institutional
DIY = do it yourself
HET = high efficiency toilets
LRP = Landscape Rebate Program
MFD = multi-family dwelling
sq ft = square feet
WBIC = weather-based irrigation controller

Notes:

(a) Program participants included in this analysis are limited to those for which relevant parcel data are available. Agricultural, extractive, open land, transportation, communications, and utilities sectors are excluded from analysis.
(b) Relative difference is calculated as the percentage of program participation by year of construction minus the overall percentage of residential customers by year of construction within the service area.

Sources:

1. Santa Clara County, 2020. Santa Clara County Assessor Parcel Data, provided via Valley Water, 22 September 2020.

5.4 Demographic Characteristics of Residential Water Conservation Program Participation

The residential water conservation programs are broadly offered to all residents in the Valley Water service area.[45] Although the programs are available to all residents, those with certain demographic characteristics can tend to participate at higher or lower rates in certain programs. The analyses described in the following sections were performed in order to better understand trends in customer demographics among residential water conservation program participants in the Valley Water service area—specifically, trends related to household income, median age of household members, and whether the home occupants rent or own the property.

5.4.1 Methodology

The following sections describe the data used to analyze demographic characteristic trends in program participation. It should be noted that several of the programs analyzed, in particular the Graywater and Submeter Programs had low levels of participation (i.e., 125 and 44 participants, respectively) relative to other programs and the overall size of the County. These programs are included in the analyses described below, but it should be noted that the results associated with these programs should be considered less robust, and while based on the best available information, due to the small sample sizes may not reflect actual demographic trends in program participation.

Household Income

Household income data were based on the estimated 2018 median household income by Census Block Group (Census, 2020). The average median persons per household for Santa Clara County is 2.97 (Census, 2020). The estimated 2018 median household income by Census Block Group was compared to 2020 California Department of Housing and Community Development (HCD) income levels for a three-person household in Santa Clara County (HCD, 2018). These income levels are defined as follows: very low income (<$59,850/year), low income ($59,850 to $85,050/year), moderate income ($85,050 to $135,250/year), high income ($135,250 to $169,050/year), and very high income (>$169,050). For purposes of this analysis, very high income is considered to be 150% of the median income of $112,700. The following sections discuss the breakdown of participation in the five conservation programs by income classification. Given that these classifications reflect the median of all households in a given Census Block Group, this reflects the predominant income for that area, but does not mean that every participant or household in that area falls within the same income group.

Median Age of Household Members

Median age of household members was similarly based on the estimated 2018 median household age by Census Block Group (Census, 2020). This reflects the median of all household members including children. Thus, a Census Block Group with a median household age of <25 reflects an area with a number of households with children, while a median household age of >55 reflects an area with fewer children and more retirement-age households.

Rentership vs. Home Ownership Status

Rentership status was based on 2018 Census estimates of the number of people living within a Census Block Group that rent the home they occupy (Census, 2020). Thus, a Census Block Group

[45] The Water Wise Outdoor Survey is not offered in the San Jose Water Company service area.

with a rentership population of less than 25% indicates that the area consists primarily of owner-occupied homes, while a rentership population of greater than 75% indicates that the area is predominantly made up of those who rent their homes.

Program participation was compared to the demographic composition of the Valley Water service area by parcel based on the above characteristics. In terms of interpreting the results, a 0% difference occurs when the distribution of program participation matches the distribution of the demographic characteristics within the service area. A positive relative difference (measured in %) indicates a higher program participation than would be expected if all demographic groups had equal levels of participation. Likewise, a negative relative difference (measured in %) indicates lower program participation than would be expected if all demographic groups had equal levels of participation.

5.4.2 Household Income Trends

The proportion of residential customers in each median household income classification varies within each retail agency area. **Figure 5-17** below shows the proportion of residential parcels within each income group (based on Census data) for each retail agency and **Figure 5-18** shows the distribution of median household income by Census Block Group across the Valley Water service area.

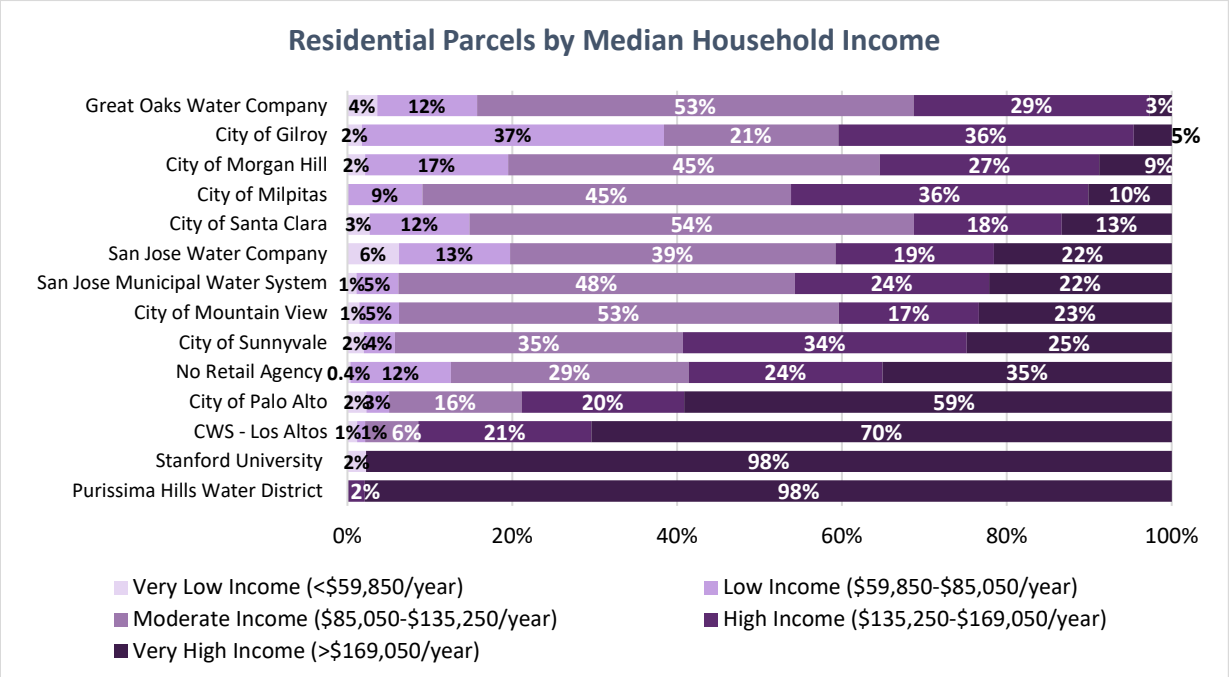


Figure 5-17 Residential Parcels by Median Household Income

Table 5-13 shows the distribution of residential water conservation program participants by income level.[46] The first chart in **Table 5-13** shows the percentage of participants in each program that live in areas of each income level grouping. The majority of participants in most programs

[46] Participants are limited to residential customers only, as income and other Census demographic data are not applicable to CII customers.

have been located in moderate to high income areas (up to 51%), and the lowest overall participation has been in very low income households (1.3 to 14%).

The second chart on **Table 5-13** shows participation rates controlled for the number of parcels within the Valley Water service area within each income group. When the relative proportion of number of parcels within each income group is controlled for, customer participation by income level are more variable for each program:

- HET Program (MFR customers) – the highest participation has been by customers in very low to moderate income areas, with the highest participation among these groups by customers in moderate income areas (14% higher). Customers in high and very high income areas have had lower levels of participation (by 9.5% and 16% respectively).
- Graywater Programs (SFR customers) – customers in very high income areas have had the highest rate of participation (by 10%), and customers in moderate income areas appear to be underrepresented by 12%.[47]
- LRP (SFR and MFR customers) – customers in very high income areas have had the highest rate of participation (by 15%), and customers in very low, low, and moderate income areas appear to be underrepresented by 1.7%, 5.5%, and 8.3%, respectively.
- Submeter Program (MFR customers) – customers in very low to moderate income areas have had the highest rate of participation (by 6.8% to 14%), and customers in high and very high income areas show an underrepresentation of 11% and 19% respectively.[47]
- Water Wise Survey Program (primarily SFR customers) – customers in very high income areas have had the highest level of participation, by 17%. Customer in low and moderate income areas appear to be underrepresented by 7.1% and 7.8% respectively.

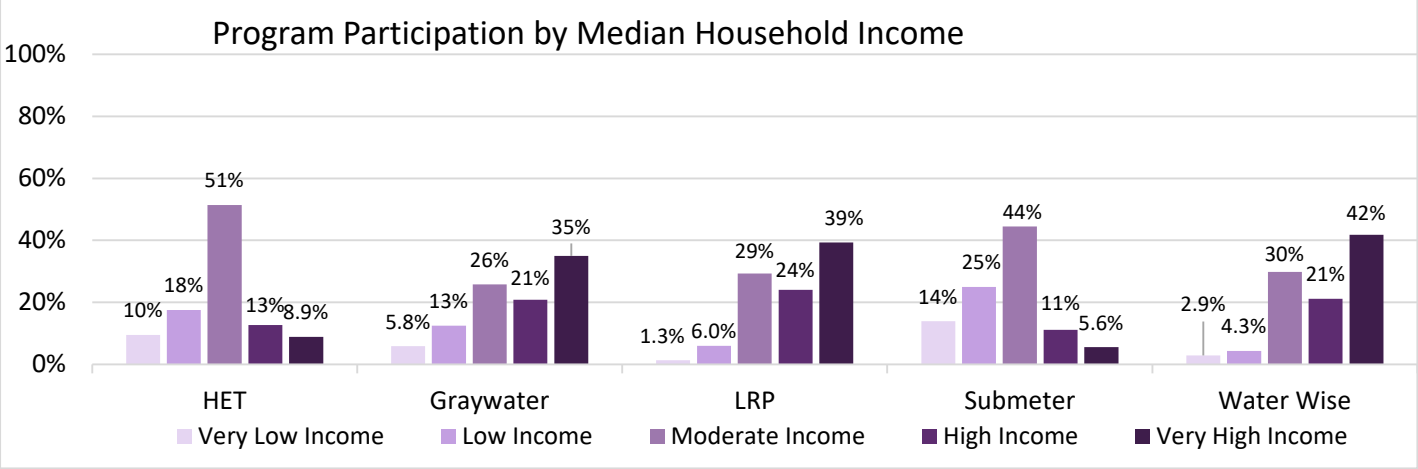
Based on the above, there appear to be opportunities to increase participation in the Graywater programs in moderate income areas, and in the LRP and Water Wise Survey Programs in low and moderate income areas.

Further analysis of program participation by customer income demographics for customers within each retail agency is provided in **Appendix C**.

[47] It is noted that the results associated with the Graywater and Submeter Programs should be considered less robust, and while based on the best available information, due to the small sample sizes may not reflect actual trends in program participation.

Table 5-13
Residential Customer Program Participation by Median Household Income
Valley Water, Water Conservation Strategic Plan

Median Household Income (a)		Percentage of Residential Customers in Santa Clara County (b)	Percentage of Participating Residential Customers (c)				
			HET Program	Graywater Programs	LRP Landscape Conversion and WBIC Rebates	Submeter Rebate Program	Water Wise Survey Program
Very Low Income	<$59,850	4.0%	10%	5.8%	1.3%	14%	2.9%
Low Income	$59,850 - $85,050	11%	18%	13%	6.0%	25%	4.3%
Moderate Income	$85,050 - $135,250	38%	51%	26%	29%	44%	30%
High Income	$135,250 - $169,050	22%	13%	21%	24%	11%	21%
Very High Income	>$169,050	25%	8.9%	35%	39%	5.6%	42%



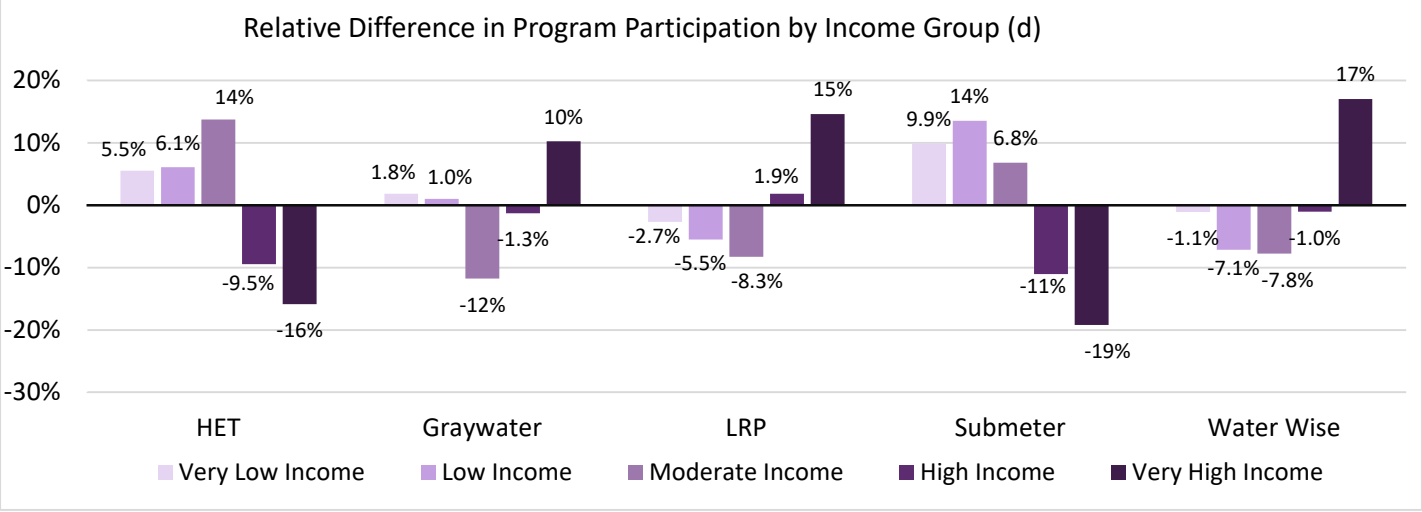


Table 5-13
Residential Customer Program Participation by Median Household Income
Valley Water, Water Conservation Strategic Plan

Abbreviations:

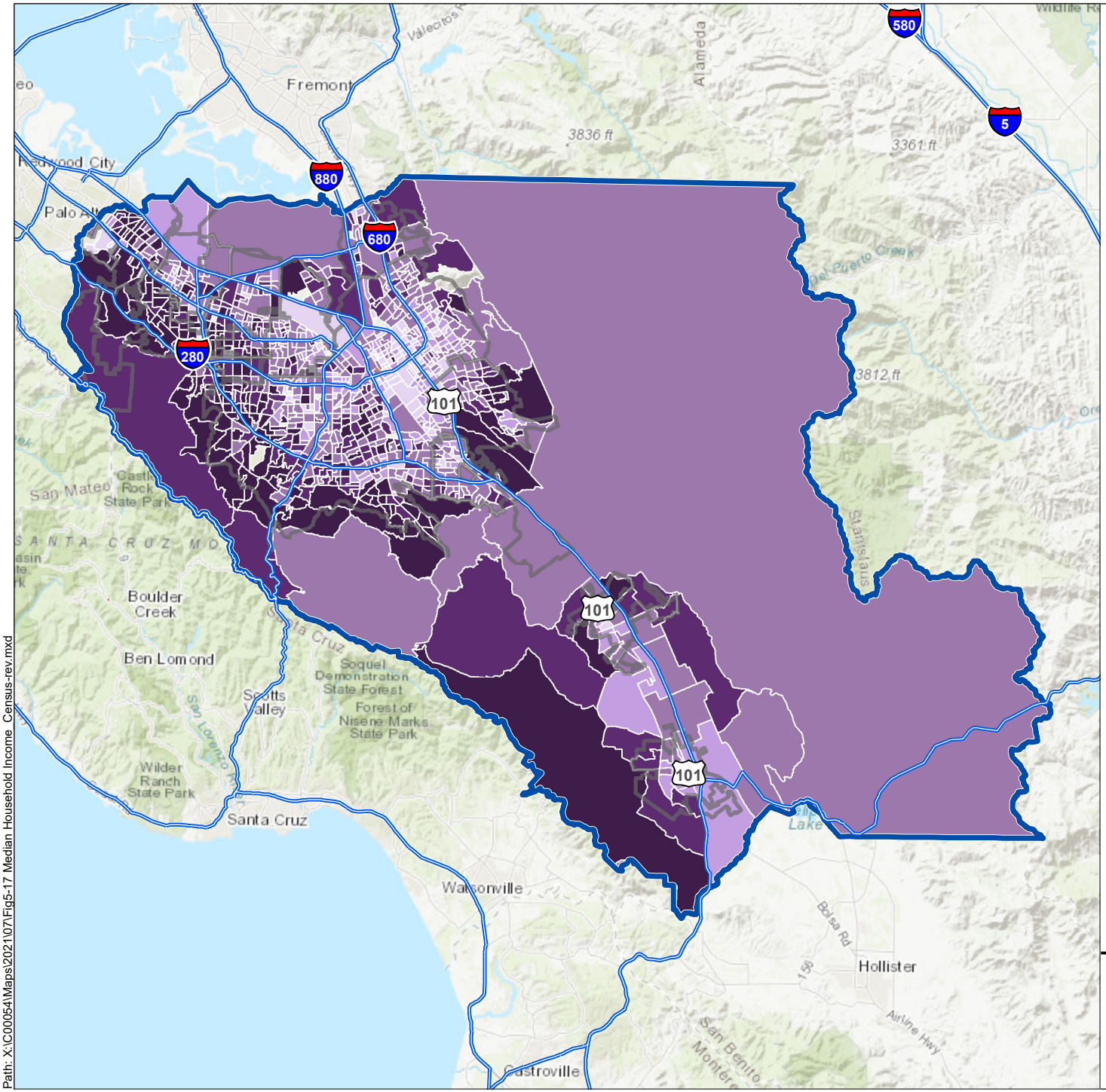
DIY = do it yourself
HET = high efficiency toilets
HCD = California Department of Housing and Community Development
LRP = Landscape Rebate Program
MFD = multi-family dwelling
WBIC = weather-based irrigation controller

Notes:

(a) Household income is based on estimated 2018 median household income by Census Block Group, per Census (2020). Income level groupings are based on California Department of Housing and Community Development ("HCD") income levels for Santa Clara County for a 3-person household in 2018 (HCD, 2018). Low income includes extremely low and very low groupings. The average persons per household is 2.97 for Santa Clara County.
(b) Residential customers include both single-family and multi-family customers. Participants included in this analysis are limited to those for which location data are available.
(c) Several programs have had limited participation. The small sample size should be considered when evaluating these results. Specifically, the Graywater Rebate and Direct Installation Program had 126 residential participants and the Submeter Rebate Program had 45 residential participants.
(d) Relative difference is calculated as the percentage of program participation by income group minus the overall percentage of residential customers by income group within the service area.

References:

1. Census, 2020. 2014-2018 American Community Survey (ACS) 5-year estimates. TIGER/Line Shapefiles by Block Group, https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-data.html, United States Census Bureau, downloaded July 2020.
2. HCD, 2018. Memorandum: State Income Limits for 2018, California Department of Housing and Community Development, dated 26 April 2018.


Fremont
Redwood City
Palo Alto
Alameda
Boulder Creek
Ben Lomond
Scotts Valley
Santa Cruz
Watsonville
Hollister
Castroville
San Mateo
Soquel Demonstration State Forest
Forest of Nisene Marks State Park
Wilder Ranch State Park
Castle Rock State Park
Stanislaus
Lake
3836 ft
3361 ft
3812 ft
880
680
280
101
580
5
Legend
Valley Water Boundary
Retail Agency Boundaries
Median Income
<$59,850 (Very Low)
$59,850 - $85,050 (Low)
$85,050 - $135,250 (Moderate)
$135,250 - $169,050 (High)
> $169,050 (Very High)
Notes
1. All locations are approximate.
2. Household income is based on estimated 2018 median household income by Census Block Group, per Census (2020). Income level groupings are based on California Department of Housing and Community Development ("HCD") income levels for Santa Clara County for a 3-person household in 2018 (HCD, 2018). The average persons per household is 2.97 in Santa Clara County.
Sources
1. U.S. Census Bureau. 2020. 2014-2018 American Community Survey (ACS) 5-year estimates. TIGER/Line Shapefiles by Block Group, https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-data.html, United States Census Bureau, downloaded July 2020.
2. HCD, 2018. Memorandum: State Income Limits for 2018, California Department of Housing and Community Development, dated April 26, 2018.
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16
Miles
Median Household Income
Valley Water
Water Conservation Strategic Plan
San Jose, CA
July 2021
C00054.00
Figure 5-18
eki environment & water
Path: X:\C00054\Maps\2021\07\Fig5-17 Median Household Income_Census-rev.mxd

5.4.3 Household Member Age Trends

The proportion of residential customers in each median household member age classification varies within each retail agency. **Figure 5-19** below shows the proportion of residential parcels within each household member age range (based on Census data) for each retail agency and **Figure 5-20** shows the distribution of median household member age by Census Block Group across the Valley Water service area.

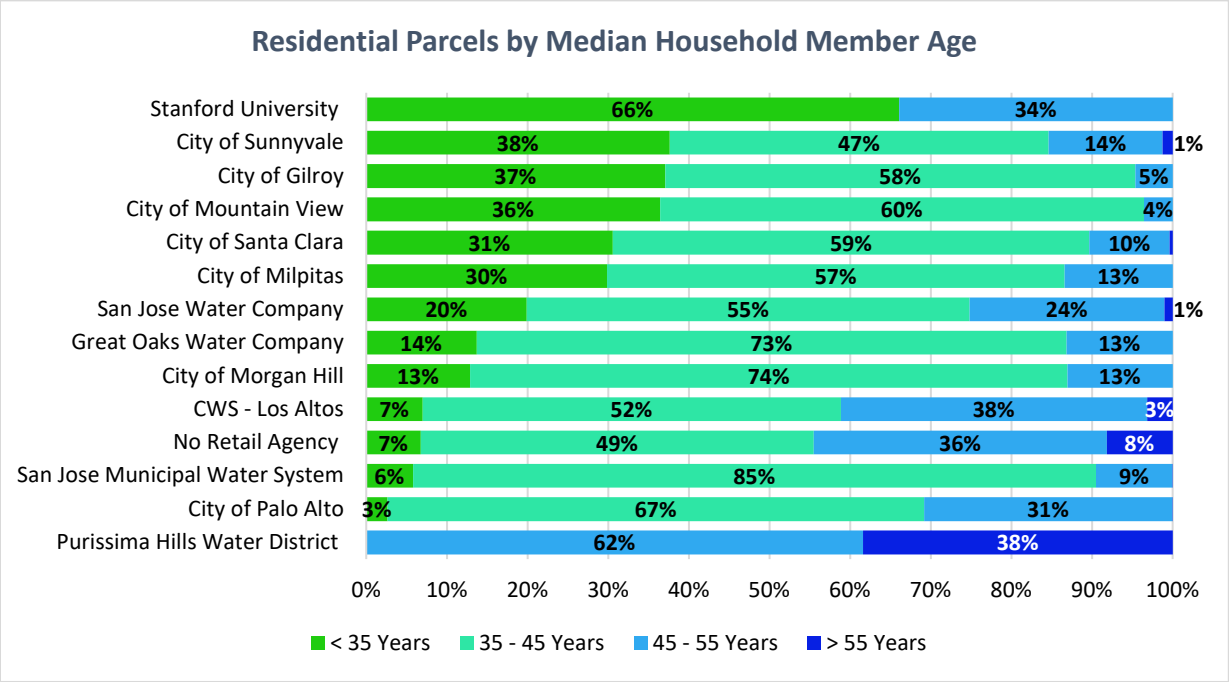


Figure 5-19 Residential Parcels by Median Household Member Age

Table 5-14 shows the distribution of residential water conservation program participants by median household member age range.[48] The first chart in **Table 5-14** shows the percentage of participants in each program that live in areas of each household member age range. The majority of participants (55% to 65%) for all programs except for the HET Program live in areas with a median household member age of 35 to 45 years old.

The second chart on **Table 5-14** shows participation rates controlled for the number of parcels within the Valley Water service area within each median household member age range. When the relative proportion of number of parcels within each income range is controlled for, customer participation by median household age indicate the following trends:

- HET Program (MFR customers) – customers in areas with a median household age ranges less than 35 years old showed a much higher level of participation (32%), while those in areas of predominantly 35-45 and 45-55 years old appear to be underrepresented by 18% and 13%, respectively.

[48] Participants are limited to residential customers only, as household member age and other Census demographic data are not applicable to CII customers.

- Graywater Programs (SFR customers) – participation by median household member age was generally consistent, with customers in areas of predominantly 45-55 year old household members having a somewhat higher rate of participation (by 6.7%).[49]
- LRP (SFR and MFR customers) – participation by median household member age was generally consistent, with customers in areas of predominantly 45-55 year old household members having a somewhat higher rate of participation (by 8.8%), and those in areas of predominantly less than 35 year old household members being somewhat underrepresented (by 9.9%).
- Submeter Rebate Program (MFR customers) – customers in areas of predominantly less than 35 and 35-45 year old household members had a somewhat higher rates of participation (7.4% and 7.2%, respectively), and those in areas of predominantly 45-55 year old household members are underrepresented (by 16%).[49]
- Water Wise Survey Program (primarily SFR customers) – customers in areas of predominantly 34-45 year old household members had a higher rate of participation (7.1%), and those in areas of predominantly less than 35 year old household members are underrepresented (by 6.6%).

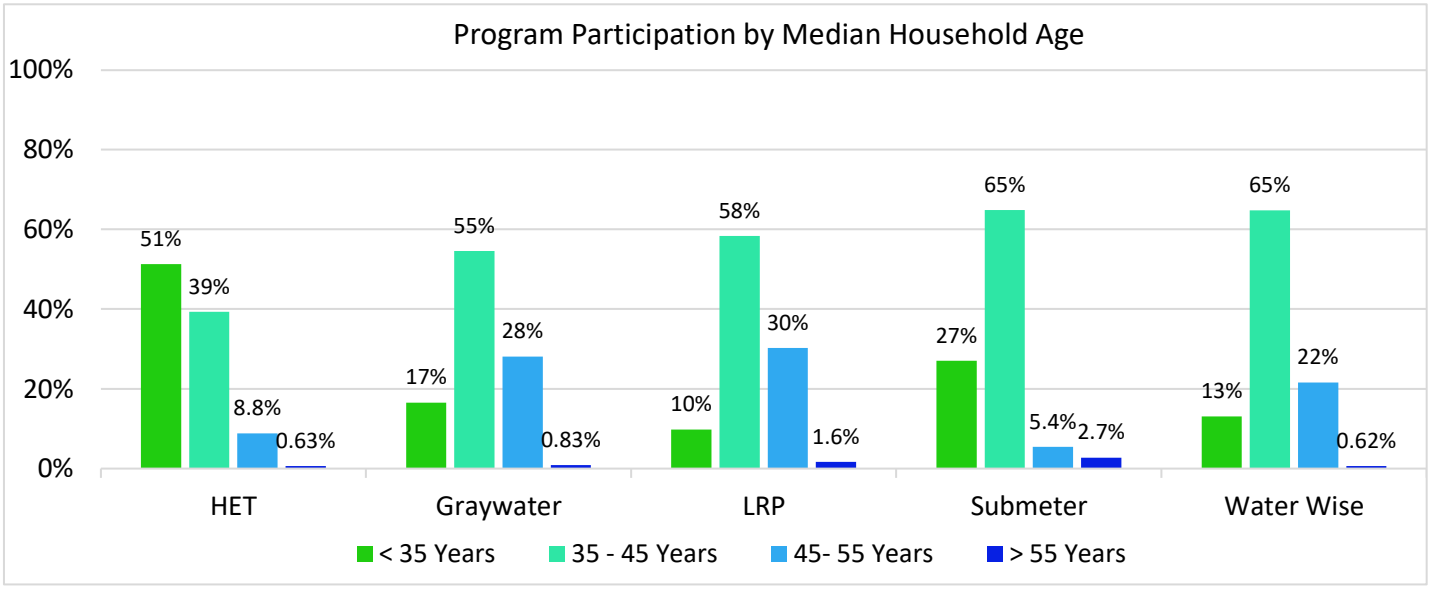
Based on the above, there may be opportunities to increase participation in the HET Program for households where the median age is over 35, and in the Graywater and LRP Programs where household members are less than 45 years old.

Further analysis of program participation by customer age demographics for customers in each retail agency is provided in **Appendix C**.

[49] It is noted that the results associated with the Graywater and Submeter Programs should be considered less robust, and while based on the best available information, due to the small sample sizes may not reflect actual trends in program participation.

Table 5-14
Residential Customer Program Participation by Median Household Age
Valley Water, Water Conservation Strategic Plan

Median Household Age (a)	Percentage of Residential Customers in Santa Clara County (b)	Percentage of Participating Residential Customers (c)				
		HET Program	Graywater Programs	LRP Landscape Conversion and WBIC Rebates	Submeter Rebate Program	Water Wise Survey Program
< 35 Years	20%	51%	17%	10%	27%	13%
35 - 45 Years	58%	39%	55%	58%	65%	65%
45- 55 Years	21%	8.8%	28%	30%	5.4%	22%
> 55 Years	1.3%	0.63%	0.83%	1.6%	2.7%	0.62%



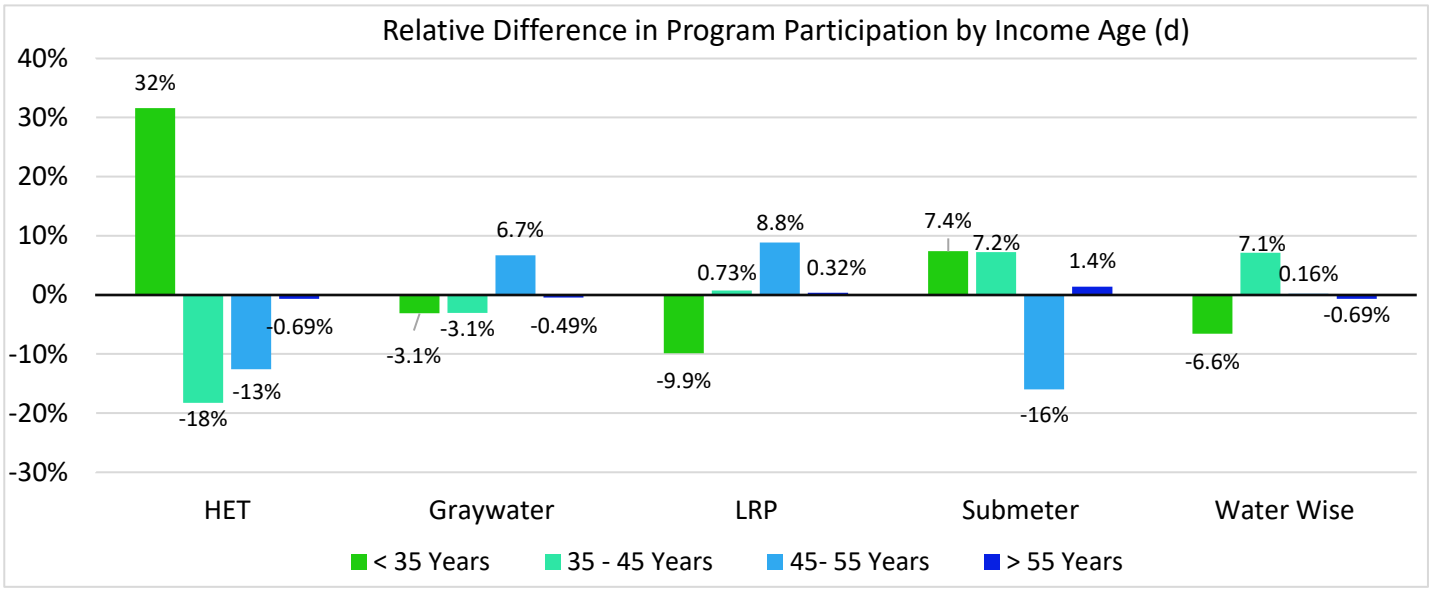


Table 5-14
Residential Customer Program Participation by Median Household Age
Valley Water, Water Conservation Strategic Plan

Abbreviations:

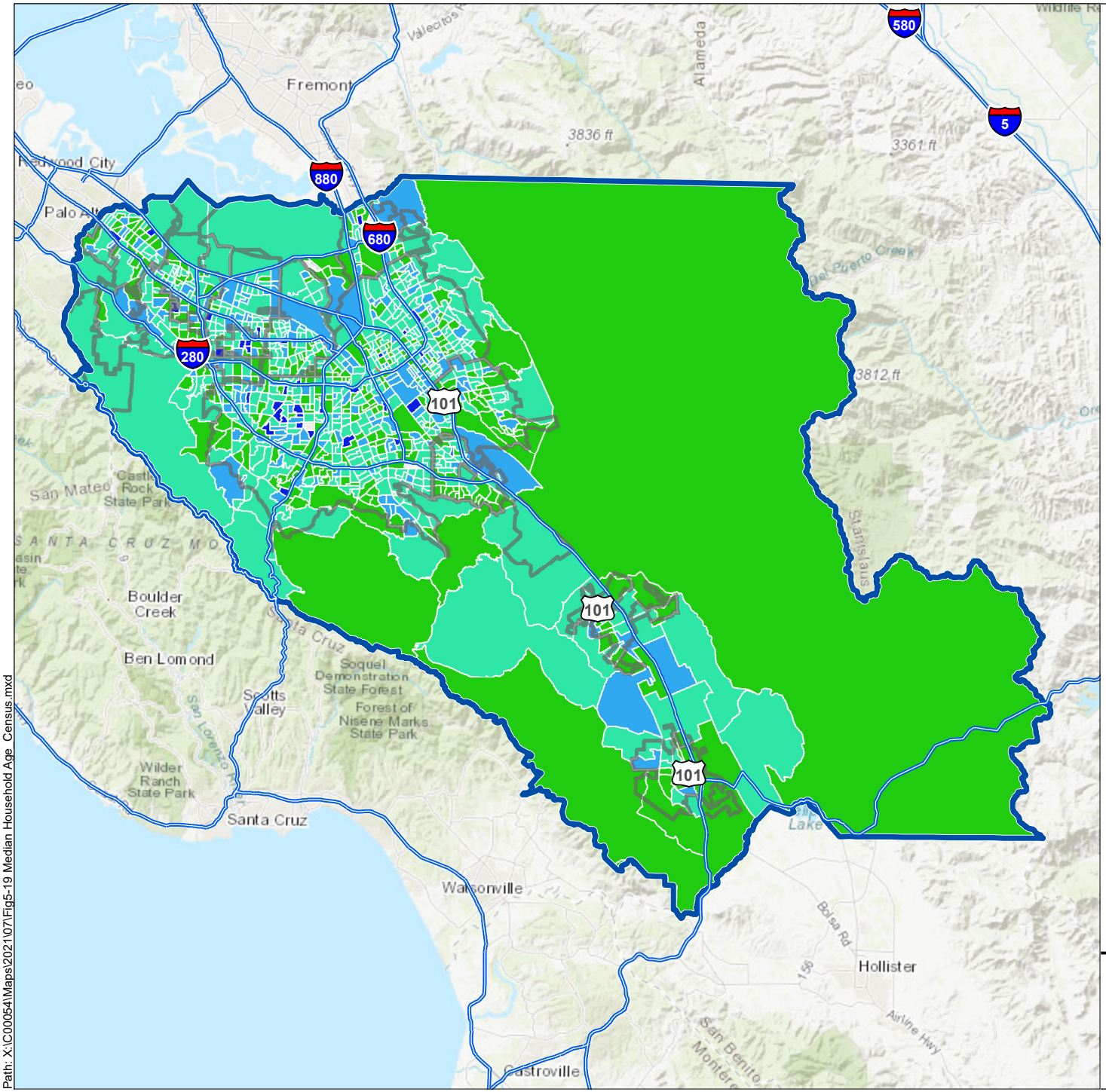
DIY = do it yourself
HET = high efficiency toilets
LRP = Landscape Rebate Program
MFD = multi-family dwelling
WBIC = weather-based irrigation controller

Notes:

(a) Median household age is based on the estimated median age of household members by Census Block Group, per Census (2020).
(b) Residential customers include both single-family and multi-family customers. Participants included in this analysis are limited to those for which location data are available.
(c) Several programs have had limited participation. The small sample size should be considered when evaluating these results. Specifically, the Graywater Rebate and Direct Installation Program had 126 residential participants and the Submeter Rebate Program had 45 residential participants.
(d) Relative difference is calculated as the percentage of program participation by income group minus the overall percentage of residential customers by income group within the service area.

References:

1. Census, 2020. 2014-2018 American Community Survey (ACS) 5-year estimates. TIGER/Line Shapefiles by Block Group, https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-data.html, United States Census Bureau, downloaded July 2020.



Legend

- Valley Water Boundary
- Retail Agency Boundaries

Median Population Age

- < 35
- 35 - 45
- 45 - 55
- > 55

Notes

1. All locations are approximate.
2. Household age is based on estimated 2018 median age of household members by Census Block Group, per Census (2020).

Sources

1. U.S. Census Bureau. 2020. 2014-2018 American Community Survey (ACS) 5-year estimates. TIGER/Line Shapefiles by Block Group, https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-data.html, United States Census Bureau, downloaded July 2020.

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Miles

Median Household Member Age

Valley Water
Water Conservation Strategic Plan
San Jose, CA
July 2021
C00054.00

Figure 5-20

Path: X:\C00054\Maps\2021\07\Fig5-19 Median Household Age_Census.mxd

5.4.4 Percentage of Rentership Trends

The proportion of residential customers that rent versus own their homes varies within each retail agency. **Figure 5-21** below shows the proportion of residential parcels within each "percentage of rentership" range (based on Census data) for each retail agency and **Figure 5-22** shows the distribution percentage of rentership by Census Block Group across the Valley Water service area.

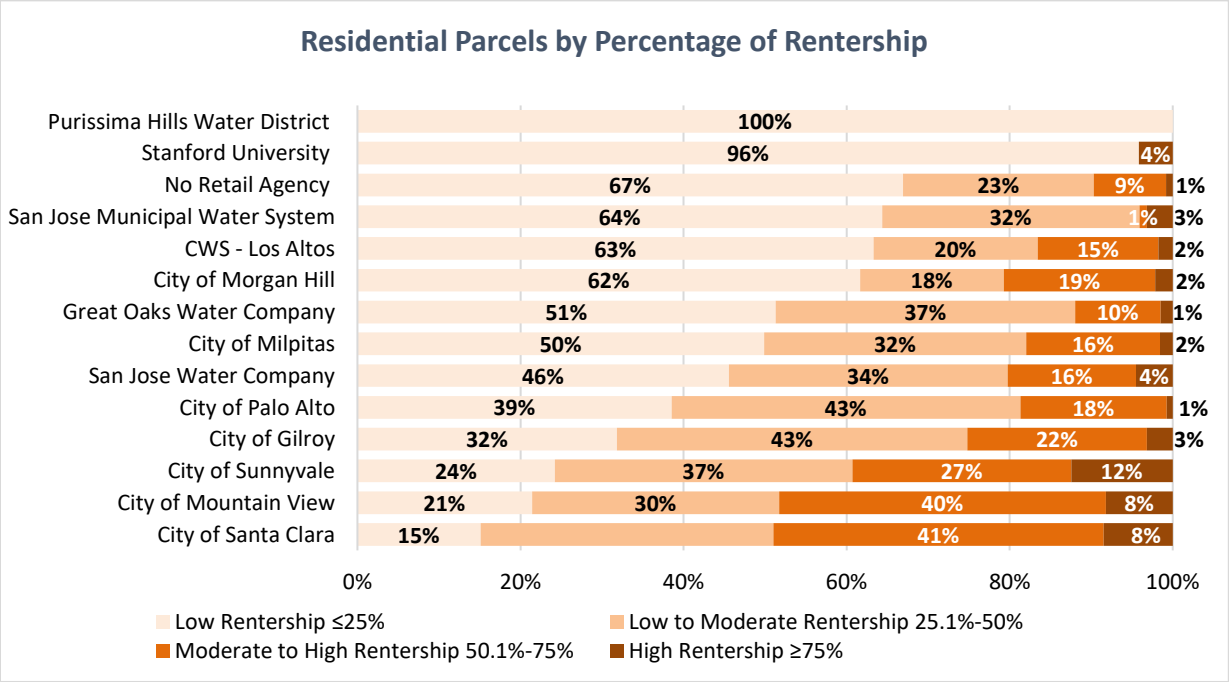


Figure 5-21 Residential Parcels by Percentage of Rentership

Table 5-15 shows the distribution of residential water conservation program participants by percentage of rentership.[50] The first chart in **Table 5-15** shows the percentage of participants in each program that live in areas of each rentership range. The distribution of participation by rentership ranges varies, with at least half of all participants in the Graywater, LRP, and Water Wise Programs living in low rentership areas, and fewer participants observed as frequency of rentership increases. Participants in the HET and Submeter programs show generally more even distributions.[51]

The second chart on **Table 5-15** shows participation rates controlled for the number of parcels within the Valley Water service area within each rentership range. When the relative proportion of parcels within each rentership range is controlled for, customer participation rates by rentership level are more variable for each program:

[50] Participants are limited to residential customers only, as rentership and other Census demographic data are not applicable to CII customers.

[51] It should be noted that this program began as a pilot program targeting mobile home parks and was then expanded to include all MFR buildings, both of which can include high rates of homeownership through a condominium ownership structure.

- HET Program (MFR customers) – customers in moderate and high rentership areas participated at the greatest rates (by 26% and 25%), with customers in low rentership areas showing underrepresentation by 12% to 39%, which would be expected given that this program targets MFR buildings.
- Graywater Programs (SFR customers) – customers in low rentership areas have shown a higher tendency to participate (by 5.1%), than those in low to moderate rentership areas (by 5.6%).[52]
- LRP (SFR and MFR customers) – customers in low rentership areas have shown a higher tendency to participate (by 12%) than those in areas of higher rentership.
- Submeter Rebate Program (MFR customers) – customers in moderate and high rentership areas showed higher levels of participation (by 6.5% to 15%), while those in low rentership areas show an underrepresentation of 29%. It should be noted that this program began as a pilot program targeting mobile home parks and was then expanded to include all MFR buildings, both of which can include high rates of homeownership through a condominium ownership structure.[52]
- Water Wise Survey Program (primarily SFR customers) – customers in low rentership areas showed higher levels of participation (by 7.9%), while those in moderate and high rentership areas appear to be underrepresented by 1.2% to 3.8%.

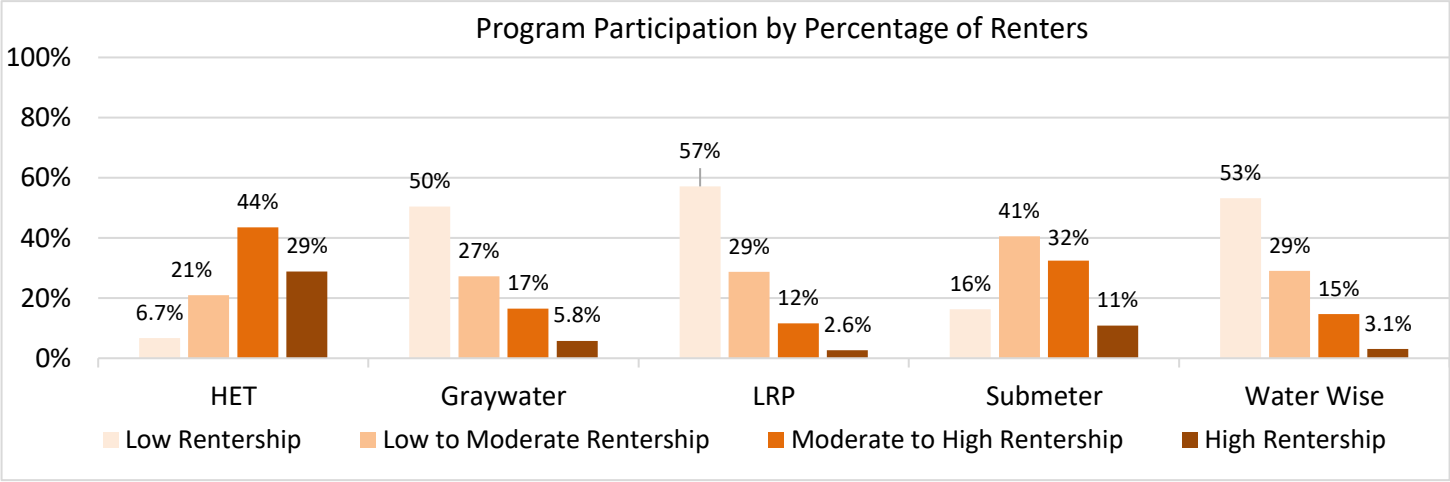
Based on the above, there may be opportunities to increase participation in the Large Landscape Program and Water Wise Survey Program in areas with higher rates of rentership.

Further analysis of program participation by customer age demographics for customers within each retail agency is provided in **Appendix C**.

[52] It is noted that the results associated with the Graywater and Submeter Programs should be considered less robust, and while based on the best available information, due to the small sample sizes may not reflect actual trends in program participation.

Table 5-15
Residential Customer Program Participation by Percentage of Rentership
Valley Water, Water Conservation Strategic Plan

Percentage of Renters (a)		Percentage of Residential Customers in Santa Clara County (b)	Percentage of Participating Residential Customers (c)				
			HET Program	Graywater Programs	LRP Landscape Conversion and WBIC Rebates	Submeter Rebate Program	Water Wise Survey Program
Low Rentership	≤25%	45%	6.7%	50%	57%	16%	53%
Low to Moderate Rentership	25.1%-50%	33%	21%	27%	29%	41%	29%
Moderate to High Rentership	50.1%-75%	18%	44%	17%	12%	32%	15%
High Rentership	≥75%	4.3%	29%	5.8%	2.6%	11%	3.1%



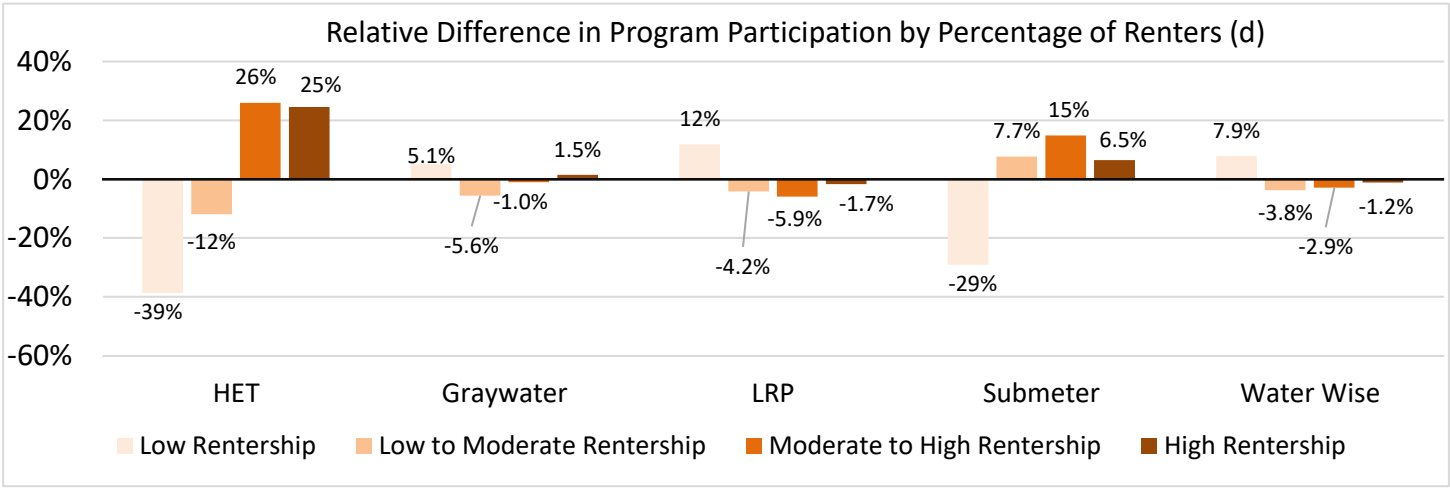


Table 5-15
Residential Customer Program Participation by Percentage of Rentership
Valley Water, Water Conservation Strategic Plan

Abbreviations:

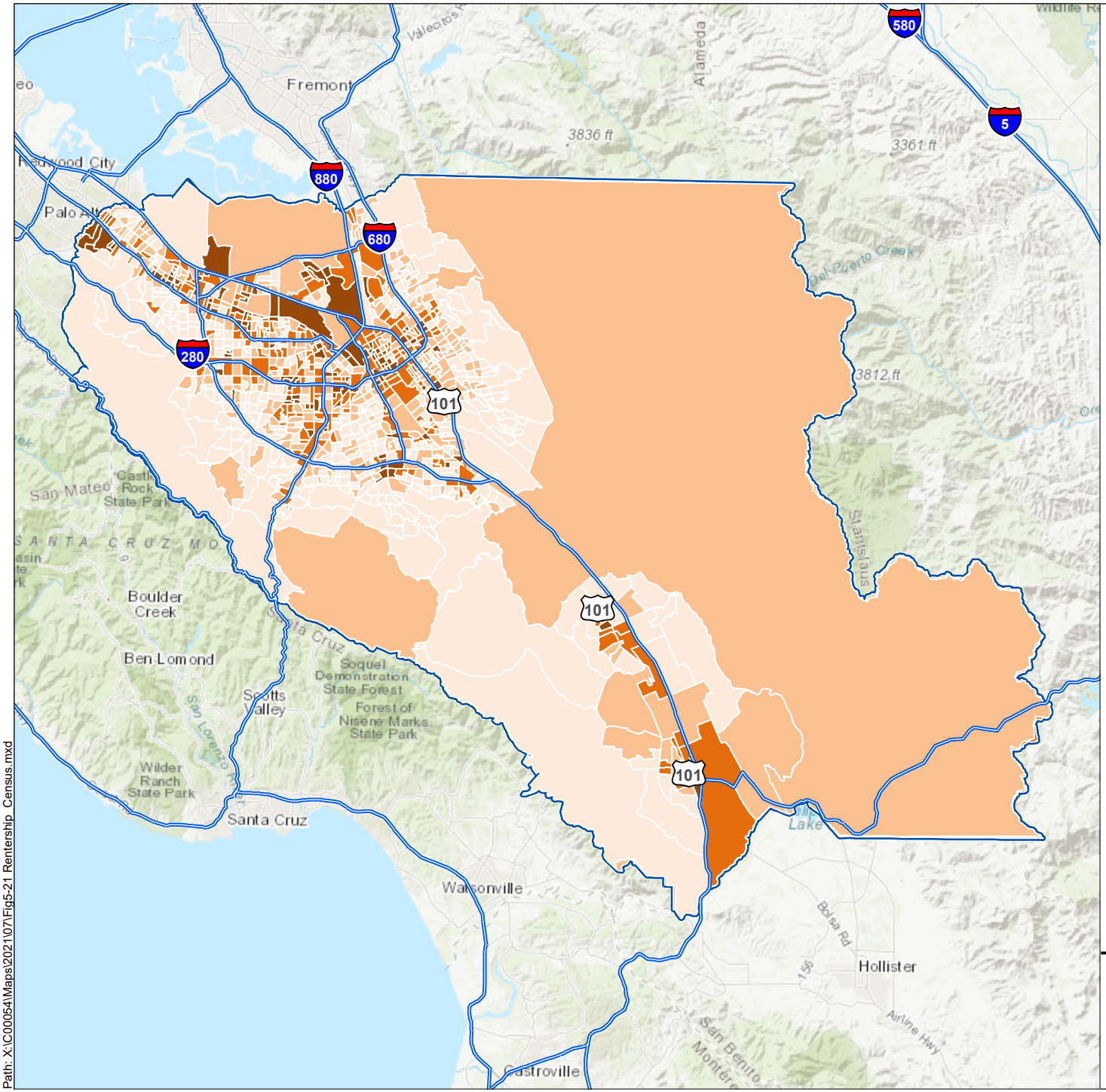
DIY = do it yourself
HET = high efficiency toilets
LRP = Landscape Rebate Program
MFD = multi-family dwelling
WBIC = weather-based irrigation controller

Notes:

(a) Percentage of renters reflects the proportion of population within a given Census Block Group that lives in renter-occupied homes. A low percentage of renters indicates an area that consists predominantly of owner-occupied homes; high percentage of renters indicates an area that consists predominantly of renter-occupied homes. Percentage of renter-occupied housing units is based on the estimated 2018 number of renter-occupied housing units by Census Block Group, per Census (2020).
(b) Residential customers include both single-family and multi-family customers. Participants included in this analysis are limited to those for which location data are available.
(c) Several programs have had limited participation. The small sample size should be considered when evaluating these results. Specifically, the Graywater Rebate and Direct Installation Program had 126 residential participants and the Submeter Rebate Program had 45 residential participants.
(d) Relative difference is calculated as the percentage of program participation by income group minus the overall percentage of residential customers by income group within the service area.

References:

1. Census, 2020. 2014-2018 American Community Survey (ACS) 5-year estimates. TIGER/Line Shapefiles by Block Group, https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-data.html, United States Census Bureau, downloaded July 2020.



Legend

- Valley Water Boundary
- Retail Agency Boundaries

Percentage of Renters

- ≤25%
- 25.1% - 50%
- 50.1% - 75%
- ≥75%

Notes

1. All locations are approximate.
2. Percentage of renter-occupied housing units is based on the estimated 2018 number of renter-occupied housing units by Census Block Group, per Census (2020).

Sources

1. U.S. Census Bureau. 2020. 2014-2018 American Community Survey (ACS) 5-year estimates. TIGER/Line Shapefiles by Block Group, https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-data.html, United States Census Bureau, downloaded July 2020.

N

0 8 16

Miles

Percentage of Rentership

Valley Water
Water Conservation Strategic Plan
San Jose, CA
July 2021
C00054.00

Figure 5-22

Path: X:\C00054\Maps\2021\07\Fig5-21 Rentership_Census.mxd

5.5 Summary of Key Findings for Program Participation Analyses

Sections 5.2 through 5.4 above evaluate past customer participation in five selected conservation programs, including participation trends based on customer demographics, property characteristics, and geography within the Valley Water service area. Based on these analyses, opportunities to increase customer participation in each of the programs are identified throughout the chapter and are summarized as key findings in **Table 5-16**.

On the basis of these key findings, **Table 5-16** also provides recommendations for potential conservation program marketing/targeting scenarios that could be implemented by Valley Water in the future to encourage increases in program participation, as discussed further in Section 6.2.3 as part of the Long-Term Conservation Plan. In general, two approaches are identified:

(1) Build on Current Successes - For programs that have had more limited participation to date, identify customers with characteristics that appear to be currently participating at higher rates, and target future outreach to these customers. That is, build on the successes of the program to date and appeal to those who may be most likely to participate.

(2) Expand to New Customer Groups - For programs that have had a good amount of participation so far, identify customers with characteristics that appear to be underrepresented in the current participant population, and target future program outreach to these customers. That is, provide targeted outreach to the customers with characteristics that as a whole have not historically participated at high rates and appear not to have been as effectively reached by past outreach efforts.

Because these customer characteristics are available in geospatial data, the results of the above analyses can be layered spatially in order to identify and locate the specific subsets of customers meeting these criteria, as illustrated conceptually in **Figure 5-23**, below.

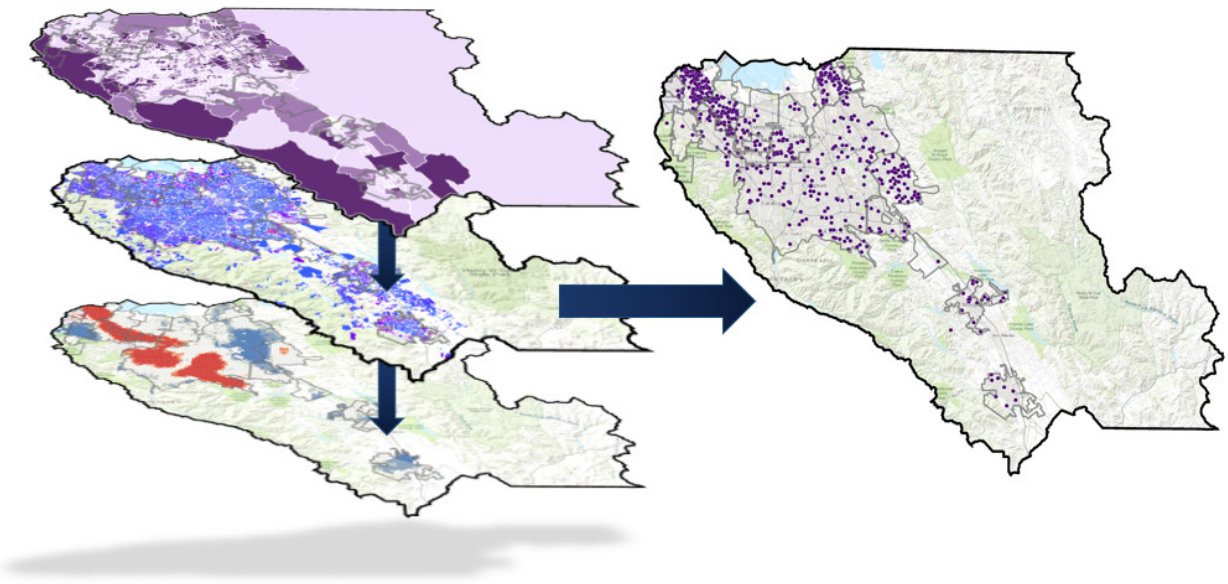


Figure 5-23 Layering Customer Characteristic Data to Identify Potential Outreach Targeting

Table 5-16 Summary of Key Findings and Program Evaluation Recommendations

Program	Key Findings by Analysis			Summary and Recommendations
	Temporal/Spatial	Building Stock Characteristics	Demographics[53] (Residential Customers Only)	
Commercial and Multi-Family Dwelling High Efficiency Toilet (HET) Direct Installation Program (HET Program)	Since its inception through August 2020, there have been a total of 1,747 participants in this program and has replaced over 35,000+ toilets and urinal flush valves. The highest levels of participation occurred in the first three years of the program, from 2004 to 2007. Following 2015, there has been a notable decrease in number of participants per year; however, the number of toilets and urinals replaced through this program has remained fairly consistent, indicating that a large number of units are being replaced per customer. Overall, it is estimated that this program has reached roughly 2.1% of eligible customers. Based on modeling of efficient fixture saturation in the County, it is estimated that only 15% of MFR toilets, 18% of CII toilets, and 56% of CII urinals in the County remain inefficient (i.e., 3.5 gpf and greater for toilets, greater than 0.5 gpf for urinals). Significant opportunities to increase participation in this program appear to remain in areas that have had a historically lower rate of participation, such as customers located outside of the Highway 101 and El Camino corridor, and in the Cal Water Los Altos District, Great Oaks Water Company, and San José Municipal Water System areas.	**Residential** - The HET Program appears to have been effective at reaching those customers who, given the building age, are expected to receive the highest benefit from this program, and as would be expected given the program eligibility requirements. **Commercial Industrial and Institutional (CII)** - Customers in older buildings participated in the program at the highest rates, as would be expected given the program eligibility requirements. This indicates that this program has been effective at reaching its target customers.	**Income** - the highest participation has been by customers in very low to moderate income areas, with the highest participation among these groups by customers in moderate income areas (14% higher). Customers in high and very high income areas have had lower levels of participation (by 9.5% and 16% respectively). **Household Member Age** - customers in areas with a median household age ranges less than 35 years old showed a much higher level of participation (32%), while those in areas of predominantly 35-45 and 45-55 years old appear to be underrepresented by 18% and 13%, respectively. **Rentership** - customers in moderate and high rentership areas participated at the greatest rates (by 26% and 25%), with customers in low rentership areas showing underrepresentation by 12% to 39%, which would be expected given that this program targets MFR buildings.	**Expand to New Customer Groups** • Identify potential residential customers/multi-family residential (MFR) developments: ○ Located in low and very low income areas, and ○ Where the buildings were constructed before 1994. Evaluate the savings potential and cost-benefit associated with targeting these areas with program outreach materials and through other outreach mechanisms. • Identify potential residential and CII customers: ○ Where the buildings were constructed before 1994, and ○ Located outside of the identified high participation density areas. Evaluate the savings potential and cost-benefit associated with target these areas with program outreach materials and through other outreach mechanisms. • Highlight the disproportionate rate of participation by customers in some retailer agency service areas, and work with retailers to increase customer awareness of, and incentives for participation in, these programs.
Graywater Laundry to Landscape Rebate and Direct Installation Programs (Graywater Programs)	From 2014 through August 2020, there have been a total of 125 participants in this program, which represents approximately 0.07% of the total single-family residential (SFR) parcels in the County, and compared to other programs is a relatively low level of overall participation. Participation rates in all retail agencies are below 0.2%. Given that the program has overall had a low rate of participation to date, significant opportunities remain to reach customers across the County with this program.	Program participants overall tended to have older, smaller homes (building interior size) than participants in other programs, but generally consistent lot sizes. Customers in homes constructed after 1994 appear to be underrepresented by their participation in this program. Unlike programs that replace older fixtures, customers in newer homes have the potential to benefit from this program, but it appears that that potential is not being fully tapped. Thus, this indicates an opportunity to increase participation, including for customers in newer homes.	**Income** - customers in very high income areas have had the highest rate of participation (by 10%), and customers in moderate income areas appear to be underrepresented by 12%. **Household Member Age** - participation by median household member age was generally consistent, with customers in areas of predominantly 45-55 year old household members having a somewhat higher rate of participation (by 6.7%). **Rentership** - customers in low rentership areas have shown a higher tendency to participate (by 5.1%), than those in low to moderate rentership areas (by 5.6%).	**Build on Current Successes** • Identify potential SFR customers: ○ Located in very income areas, ○ Where the buildings were constructed before 1994, and ○ Have been identified as being eligible for the program. Evaluate the savings potential and cost-benefit associated with targeting these areas with program outreach materials and through other outreach mechanisms.

[53] It is noted that the results associated with the Graywater and Submeter Programs should be considered less robust, and while based on the best available information, due to the small sample sizes may not reflect actual trends in program participation.

Table 5-16 Summary of Key Findings and Program Evaluation Recommendations

Program	Key Findings by Analysis			Summary and Recommendations
	Temporal/Spatial	Building Stock Characteristics	Demographics[52] (Residential Customers Only)	
Landscape Rebate Program (LRP) Landscape Conversion and Weather Based Irrigation Controller (WBIC) Rebates	From 2009 through August 2020 there have been 11,024 participants in this program, which represents 2.7% of residential parcels in the County. The program had an increased level of participation from 2014-2019, particularly in 2015 and 2016. <u>Landscape Conversion Rebate</u> Overall participation has been 1.8% and 0.44% of SFR and MFR parcels, respectively. Relative to the number of SFR parcels, the highest level of participation has been in the Cities of Palo Alto, Sunnyvale, and Mountain View and Stanford University. The lowest level of participation has been in the Cities of Milpitas and Gilroy. Relative to the number of MFR parcels, the highest level of participation has been in the San José Municipal Water System, and the lowest level of participation has been in the Purissima Hills Water District, Stanford University, and Great Oaks Water Company. <u>WBIC Rebate</u> Overall participation has been 1.1% and 0.26% of SFR and MFR parcels, respectively. Relative to the number of SFR parcels, the highest level of participation has been in the City of Mountain View, City of Palo Alto, City of Sunnyvale, and Stanford University, and the lowest level of participation has been in the City of Gilroy and City of Milpitas. Relative to the number of MFR parcels, the highest level of participation has been in the Cities of Gilroy and Morgan Hill, and the lowest level of participation has been in the Great Oaks Water Company service area. Although total participation levels between Landscape Conversion and WBIC Rebates have been similar, Landscape Conversion rebates are more popular than WBIC rebates in some retail agencies and vice versa.	**Residential** - Customers in homes constructed after 1994 appear to be underrepresented by their participation in this program. Unlike programs that replace older fixtures, customers in newer homes have the potential to benefit from this program, but it appears that that potential is not being fully tapped. Thus, this indicates an opportunity to increase participation for customers in newer homes. **CII** - customers in buildings constructed between 1994 and 2009 have had the highest rate of participation (by 13%), and customers in buildings constructed prior to 1994 and in 2010 or later appear to be underrepresented by 8.2% and 5%, respectively. This indicates an opportunity to increase participation in this program for customers in both older and newer buildings.	**Income** - customers in very high income areas have had the highest rate of participation (by 15%), and customers in very low, low, and moderate income areas appear to be underrepresented by 1.7%, 5.5%, and 8.3%, respectively. **Household Member Age** - participation by median household member age was generally consistent, with customers in areas of predominantly 45-55 year old household members having a somewhat higher rate of participation (by 8.8%), and those in areas of predominantly less than 35 year old household members being somewhat underrepresented (by 9.9%). **Rentership** - customers in low rentership areas have shown a higher tendency to participate (by 12%) than those in areas of higher rentership.	**Expand to New Customer Groups** • Identify potential residential customers: ○ Located in very low, low and moderate income areas, ○ Where the buildings were constructed after 1994, and ○ Located outside of the identified high participation density areas. Evaluate the savings potential and cost-benefit associated with targeting these areas with program outreach materials and through other outreach mechanisms. • Identify potential CII customers: ○ Where the buildings were constructed before 1994 or after 2010, and ○ Located outside of the identified high participation density areas. Evaluate the savings potential and cost-benefit associated with targeting these areas with program outreach materials and through other outreach mechanisms. • Highlight the disproportionate rate of participation by customers in some retailer areas, and work with retailers to increase customer awareness of these programs.

Table 5-16 Summary of Key Findings and Program Evaluation Recommendations

Program	Key Findings by Analysis			Summary and Recommendations
	Temporal/Spatial	Building Stock Characteristics	Demographics[52] (Residential Customers Only)	
Submeter Rebate Program	This program has had 44 MFR participants from 2000 through August 2020. Relative to the total number of MFR parcels in the County, this represents a participation rate of 0.06%. The greatest level of participation occurred in 2009, but participation within any one retail agency has been less than 0.2% Relative to the total number of MFR parcels, the highest level of participation has been by customers in the City of Sunnyvale, City of Morgan Hill, and San José Municipal Water System. All other retail agencies have had relatively minimal participation, and no retail agency has had greater than 0.2% participation.	Customers in homes constructed after 1994 appear to be underrepresented by their participation in this program. While older MFR and mobile homes are less likely to be individually metered than new homes, this is not always the case. Customers in newer homes also have the potential to benefit from this program, but it appears that that potential is not being fully tapped. Thus, this indicates an opportunity to increase participation, including for customers in newer homes.	**Income** - customers in very low to moderate income areas have had the highest rate of participation (by 6.8% to 14%), and customers in high and very high income areas show an underrepresentation of 11% and 19% respectively. **Household Member Age** - customers in areas of predominantly less than 35 and 35-45 year old household members had a somewhat higher rates of participation (7.4% and 7.2%, respectively), and those in areas of predominantly 45-55 year old household members are underrepresented (by 16%). **Rentership** - customers in moderate and high rentership areas showed higher levels of participation (by 6.5% to 15%), while those in low rentership areas show an underrepresentation of 29%. It should be noted that this program began as a pilot program targeting mobile home parks and was then expanded to include all MFR buildings, both of which can include high rates of homeownership through a condominium ownership structure.	**Build on Current Successes** • Identify potential MFR customers: ○ Located in low and very low income areas, and ○ Where homes were constructed before 1994. Evaluate the savings potential and cost-benefit associated with targeting these areas with program outreach materials and through other outreach mechanisms.
Water Wise Survey Program	From 2017 through August 2020, 682 participants have received Water Wise Indoor Survey DIY Kits, and 714 participants have received WWOS. Relative to the total residential parcels in the County, including both SFR and MFR parcels, this represents a participation rate of 0.17% for both the indoor and outdoor portions of the program, for a total of 0.34% in both programs. The distribution of participation between the Water Wise Indoor Survey DIY Kit and WWOS portions of the program have been very consistent. Relative to the total number of residential parcels, the highest levels of participation in both the indoor and outdoor portions have been by customers in the City of Mountain View, City of Palo Alto, Milpitas, and Stanford University, and the lowest has been in the Cal Water Los Altos District, City of Gilroy, and Great Oaks Water Company. The only notable difference in participation on a percentage of parcel basis has been in the City of Mountain View, where customers have participated in the WWOS at approximately twice the level of Water Wise Indoor Survey DIY Kit.	Participants in homes constructed from 1994 to 2009 have tended to participate at a higher rate than those with newer or older homes. Given that this program is designed to help customers identify areas where they can increase water efficiency, those in homes constructed prior to 1994 and to a lesser extent, in 2010 or later, would also be expected to receive a similar benefit. Thus, this represents an opportunity to increase participation in this program, particularly among customers with older homes.	**Income** - customers in very high income areas have had the highest level of participation, by 17%. Customer in low and moderate income areas appear to be underrepresented by 7.1% and 7.8% respectively. **Household Member Age** - customers in areas of predominantly 34-45 year old household members had a higher rate of participation (7.1%), and those in areas of predominantly less than 35 year old household members are underrepresented (by 6.6%). **Rentership** - customers in low rentership areas showed higher levels of participation (by 7.9%), while those in moderate and high rentership areas appear to be underrepresented by 1.2% to 3.8%.	**Expand to New Customer Groups** • Identify potential residential customers: ○ Where homes were constructed before 1994 or after 2010, ○ Located in low and moderate income areas, ○ Located in moderate and high rentership areas, and ○ Located outside of the identified high participation density areas. Evaluate the savings potential and cost-benefit associated with targeting these areas with program outreach materials and through other outreach mechanisms. • Highlight the disproportionate rate of participation by customers in some retailer areas, and work with retailers to increase customer awareness of these programs.

6 Long-Term Conservation Plan

As discussed in Section 4, through its Water Supply Master Plan 2040, Valley Water expanded its long-term conservation target of 99,000 acre-feet per year (AFY) by 2030 to 109,000 AFY by 2040 and has made great strides towards achieving these targets. Considering the savings achieved to date (Section 4), Valley Water will need to obtain an additional 15,000 AFY of savings by 2030 and an additional 11,000 AFY of savings by 2040 through implementation of active conservation programs.

This section presents and evaluates a range of potential conservation programming scenarios with a varying suite of program offerings and implementation levels. Each scenario is evaluated in terms of its efficacy to meet the water conservation targets, incorporating the potential range of benefits from the Model Water Efficient New Development Ordinance (MWENDO) implementation, as well as evaluating the anticipated budget expenditures to achieve each scenario and the unit costs of savings associated with each scenario.

This section also includes a discussion of additional considerations for Valley Water's future conservation program planning, including: (1) a review of the changes in program participation observed during the recent 2012-2016 drought period in response to Valley Water's increased conservation funding and focus, (2) a review of Valley Water's conservation program staffing levels, (3) a discussion of potential regional model ordinance considerations, and (4) a discussion of potential new approaches to augment and adapt Valley Water's conservation programs in the future, including potentially implementing a new pressure regulating valve or pressure reducing valve (PRV) program and/or refining its existing Large Landscape Program.

6.1 Evaluation of Potential Conservation Program Scenarios

6.1.1 Long-Term Conservation Targets

The long-term targets for water conservation established by the Water Supply Master Plan 2040 reflect the combined water savings anticipated from plumbing fixture efficiency codes and standards, new development ordinances and requirements, and water conservation programs operated by Valley Water and its program partners. The starting year for calculating water savings is 1992 (i.e., with programs initiated in 1991) and the targets are 99,000 AFY by 2030 and 109,000 AFY by 2040 (Valley Water, 2019b), as discussed further in Sections 3 and 4.[54] The conservation program scenarios presented herein are evaluated relative to their ability to satisfy the remaining conservation needed to reach the 2030 and 2040 targets.

As evaluated in Section 4, Valley Water's Conservation Tracking Model estimates that cumulative water conservation savings have been 74,000 AFY through 2020, of which 54,000 AFY is plumbing codes and standards (i.e., passive savings) and 20,000 AFY is Valley Water's conservation programs and initiatives (i.e., active savings).

As shown in **Table 6-1**, the Conservation Tracking Model further estimates that cumulative passive savings will be 76,000 AFY and 94,000 AFY by 2030 and 2040, respectively, and that the

[54] The long-term conservation targets include an additional 1,000 AFY of savings, for a total of 110,000 AFY of savings by 2040, which is expected to be met through stormwater management programs, rather than water conservation programs.

residual water savings from the active programs implemented by Valley Water before 2021 will be 8,000 AFY in 2030 and 5,000 AFY in 2040. Thus, the net requirement for additional savings from water conservation program implementation is estimated to be 15,000 AFY by 2030 and 11,000 AFY by 2040.

Table 6-1 Valley Water Conservation Targets and Water Savings Requirements

Year	Target Water Savings (AFY)	Savings from Plumbing Codes and Appliance Standards (AFY)	Residual Savings from Pre-2021 Program Participation (AFY)	Required Additional Savings from Programs and Initiatives (AFY)
2020	NA	54,000	NA	NA
2030	99,000	76,000	8,000	15,000
2040	109,000	94,000	5,000	11,000

Savings rounded to nearest thousand AFY and values in rows may not sum exactly due to rounding.

6.1.2 Conservation Program Scenarios

Three conservation program approaches were considered for this analysis, and each one was evaluated under two conditions (i.e., assuming a range of savings associated with the MWENDO implementation; see below). Thus, a total of six scenarios were evaluated, as shown in **Table 6-2**.

Table 6-2 Summary of Modeled Conservation Program Scenarios

Conservation Program Scenario	Description
1a) Business-As-Usual, with the MWENDO	Valley Water's existing broad mix of conservation programs at recent average rates of implementation. Includes the MWENDO water savings.
1b) Business-As-Usual, without the MWENDO	Valley Water's existing broad mix of conservation programs at recent average rates of implementation. Does not include the MWENDO water savings.
2a) Broad Program Mix, with the MWENDO	Valley Water's existing mix of conservation programs, with implementation rates scaled to meet the 2030 and 2040 conservation targets. Includes the MWENDO water savings.
2b) Broad Program Mix, without the MWENDO	Valley Water's existing broad mix of conservation programs, with implementation rates scaled to meet the 2030 and 2040 conservation targets. Does not include the MWENDO water savings.
3a) State Water Use Objective Mix, with the MWENDO	Subset of Valley Water's existing conservation programs that contribute to meeting the state water use objectives, with implementation rates scaled to meet the 2030 and 2040 conservation targets. Includes the MWENDO water savings.
3b) State Water Use Objective Mix, without the MWENDO	Subset of Valley Water's existing conservation programs that contribute to meeting the state water use objectives, with implementation rates scaled to meet the 2030 and 2040 conservation targets. Does not include the MWENDO water savings.

Business-As-Usual: This scenario is based on Valley Water's existing mix of conservation programs (**Table 4-1**). These programs target indoor and outdoor residential water uses, commercial, industrial, and institutional (CII) indoor water uses (e.g., sanitation, process, washing, cooling, and food preparation water uses), and non-residential landscape water uses. In this scenario, program implementation is assumed to continue at recent average rates of implementation (refer to Sections 4 and 5 for detailed analysis of existing programs and recent implementation rates). This scenario is intended to evaluate whether Valley Water's current conservation program implementation rates would be expected to result in Valley Water meeting its long-term conservation targets.

Broad Program Mix: This scenario reflects Valley Water's existing broad mix of conservation programs that are aimed at indoor and outdoor residential water uses, CII indoor water uses, and non-residential landscape water uses, i.e., this scenario is based on Valley Water's existing mix of conservation programs. Unlike the Business-As-Usual scenario, however, this scenario reflects adjustments to the rates of implementation/participation to reach the long-term conservation targets, and includes increases in participation in key, high water-saving programs.

State Water Use Objectives Mix: Through a multi-year process, the California Department of Water Resources [DWR] and State Water Resources Control Board [SWRCB] are developing annual water use objectives that are calculated based on a combination of: (1) indoor residential water use, (2) outdoor residential and non-residential water use, and (3) water loss. When surveyed (Section 3.4), Valley Water's retail agencies indicated that they were generally unsure of their ability to meet these annual water use objectives and would like Valley Water's assistance in preparing for and meeting the objectives. This scenario is based on implementation of the subset of existing programs that most directly contribute towards meeting the pending state water use objectives, colloquially termed Making Water Conservation a California Way of Life (discussed further in Section 3.2).[55, 56, 57] This mix includes a high implementation rate of programs that address indoor and outdoor residential water use and outdoor non-residential water use.

Table 6-2 summarizes the conservation programs scenarios that were analyzed. Detailed assumptions, including the specific programs included in each scenario and the assumed implementation rates are provided in **Appendix D**.

6.1.3 Model Water Efficient New Development Ordinance

The MWENDO, which was finalized in 2019, represents a new and significant conservation initiative being pursued by Valley Water (Valley Water, 2019b). The model ordinance is intended

[55] See California Department of Water Resources and State Water Resources Control Board (2018). Making Water Conservation a California Way of Life: Primer of 2018 Legislation on Water Conservation and Drought Planning Senate Bill 606 (Hertzberg) and Assembly Bill 1668 (Friedman). Accessed from: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Water-Use-And-Efficiency/Make-Water-Conservation-A-California-Way-of-Life/Files/PDFs/Final-WCL-Primer.pdf

[56] Valley Water's retailer agencies will be required to report on these objectives on an annual basis beginning in 2023 and to comply with them beginning in 2027.

[57] The state is developing CII performance standards, akin to BMPs. The nature and extent of these BMPs is still unknown but the state's primary focus is on the residential and landscape water use objectives.

to be adopted by all of the cities within Santa Clara County, and has the following main requirements for new development:

- Require hot water recirculation for single-family residential (SFR) development;
- Pre-plumb SFR development for graywater collection, treatment, and redistribution;
- Pre-plumb multi-family residential (MFR) development for alternative water sources;
- Require MFR development to submeter indoor water uses;
- Require MFR development to have locks on outdoor hose bibs;
- Require recycled water connections for common areas for new developments of three or more homes that are managed by Homeowner Associations (HOAs); and
- Prohibit the sale of non-compliant water fixtures.[58]

Valley Water's role will be to promote ordinance adoption and implementation and provide technical assistance (Valley Water, 2019b). Valley Water has begun working with the city governments within the county to secure the MWENDO adoption, but there has been limited adoption by municipalities in the county so far. For water savings modeling purposes, it is assumed that adoption will occur gradually over time (i.e., coverage will be 25% of the county by 2025 and will increase by 5% annually thereafter; full coverage will not occur until 2040) and incremental savings benefits will be minimal and generally consistent with assumptions included in the Master Plan. Additional detailed assumptions used for water savings modeling purposes could be found in **Appendix D**. Based on these planning assumptions, estimated the MWENDO water savings are summarized in **Table 6-3**.

Table 6-3 MWENDO Planning-Level Water Savings Estimates

Year	Single-Family Residential (AFY)	Multi-Family Residential (AFY)	Total (AFY)
2025	0	100	100
2030	100	800	900
2035	200	2,000	2,200
2040	500	3,700	4,200

Savings rounded to nearest hundred AFY.

The intent of the MWENDO is to promote the efficient use of water in new development and therefore reduce the amount of water savings that will be needed from Valley Water conservation programs to meet the 2030 and 2040 conservation targets. However, because the timing and volume of the MWENDO water savings is very uncertain, two variants of each conservation scenario are provided below: one assumes that the MWENDO is universally adopted and achieves the projected savings volumes shown in **Table 6-3**, and one assumes that

[58] Noncompliant plumbing fixture means (1) any toilet manufactured to use more than 1.6 gallons of water per flush, (2) any urinal manufactured to use more than one gallon of water per flush, (3) any showerhead manufactured to have a flow capacity of more than 2.5 gallons of water per minute, (4) any interior faucet that emits more than 2.2 gallons of water per minute (California Civil Code §1101.3). https://codes.findlaw.com/ca/civil-code/civ-sect-1101-3.html

the MWENDO is not universally adopted and the estimated water savings are not realized. **Table 6-4** identifies programs that are included in each scenario. Additional information about the assumed participation rates are included in **Appendix D**, **Tables 4** to **7**.

Table 6-4 Conservation Program Scenarios

Class	Program Name	Activity Unit	Business-As-Usual	Broad Program Mix[59]	State Water Use Objective Mix
SFR	Aerators	Aerator	Yes	Yes	Yes
SFR	AMI Leak Alert & Home Water Report	Home	Yes	Yes	Yes
SFR	Home Water Use Reports	Home	Yes	Yes	Yes
SFR	Water Wise Indoor DIY Kit	Survey	Yes	Yes	Yes
SFR	Water Wise Outdoor Survey	Survey	Yes	Yes	Yes
SFR	Residential LF Showerhead, SFR	Showerhead		Yes	Yes
OTH	Agriculture Mobile Lab	AF	Yes	Yes	Yes
MFR	MF Bathroom Retrofit Direct Install	Toilet	Yes	Yes	Yes
IRR	Graywater - L2L	Rebate	Yes	Yes	Yes
IRR	High efficiency nozzles for pop ups	Nozzle	Yes	Yes	Yes
IRR	Large Land. Irrigation Controller	Controller	Yes	Yes	Yes
IRR	Large Landscape Program	Survey	Yes	Yes	Yes
IRR	Large Landscape Water Budgets	Site	Yes	Yes	Yes
IRR	Rain Barrel Rebate (40-199 gal)	Rain Barrel	Yes	Yes	Yes
IRR	Rain Cistern Rebate (200+ gal)	Gallons	Yes	Yes	Yes
IRR	Rain Sensors	Sensor	Yes	Yes	Yes
IRR	Residential Irrigation Controller, SFR	Controller	Yes	Yes	Yes
IRR	Rotor Sprinklers/Spray Bodies	Nozzle	Yes	Yes	Yes
IRR	Turf Replacement	Square Foot	Yes	Yes	Yes
IRR	Flow Sensor/Dedicated Irrigation Meter	Meter	Yes	Yes	Yes
CII	CII Aerators 1/2 gallon per minute	Aerator	Yes	Yes	
CII	CII Aerators Direct Install	Aerator	Yes	Yes	
CII	CII Spray Rinse Valve Direct Install	Valve	Yes	Yes	
CII	CII Ultra HE Toilet Direct Install	Toilet	Yes	Yes	
CII	CII 0.125 Gallon Urinal Direct Install	Urinal	Yes	Yes	
CII	Residential Meter Installation	Meter	Yes	Yes	Yes
CII	CII ULF Toilet Prison Direct Install	Toilet	Yes	Yes	
CII	WET	CCF	Yes	Yes	

Abbreviations:
AF = acre-feet
AMI = Advanced Metering Infrastructure
CCF = hundred cubic feet
CII = Commercial, Industrial, and Institutional
DIY = Do-It-Yourself
gal = gallon
HE = high efficiency
IRR = irrigation
L2L = laundry to landscape
LF = low flow
MF = multi-family
MFR = Multi-Family Residential
OTH = other
SFR = Single-Family Residential
ULF = Ultra-Low Flush
WET = Water Efficient Technologies

[59] The Broad Program Mix scenario has higher assumed participation rates than the Business-As-Usual scenario.

6.1.4 Projected Water Savings by Scenario

Projected water savings for each scenario are summarized in **Table 6-5**, rounded to the nearest thousand AFY. Based on these results, if Valley Water continues with its current programs and implementation rates (Business-As-Usual) and assuming the MWENDO water savings are fully realized by all cities, then Valley Water will meet its conservation target in 2040, but not 2030. If the MWENDO savings are not realized, then Valley Water will not meet its conservation target in 2030 and will barely meet its conservation target in 2040. Therefore, Valley Water must shift the focus of its programs and/or increase implementation rates in order to meet the long-term conservation targets.

Both the Broad Program Mix and the Water Use Objective Mix scenarios meet the 2030 and 2040 targets by design (i.e., the assumed program implementation rates were increased to achieve the necessary savings). When the fully realized MWENDO savings are included, the savings under both scenarios meet the 2030 target and exceed the 2040 target by several thousand acre feet. This results from the ramp-up of the MWENDO savings over the forecast plus the residual water savings from 2021-2030 program implementation.

While this analysis indicates that achieving the targets is possible, as discussed further below, Valley Water will have to significantly increase program participation rates to accomplish that objective.

Table 6-5 Projected Water Savings by Scenario (AFY)

Scenario	MWENDO Savings	2025	2030	2035	2040
1) Business-As-Usual	**a)** With	84,000	95,000	104,000	113,000
	b) Without	84,000	94,000	102,000	109,000
2) Broad Program Mix	**a)** With	88,000	99,000	107,000	115,000
	b) Without	88,000	99,000	105,000	111,000
3) Water Use Objective Mix	**a)** With	88,000	99,000	107,000	115,000
	b) Without	88,000	99,000	105,000	111,000
Long-Term Conservation Targets		--	**99,000**	--	**109,000**

Savings rounded to nearest thousand AFY.
Cells marked grey indicate scenarios and years that do not meeting the long-term conservation targets.

6.1.5 Program Expenditure by Scenario

The estimated average annual expenditure by scenario is summarized in **Table 6-6**. Costs include Valley Water's labor, benefits, and overhead, plus expenditures for outside services, materials, and financial incentives and rebates. Labor, benefits, and overhead costs are based on the Valley Water's water conservation program operations cost forecast.[60] The Business-As-Usual scenario assumes the same staffing level that is in this forecast. The other two scenarios assume that

[60] Valley Water provided this forecast to M.Cubed in the spreadsheet "91151001_Water Conservation Program_v2.0.xlsm."

staffing is increased from 4 to 10 FTE over a three-year period.[61] **Figure 6-1** shows the staffing implementation schedule included in the modeling. Conservation staffing levels are discussed further in Section 6.2.2.

In the previous ten years (2011-2020), Valley Water conservation program expenditures have averaged $5.1 million per year in 2019 constant dollars. It should be noted that this ten-year period includes additional conservation funding implemented as part of Valley Water's response to the historic drought, as discussed further in Sections 6.2.1 and 7.2.

Under the Business-As-Usual scenario, projected annual expenditures would be less than historical expenditures and decline over time.[62] However, as noted above, this approach does not result in Valley Water fully meeting its long-term conservation targets.

Under the Broad Program Mix scenario, projected annual expenditures would average $6.2 million from 2021-2025 and $7.9 million from 2026-2030 in the without the MWENDO scenario and $6.8 million in the with the MWENDO case. Thus, as modeled, the MWENDO has the potential to reduce 2026-2030 annual program expenditure by $1.1 million (about 14%).

The State Water Use Objective Mix scenario results in lower expenditure from 2021-2025 but higher expenditure from 2006-2030 compared to the Broad Program Mix scenario. Based on this analysis, the Water Use Objective Mix scenario's cost advantage is relatively small and transitory.

Without the MWENDO, relative to the Business-As-Usual scenario, annual costs are, on average, 53% greater under the Broad Program Mix scenario and 47% greater under the State Water Objective scenario. With the MWENDO, relative to the Business-As-Usual scenario, annual costs are, on average, 41% greater under the Broad Program Mix scenario and 36% greater under the State Water Objective scenario. The effect of the MWENDO (if implemented as projected) is to reduce needed program expenditure by roughly one million dollars per year between 2026 and 2030.

Table 6-6 Projected Program Materials and Services Expenditure by Scenario (Millions of Dollars per Year, 2019 Constant Dollars)

Scenario	MWENDO Savings	2011-2020 Historical	2021-2025	2026-2030
1) Business-As-Usual	**a)** With	5.1	$4.7	$4.5
	b) Without	5.1	$4.7	$4.5
2) Broad Program Mix	**a)** With	5.1	$6.2	$6.8
	b) Without	5.1	$6.2	$7.9
3) Water Use Objective Mix	**a)** With	5.1	$5.5	$7.0
	b) Without	5.1	$5.5	$8.0

Costs presented in millions of dollars per year as 2019 constant dollars, rounded to nearest hundred thousand dollars. Valley Water staffing and overhead costs are included. Historical 2011-2020 costs include those associated with increased conservation efforts associated with Valley Water's response to the historic drought (Section 7.2).

[61] Per April 21, 2021 email from Karen Koppett.

[62] Expenditures trend down over time because plumbing fixture/appliance replacement programs are phased out due to high saturation rates of efficient fixtures.

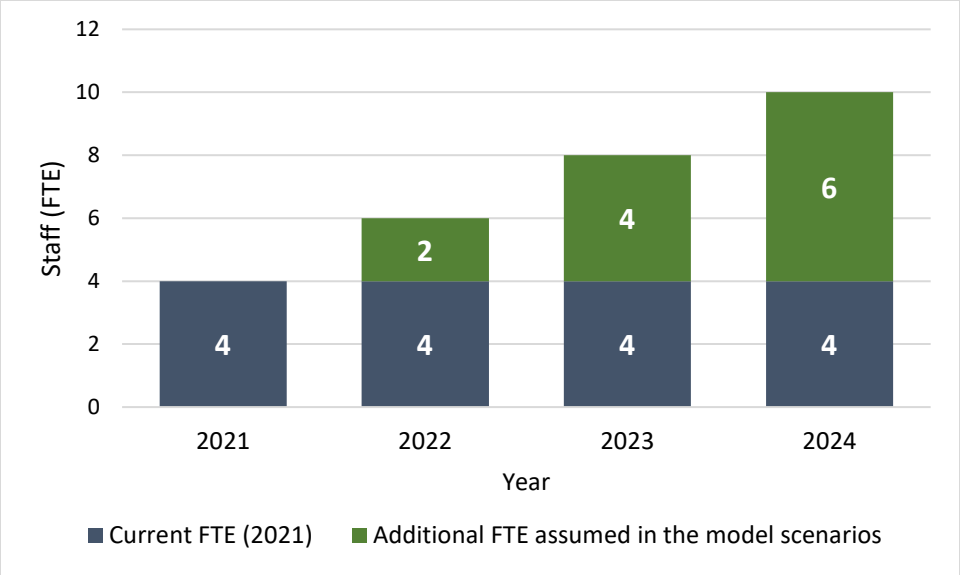


Figure 6-1 Staffing Implementation Schedule Assumed in the Broad Program Mix and Water Use Objective Mix Scenarios

6.1.6 Unit Cost of Savings

Table 6-7 summarizes the unit cost of water savings ($/AF) under each scenario. The unit costs in Table 11 are based on a 3% real discount rate. Unit costs for the Business-As-Usual scenario are, on average, 11% lower than under the Broad Program Mix Scenario, and 9% lower than under the State Water Use Objective scenario. However, Valley Water is not able to meet its 2030 conservation target under the Business-As-Usual scenario. In order to meet the 2030 target, Valley Water must expand its conservation program, essentially moving up the conservation supply curve. The State Water Use Objective scenario generates water savings at lower unit cost than the Broad Program Mix scenario, but the difference is not consequential, about 2%, on average.

Table 6-7 Unit Cost of Savings ($/AF)

Scenario		Unit Cost of Savings ($/AF)
1) Business-As-Usual	**a)** With MWENDO	412
	b) Without MWENDO	412
2) Broad Program Mix	**a)** With MWENDO	461
	b) Without MWENDO	465
3) State Water Use Objective Mix	**a)** With MWENDO	453
	b) Without MWENDO	456

Unit cost includes outlays for financial incentives, materials, and services as well as Valley Water's labor and overhead costs or outlays by Valley Water program partners and program participants.

6.1.7 Individual Program Costs and Savings Evaluation

Table 6-8 presents a comparison of individual water conservation programs, and identifies the following information for each program:

- **Cumulative Water Savings in 2030** – cumulative water savings in 2030 associated with implementation of each program from 2021 to 2030; and
- **Cost of Water Saved** – present value cost of program implementation divided by discounted annual water savings over the life of the savings.

The unit costs associated with the programs in the Broad Program Mix scenario are higher than the unit costs for the Business-As-Usual scenario, due to the cost associated with additional water supply that Valley Water would need to secure if the target water savings could not be achieved. Conversely, the unit costs associated with the programs in the Broad Program Mix scenario are similar to the State Water Use Objective Mix scenario since both scenarios assume that implementation rates will be increased such that the necessary water savings are achieved. In general, the unit costs of any programs without the MWENDO are higher than the unit costs with the MWENDO as the MWENDO (if implemented as projected) will allow Valley Water to achieve additional water savings.

Since the Broad Program Mix scenario (without MWENDO) contains all of the programs that are included in other scenarios and has the highest per-program unit costs, the cost-saving analysis for this scenario is conservatively used to identify the relative cost-effectiveness of each program (i.e., all other program scenarios will be even more cost-effective)**.**

As shown in **Table 6-8**, the Residential LF Showerhead program has the smallest unit cost, suggesting that this program theoretically allows Valley Water to best use its expenditure and achieve savings. However, it should be noted that Residential LF Showerhead program and the three other most cost-effective programs have limited potential water savings, with cumulative savings of less than 20 AF from 2021 to 2030. Thus, it is recommended that Valley Water rather prioritize its efforts on programs that have larger water saving potential, as well as lower unit costs, such as the Large Landscape Program and the AMI Leak Alert & Home Water Report programs.

Table 6-8 Costs and Savings of Potential Conservation Programs

Program (a)	Sector	Water Use Class	Water Savings in 2030 (AF)	Cost of Water Saved ($/AF)
Residential LF Showerhead, SFR	SFR	HESH	2	$325
CII Aerators 1/2 gallon per minute	CII	AERATORS	1	$357
Aerators	SFR	AERATORS	4	$357
Water Wise Indoor DIY Kit	SFR	AUDITS & RPTS	12	$359
Large Landscape Water Budgets	IRR	IRR	5,197	$369
Rain Sensors	IRR	IRR	110	$385
Large Land. Irrigation Controller	IRR	IRR	255	$391
Flow Sensor/Dedicated Irrigation Meter	IRR	METERS	219	$400
Agriculture Mobile Lab	OTH	MISC	2,000	$421
WET	CII	WET	154	$424
AMI Leak Alert & Home Water Report	SFR	AUDITS & RPTS	4,642	$425
Home Water Use Reports	SFR	AUDITS & RPTS	811	$427
Residential Meter Installation	CII	METERS	102	$456
Large Landscape Program	IRR	IRR	104	$543
CII Spray Rinse Valve Direct Install	CII	COM KITCH	6	$597
CII Aerators Direct Install	CII	AERATORS	2	$676
Residential Irrigation Controller, SFR	IRR	IRR	358	$749
MF Bathroom Retrofit Direct Install	MFR	HET	402	$798
High efficiency nozzles for pop ups	IRR	IRR	27	$964
Rain Barrel Rebate (40-199 gal)	IRR	IRR	4	$996
Water Wise Outdoor Survey	SFR	AUDITS & RPTS	11	$1,308
Rain Cistern Rebate (200+ gal)	IRR	IRR	4	$1,313
Turf Replacement	IRR	IRR	396	$1,348
CII ULF Toilet Prison Direct Install	CII	ULFT	73	$1,368
CII Ultra HE Toilet Direct Install	CII	HET	110	$1,489
Graywater - L2L	IRR	IRR	3	$1,903
Rotor Sprinklers/Spray Bodies	IRR	IRR	35	$2,128
CII 0.125 Gallon Urinal Direct Install	CII	HEU	22	$2,265

Abbreviations:

AF = acre-feet
AMI = Advanced Metering Infrastructure
CCF = hundred cubic feet
CII = Commercial, Industrial, and Institutional
COM = commercial
DIY = Do-It-Yourself
gal = gallon
HE = high efficiency
HESH = high efficiency showerhead
HEU = High Efficiency Urinals
IRR = irrigation
KITCH = kitchen
L2L = laundry to landscape
LF = low flow
MF = multi-family
MFR = Multi-Family Residential
OTH = other
RPTS = reports
SFR = Single-Family Residential
ULF = Ultra-Low Flush
ULFT = Ultra-Low Flush Toilet
WET = Water Efficient Technologies

6.1.8 Scenario Evaluation Conclusions and Recommendations

This Strategic Plan evaluated three alternative conservation program scenarios for meeting Valley Water's long-range conservation targets. Major findings include:

- Valley Water will not meet its 2030 conservation target under the Business-As-Usual scenario. There is a 5,000 AF shortfall if the MWENDO savings are not assumed, and a 4,000 AF shortfall with the MWENDO.
- To meet its 2030 conservation target using its existing mix of programs, Valley Water will need to significantly increase program implementation rates, as illustrated by the Broad Program Mix scenario. Over the next 10-year period 2021-2030, average annual program expenditure is estimated $2.2 million under the Business-As-Usual scenario and $7.1 million without the MWENDO and $6.5 million with the MWENDO under the Broad Program Mix scenario. If the MWENDO savings are not assumed, program costs would need to increase, on average, by 53% under the Existing Program Mix scenario and by 47% under the State Water Use Objective scenario. If the MWENDO savings are assumed, the program cost increases for the two scenarios would be 41% and 36%, respectively.
- While Valley Water meets its 2030 target at lower cost under the State Water Use Objective scenario, which refocuses Valley Water programs on landscape water savings, there are several downsides to this approach:
    - From Valley Water's annual operating budget perspective, the level of cost savings is likely to be relatively minor. The difference in the unit cost of savings is only about 2%, which is within the model's margin of error. Cost savings are negligible.
    - By focusing efforts on the sectors included in the State Water Use Objectives, Valley Water would exclude conservation programs that benefit CII customers. The approach is likely to be viewed as inequitable. All county water users contribute to Valley Water's water conservation budget and reasonably expect to be able to benefit from the available conservation programs.
    - While CII water use *currently* falls outside the state water use objectives, as conservation requirements continue to evolve, it is possible that this category of urban water use will either be incorporated into the objectives in the future, or other requirements for continued CII conservation will be implemented. Keeping in place or even extending the current mix of CII programs provides a reasonable hedge against this possibility. Further, CII programs such as Valley Water's Water Efficient Technology (WET) Rebate Program are uniquely transparent and effective because the savings opportunities identified are specifically tailored to each program participant and because Valley Water only pays for the demonstrated water savings from the program.
- The MWENDO generated water savings (if implemented as projected) would allow Valley Water to reduce annual program expenditure. Average annual expenditure from 2021 to 2030 under the Broad Program Mix scenario is $7.1 million/year in 2019 constant dollars without the MWENDO and $6.5 million/year with the MWENDO, a reduction of 8%. However, the timing and volume of the MWENDO water savings is very uncertain. A prudent planning stance would be to initially plan for limited water savings from the

MWENDO and then adjust program implementation levels over time as more information regarding the MWENDO adoption and performance becomes available.

For all of the above reasons, it is recommended that Valley Water continue with its current mix of conservation programs, and work to increase its implementation rates, particularly for programs that target landscape water use (e.g., Scenario 2 – Broad Program Mix with MWENDO).

6.2 Other Program Planning Considerations

Valley Water has a very successful and robust conservation program that has proved effective in saving significant amounts of water and being flexible and adaptable to the needs of its retail agencies and their customers. This section focuses on key elements for Valley Water to consider in planning and adapting its conservation program into the future, in context with the conservation program scenario findings discussed above and the detailed analysis conducted in Sections 4 and 5.

6.2.1 Changes in Program Participation During Drought Years

During the 2012-2016 drought,[63] the Valley Water Board supported budget adjustments for increased messaging/advertising, water conservation program implementation, and education regarding water waste prohibitions, with $16.4 million for conservation programs and $2.4 million for outreach and advertising (Valley Water, 2017e). The increased program and outreach funding was primarily focused on programs targeting outdoor water savings (Section 7.2.2).

In order to evaluate how conservation program participation changed during the drought in response to this increase in funding and outreach, participation in each of Valley Water's conservation programs from the program's inception through 2013 (considered the "pre-drought" period for purposes of this analysis) was compared to participation during the height of the drought. While Valley Water's drought response efforts were implemented in 2014, because this year was a transition or "ramp up" period, program participation in 2015 through 2017 was used as the "drought response" period for purposes of this evaluation (see **Table 6-9**).

Program participation was identified as having increased during the drought if the average participation rate of the drought response period was at least 20% higher than the median pre-drought period participation rate. Program participation was identified as having decreased during the drought if the median participation rate of the drought response period was at least 20% lower than the median pre-drought participation rate. If the median participation rate of the drought response period was at least 20% higher or lower than the median pre-drought participation rate, the program participation was identified as increased or decreased, respectively, during the drought. If the median participation rate changed less than 20%, program participation was identified as not having changed during the drought.[64] The results of this analysis are summarized in **Table 6-9**. For reference, change in maximum participation from the

[63] As discussed further in Section 7, 2011 was the beginning of the dry weather period, however, supplies did not begin to be constrained until 2014 and thus significant drought response actions were taken over the 2014 to 2017 timeframe.

[64] Programs that were established after or concluded before 2013, insufficient data were available and thus were excluded from this analysis.

drought response period relative to the pre-drought period for each program is also presented in the table.

Conservation programs targeting irrigation savings showed the greatest increase in participation during the drought response period, with participation in most programs increasing ten-fold or more relative to pre-drought participation. By contrast, CII programs generally showed a decrease of 25% or more in participation during the drought response period. Two single-family residential (SFR) programs showed moderate increases in participation of 25% and 60% relative to the pre-drought period. These findings illustrate that with marked increases in funding and outreach, Valley Water has been able to dramatically increase program participation, particularly in programs that target outdoor water use. This is further supported by the results of the total expenditure analysis presented in Section 6.1.

The rates of increase in irrigation programs observed during the drought are far greater than the increased participation rates needed to achieve the 2030 and 2040 conservation targets per the Section 6.1 analysis. Therefore, this further indicates that the Broad Program Mix scenario should be achievable with sufficient funding, staffing and support.

Table 6-9 Changes in Water Conservation Program Participation During Drought (2015 – 2017)

Program Name	Participation Period	Units	Average Annual Participation through 2013	Average Annual Participation 2015-2017 (a)	Participation Change	Change in Average Participation	Change in Maximum Participation
Single Family Residential							
Residential HE Toilets, SFR	**2004 - 2016**	**Toilet**	**1,570**	**2,518**	**Increased**	**60%**	**25%**
Residential Surveys, SFR	**1999 - 2017**	**Survey**	**1,176**	**1,475**	**Increased**	**25%**	**-16%**
Aerators	1996 - present	Aerator	8,688	8,511	No Change	-2.0%	-59%
Residential LF Showerhead, SFR	1993 - present	Showerhead	5,319	4,324	No Change	-19%	-75%
Residential Low WF HEW	2010 - 2018	Washer	14,217	5,989	Decreased	-58%	-45%
Multi-Family Residential							
Residential HE Toilets, MFR	2005 - present	Toilet	1,281	1,145	No Change	-11%	-40%
Residential LF Showerhead, MFR	1993 - present	Showerhead	2,593	1,628	Decreased	-37%	-76%
Residential Surveys, MFR	1999 - 2017	Survey	1,119	567	Decreased	-49%	-70%
Commercial, Industrial, Institutional							
CII 1/2 Gallon Urinal	2007 - 2018	Urinal	317	268	No Change	-15%	-26%
CII Laundromat	2000 - 2017	Washer	298	218	Decreased	-27%	-50%
CII HE Toilet	2005 - present	Toilet	1,333	564	Decreased	-58%	-72%
Residential Meter Installation	2001 - present	Meter	642	214	Decreased	-67%	-83%
CII Spray Rinse Valve	2003 - present	Valve	449	61	Decreased	-86%	-92%
WET	1997 - present	CCF	40,148	4,776	Decreased	-88%	-93%
Irrigation							
Flow Sensor/Dedicated Irrigation Meter	**2013 - present**	**Meter**	**1**	**72**	**Increased**	**7,067%**	**11,200%**
Rotor Sprinklers or Spray Bodies with Pressure Regulation and/or Check Valves	**2012 - present**	**Nozzle**	**1,097**	**42,056**	**Increased**	**3,734%**	**4,465%**

Table 6-9 Changes in Water Conservation Program Participation During Drought (2015 – 2017)

Program Name	Participation Period	Units	Average Annual Participation through 2013	Average Annual Participation 2015-2017 (a)	Participation Change	Change in Average Participation	Change in Maximum Participation
Turf Replacement	**2006 - present**	**Square Foot**	**178,274**	**3,286,679**	**Increased**	**1,744%**	**895%**
High efficiency nozzles for pop ups	**2012 - present**	**Nozzle**	**2,965**	**53,410**	**Increased**	**1,701%**	**2,238%**
Residential Irrigation Controller, SFR	**2008 - present**	**Controller**	**55**	**755**	**Increased**	**1,268%**	**735%**
Rain Sensors	**2012 - present**	**Sensor**	**56**	**510**	**Increased**	**818%**	**1,284%**
Large Land. Irrigation Controller	2004 - present	Controller	137	108	Decreased	-21%	-39%
Large Landscape Program	1995 - present	Survey	84	24	Decreased	-71%	-82%
Other							
Agriculture	**1998 - present**	**AF**	**888**	**1,833**	**Increase**	**107%**	**100%**

Abbreviations:
AF = acre-feet
CCF = hundred cubic feet
CII = commercial, industrial, institutional
gal = gallon
HE = high efficiency
HEW = high efficiency washer
= Increase participation
LF = low flow
MFR = multi-family residential
N/A = not applicable
SFR = single-family residential
ULF = ultra-low flow
WET = water efficient technologies

Notes:
(a) Although the drought started before 2015, participation in 2015-2017 was used to represent customer responses to the State and local agency's policies and regulations during the severe drought period.

6.2.2 Conservation Program Staffing Levels

Valley Water's Water Conservation Program currently includes four full-time staff members, typically four part-time temporary staff, and up to six student interns (number varies depending on season and program needs). The full-time staff includes one senior water conservation specialist and three water conservation specialists. These staff manage all aspects of Valley Water's conservation programs (including program administration, technical expertise, education and outreach, and coordination and management of outside contractors, among other things) that serve a population of 1.9 million in Santa Clara County. This equates to roughly one full-time staff member per 475,000 people served. Conservation staffing levels for other similarly sized agencies are more typically on the order of one staff member per 80,000 people served, or roughly four times the staffing levels of Valley Water.

Based on our review of the Valley Water's staffing levels, the current staffing level is not adequate to continue to expand the programs needed to achieve the long-term water conservation targets. Many programs that Valley Water would need to increase participation in require higher levels of staffing to support relative to the more traditional rebate-type programs. Given its limited staff resources, Valley Water's ability to deploy and manage programs is limited and, even with additional funding, Valley Water may not be able to achieve the required levels of implementation identified in any of the identified scenarios. In order to successfully implement the planned conservation programs, particularly at the increased implementation rates required to reach the conservation targets, Valley Water will need staff dedicated to particular areas and programs, with specialized expertise, such as staff with technical knowledge on landscape conversions and experience with administration and coordination of contractor-implemented programs. In addition to the additional staff resources needed to administer and manage programs at increased participation levels, Valley Water will need to conduct more intensive community outreach, including relationship building with the community, which is considerably time and staff-intensive. It should also be noted that while Valley Water frequently leverages its resources by hiring outside contractors for certain aspects of its conservation programs, that the hiring and management of contractors in and of itself is time-intensive and requires experienced and knowledgeable staff to support the efforts.

Therefore, based on the comparison of staffing levels at other similar-sized agencies and the modeling described under Section 6.1, it is recommended that Valley Water's conservation staffing be increased to at least 10 full time equivalent (FTE) in order to adequately support achievement of the conservation targets.

6.2.3 Potential Approaches to Augment Valley Water's Conservation Programs

This Plan recommended that Valley Water continues to pursue a broad mix of conservation programs that target all aspects of customer water use. The recommendation was based on the already very comprehensive and diverse set of program offerings provided by Valley Water. Valley Water's conservation programs have been so successful in the past in part due to Valley Water's ability to adopt new technologies and approaches to conservation as they evolve and in response to the needs of the County. The sections below discuss additional opportunities to continue to augment and adapt Valley Water's conservation programs into the future (e.g., by increasing participation rates, or augmenting the program offerings).

6.2.3.1 Potential Regional Model Ordinance Considerations

Valley Water faces several water supply reliability challenges that may impact the availability of each of their supply sources in the future, including drought, climate change, and evolving regulatory constraints such as potential changes to the San Francisco Bay/Sacramento-San Joaquin Delta Estuary Water Quality Control Plan (Bay-Delta Plan) that may have significant impacts to State Water Project (SWP) and Central Valley Project (CVP) delivery. Water conservation plays a critical role in increasing supply reliability by making efficient use of existing supplies. As supply reliability becomes increasingly complex and difficult to project into the future, water supply projection becomes a challenge in particular for retail agencies developing long-term water supply planning documents such as Urban Water Management Plans (UWMPs) and Water Supply Assessments (WSAs).

Valley Water has taken a key leadership role in developing the MWENDO to implement and standardize water efficiency requirements for new developments across Santa Clara County. The MWENDO includes requirements to facilitate increased water efficiency including infrastructure to allow for the use of alternative water sources and on-site reuse. In addition to the tools contained in the MWENDO, there are other policy-based water efficiency tools that supply-constrained agencies across California have implemented, and that Valley Water could explore as its retail agencies face more difficult supply planning decisions. These policy-based tools are often bundled together and referred to as Water Demand Offset (WDO) or Water Neutrality policies. Through these policies, project developers are generally required to offset the new demand anticipated by the development through some combination of demand mitigation options, including:

- **On-site retrofits.** Project developer with existing property reduces total projected water demand by retrofitting existing property with efficient water fixtures. The California Civil Code §1101.1-1101.9 [65] require water-conserving plumbing fixtures be installed in residential and commercial property built before January 1, 1994. If projected water demand is reduced below baseline for existing property, no off-site WDOs are required. If not, offsite WDOs are required.
- **Off-site retrofits.** Project developer coordinates and pays for installation of water efficient fixtures at other properties or converts existing irrigation systems to recycled water for other off-site properties, typically those owned by other entities.

[65] Code Section 1101.1-1101.9, Water-Conserving Plumbing Fixtures Required in California, accessed https://www.kts-law.com/water-conserving-plumbing-fixtures-required-in-california/.

- **On-site reuse.** Larger scale developments are required to implement on-site reuse of water, including rainwater, graywater, stormwater, and blackwater. These policies have recently been implemented by the Cities of San Francisco[66] and Menlo Park.[67]
- **Supply augmentation.** Project developer secures its own water supply to serve the development, either through direct provision of water to the development or through an agreement to transfer rights to the water supplier.
- **WDO fees.** Project developer pays fees to implementing entity based on the amount of water offset, and the agency uses the fees to fund water conservation programs. Such conservation programs could include system water loss mitigation projects (e.g., capital improvement, AMI meters, etc.), purchase of water efficient equipment (e.g., NO-DES hydrant flushing machine to recycle water used to flush mains), and recycled water system infrastructure, as well as fixture rebate or retrofit and education-based conservation programs.

Such policies could be designed as a "net neutral" policy wherein the new development is required to offset all new demands associated with the development project. In addition to conserving water, this policy has a key benefit to retail agencies in support of their water supply planning efforts such as UWMPs and WSAs, because even if an agency shows reduced water reliability in its planning horizon (e.g., supply shortfalls identified in drought periods), approval of the new developments with "net neutral" water use would not change the overall supply reliability for the existing retail agency customers. Additionally, including a WDO fee element to such policies could result in an ongoing funding source that could support a variety of conservation and/or water loss mitigation efforts, including those that directly respond to the forthcoming Making Water Conservation a California Way of Life annual water use objectives requirements.

6.2.3.2 Customer Targeting

Valley Water has a wealth of program participation data that can be evaluated and mined to better understand which programs are reaching which customers. Detailed analysis of participation trends based on customer demographics, property characteristics, and geography

[66] In September 2012, the City and County of San Francisco implemented Article 12C of the San Francisco Health Code, commonly referred to as the Non-potable Water Ordinance, which established regulations for the collection, treatment, and use of alternate water sources for non-potable applications. The Non-potable Water Ordinance requires any new development projects 250,000 square feet (sq ft) or more to install an onsite non-potable water system that collects and treats graywater, rainwater, and foundation drainage for use in toilet and urinal flushing and irrigation. Development projects 40,000 sq ft or more must prepare water budget calculations to assess the amount of rainwater, graywater and foundation drainage available to the project, as well as assess the demands associated with toilet and urinal flushing and irrigation.

[67] The City of Menlo Park established guidelines for water use efficiency and recycled water requirements through several zoning ordinances, including: Office (O) Section 16.43.140 Green and sustainable building, Life Sciences (LS) Section 16.44.140 Green and sustainable building, and Residential Mixed-Use (R-MU) Section 16.45.140 Green and sustainable building. These ordinances comply with the California Green Building Standards Code (CALGreen), Cal. Code Regs., Title 24, Part 11 and require all new buildings 250,000 sq ft or more to use alternate sources of water approved by the City for non-potable uses, including rainwater, graywater, stormwater and blackwater. Approved uses for non-potable water include toilet and urinal flushing, cooling applications, process water, dust control and soil compaction, water features or decorative fountains, irrigation, or others approved by the City.

were conducted for five key Valley Water conservation programs (Commercial and Multi-Family Dwelling High Efficiency Toilet Direct Installation Program, Graywater Laundry to Landscape Rebate and Direct Installation Programs, Landscape Rebate Program: Landscape Conversion Rebate and Weather Based Irrigation Controller Rebate, Submeter Rebate Program, and Water Wise Survey Program), and the results are presented in **Table 5-13**. On the basis of those findings, two overall approaches are recommended to identify specific customers to target through marketing and outreach to increase program participation:

(1) Expand to New Customer Groups - For programs that have had a good amount of participation so far, identify customers with characteristics that appear to be underrepresented in the current participant population, and target future program outreach to these customers. That is, provide targeted outreach to the customers with characteristics that as a whole have not historically participated at high rates and appear not to have been as effectively reached by past outreach efforts.

(2) Build on Current Successes - For programs that are newer or have had more limited participation to date, identify customers with characteristics that appear to be currently participating at higher rates, and target future outreach to "similar" customers to get additional program participation. That is, build on the successes of the program to date and appeal to those who may be most likely to participate.

Marketing and outreach have been proven to drive residential customer participation in conservation programs, as particularly evidenced by the increased participation rates observed in response to marketing efforts during the drought. As Valley Water seeks to increase its program participation to meet its long-term conservation targets for 2030 and 2040, it is therefore recommended that Valley Water:

- Continually evaluate program participation and success,
- Identify and evaluate programs that are not meeting the expected levels of participation,
- Utilize the analysis and targeting approaches for the five programs presented in Section 5 to increase program participation in high-water saving programs, and
- Conduct similar analyses to those in Section 5 for any programs Valley Water identifies as needing to increase program participation, and apply the approaches for identifying customers to target with marketing and outreach identified above.

By monitoring and adaptively managing participation in high-water saving programs through targeted marketing and outreach, Valley Water will be able to leverage its limited staff resources to the best of its ability to work towards its conservation targets.

6.2.3.3 Pressure Regulating Valves

The California Plumbing Code §608.2 requires that a PRV be installed at service connections where the system water pressure exceeds 80 pounds per square inch (psi), to reduce the water service pressure to 80 psi.[68] This responsibility falls to the property owner, and it is possible that customers in some areas with high water pressure do not have such a PRV, or that the PRV they

[68] California Plumbing Code, 2016. Chapter 6 Water Supply and Distribution. https://up.codes/viewer/california/ca-plumbing-code-2016/chapter/6/water-supply-and-distribution#6.

have may not be functioning as intended.[69] Systems with higher pressure have been demonstrated to have higher leakage rates (Lambert, 2001). In addition, without a pressure regulator, sprinklers and other irrigation devices used by customers with higher water pressure would be expected to use more water and result in a greater degree of irrigation overspray (inefficiency) than those in lower pressure areas. If that is the case, providing PRVs to customers in high pressure areas could result in water savings by increasing irrigation efficiency, in addition to reduced leakage losses. Further, while the Plumbing Code requires an 80 psi PRV to be installed, use of PRVs in the 60 psi to 70 psi range may result in additional water savings, while still maintaining pressures within an ideal range for customers.

Valley Water could explore a new conservation program aimed at replacing customer PRVs. Such a program could include: (1) providing PRVs to customers without one, (2) replacing failing PRVs, and/or (3) incentivizing the use of lower pressure PRVs in the 60 psi to 70 psi range. The design of such a program should include the following considerations:

- While an 80 psi PRV is required under the plumbing code, a conservation program could incentivize the installation of a more restrictive PRV, such as 60 psi, for additional water savings.
- The actual operating pressure at a customer site can be tested as a criterion for program eligibility, and would help Valley Water identify customers with existing, but poor performing PRVs.
- Valley Water could work with its retail agencies to identify areas of high water main pressure to identify customers where this program might be most effective and/or to use for the development of a pilot program.
- Customers in zones with pressure greatly exceeding 80 psi would likely be experiencing substantial negative impacts indoors without a PRV in place; thus, customers in the highest pressure zones are likely to already have a PRV installed. However, these may be good candidates for the replacement of an existing PRV with a PRV that reduces pressure below 80 psi, but within an acceptable range (e.g., 60 to 70 psi).
- Most indoor water use devices, such as clothes washers, dishwashers, toilets, and showerheads typically have an internal mechanism that limit the amount of water used regardless of available water pressure. Increased water pressure would be expected to result in a higher degree of inefficiency among outdoor water using devices such as sprinklers, garden hoses, and drip irrigation, than among indoor devices.
- Customers in areas with high pressure and inadequate pressure regulation are likely to experience more leaks and breakages due to the increased pressure than customers in lower pressure areas (Lambert, 2001).

[69] Per the Legacy Plumbing website (https://legacyplumbing.net/services/pressure-reducing-valves/#:~:text=PRVs%20typically%20last%20between%208,these%20symptoms%20start%20to%20appear), the average lifespan of household PRVs is 8 to 15 years, and per the conversation with a representative of a well-known valve manufacturer (Cla-Val), with good maintenance (service every 2 to 5 years), a PRV could last 20 years. Since the lifespan of PRVs depend on various factors, such as water pressure in the water main, it would be expected that many PRVs would be operating as intended.

- Changing water pressure for industrial accounts may have a potential impact on manufacturing operations, and thus should be approached with caution.

6.2.3.4 Large Landscape Program

Valley Water's 2020 Annual Report on the Large Landscape Program identifies areas with potential water savings in the irrigation sector. As identified in the 2020 Annual Report, overwatering has rebounded after the drought, with smaller commercial sites appearing to be more likely to overwater. The 2020 Annual Report also identified that sites that have their landscaper actively included as stakeholders overwater 30% less than those who aren't enrolled.

Since smaller sites with less than one acre of landscape make up more than half of the total sites in the Large Landscape Program, and assuming a similar proportion for all sites within Valley Water's service area, it appears that doing additional outreach to customers with smaller sites could increase the water savings for this program. Thus, it is recommended that Valley Water target landscape customers with smaller sites and partner with its retail agencies to engage the targeted customers as stakeholders in the landscape program development through the existing online platform (www.waterfluence.com). Allowing landscapers to provide comments and contribute to the development of the existing and future landscape programs is likely to increase program participation as well as program efficiency.

6.3 Summary

This section presents and evaluates three potential conservation programming scenarios with respect to: (1) its efficacy to meet the long-term conservation targets, (2) estimated budget expenditures, and (3) scenario and program cost effectiveness. This section also presents an evaluation and discussion of additional considerations for Valley Water's future conservation program planning, including: (1) a review of the changes in program participation observed during the recent drought period in response to Valley Water's increased conservation funding and focus, (2) a review of conservation program staffing levels, (3) a discussion of potential regional model ordinance considerations, and (4) a discussion of potential new approaches to augment and adapt Valley Water's conservation programs in the future.

Key findings and considerations for the design and implementation of Valley Water's conservation programs going forward are summarized below.

- If Valley Water continues its current conservation program activity at recent levels of implementation and participation going forward, it will not meet its 2030 conservation target.
- Valley Water's current broad and comprehensive mix of conservation programs are sufficient and appropriate to meet its 2030 and 2040 targets, if program implementation rates are increased and shifted towards the highest saving programs (e.g., those that target outdoor landscaping water use). The current mix is also beneficial because it offers a broad suite of programs to all customers and sectors (Section 6.1).
- In order to meet its 2030 and 2040 targets, Valley Water will need to increase implementation and participation rates in its programs, which will require a commensurate increase in expenditures. Through its experiences responding to the drought, Valley Water demonstrated the ability to significantly increase participation in

its programs, including greater than ten-fold participation increases for specifically targeted programs, which was enabled by the increased funding allocated to these programs and outreach as part of the drought response efforts (Section 6.2.1).

- The current staffing level is not adequate to continue to maintain the programs needed to achieve the long-term water conservation targets. Valley Water's current conservation staffing levels are much lower than that of other similarly sized agencies. With limited staff resources, Valley Water's ability to deploy and manage programs is limited and even with additional funding, Valley Water may not be able to achieve the necessary levels of implementation identified in the scenarios. Therefore, it is recommended that Valley Water's conservation staffing level be increased to at least 10 FTE in order to adequately support achievement of the conservation targets.
- Valley Water's conservation programs have been so successful in the past in part due to Valley Water's ability to adopt new technologies and approaches as they evolve and in response to the needs of the County. Valley Water is recommended to continue to pursue a broad mix of conservation programs that target all aspects of customer water use. Four additional opportunities to continue to augment and adapt Valley Water's conservation programs into the future include: (1) evaluating model ordinance options related to further water demand offset policies, (2) using geospatial-based participation trend analyses as a tool to identify customers to target with marketing and outreach to adaptively manage and increase participation in key programs, (3) considering expanding program offerings to those that provide conservation savings related to water loss, such as a PRV-based program, and (4) increasing outreach to small site landscape customers to boost program participation rates and program efficiency.

7 Water Shortage Management

Valley Water's various water supply sources are subject to a number of constraints including hydrologic variability, regulatory requirements, climate change, and infrastructure capacity, which can result in water shortage conditions. This section discusses the various documents that are employed by Valley Water to address water shortage conditions; and Valley Water's response to the 2012-2016 drought,[70] including specific actions taken in regard to water conservation and demand management policies and recommendations for future drought response; and the challenge demand hardening may pose for future drought response.

It should be noted that at the time of the writing of this Strategic Plan (Summer 2021), Valley Water is responding to a new and significant drought, and has initiated the development of a Drought Response Plan under a WaterSMART grant received from the United States Bureau of Reclamation. Given the timing of the development of this Plan, the 2021 drought response is not specifically addressed herein.

7.1 Water Shortage Planning Documents

Valley Water and its retailers are required to prepare several planning documents that address different aspects of preparation for water shortages (including catastrophic supply interruption) and associated response actions. The general requirements for, and content of, the primary planning documents related to water shortages or other supply interruptions are summarized below.

7.1.1 Water Shortage Contingency Plan

The Urban Water Management Planning Act (California Water Code [CWC] §10610 – 10657) requires that any urban water wholesaler or retailer providing municipal water to more than 3,000 connections or supplying more than 3,000 acre-feet (AF) of water annually to update their Water Shortage Contingency Plan (WSCP) every five years, consistent with the Urban Water Management Plan (UWMP) update cycle. Valley Water expanded its WSCP into a standalone document as part of 2020 UWMP development. The purpose of the WSCP is to detail how a water supplier will respond if water shortage conditions occur, including, among other things:

- Identifying shortage response actions (demand reduction and/or supply augmentation) for six levels to address shortage conditions ranging from up to 10% to greater than 50% shortage;
- Estimating the extent to which the gap between supplies and demand will be reduced by implementation of each shortage action; and
- Identifying the procedures the agency will follow to determine each year if water shortage conditions are likely to occur in the coming year (Supply and Demand Assessment).

Many of these requirements are new for the 2020 update to the WSCPs, and are intended to make these plans even more robust tools for responding to drought and other water shortage

[70] As discussed further in Section 7.2.1, 2011 was the beginning of the dry weather period, however, supplies did not begin to be constrained until 2014 and thus significant drought response actions were taken over the 2014 to 2017 timeframe.

conditions. Valley Water and 11 of the retailers in the County[71] were required to submit updated WSCPs to the California Department of Water Resources (DWR) by July 1, 2021. Valley Water's 2020 WSCP can be found at its website (https://www.valleywater.org/your-water/water-supply-planning/urban-water-management-plan). The WSCPs for Valley Water and its retail agencies will also be made available on DWR's Water Use Efficiency Data (WUEdata) web portal as part of their UWMP submittals (https://wuedata.water.ca.gov/).

Valley Water has demonstrated success in reducing water demand in a drought by coordinating very closely with its retailers. During the 2012-2016 drought Valley Water and retailers held regular meetings and exchanged information on water supply conditions, operations, and actions/messaging to achieve water use reduction. For example, Valley Water held two summits in 2015, one with retailers and another with elected officials, to facilitate increased water use reductions and increase coordination to meet the 30% reduction target. Valley Water will continue the collaboration with its retailers in any future drought. Meanwhile, Valley Water will closely monitor its water supply reliabilities by using groundwater storage as an indicator and signal[72] and prepare an Annual Water Supply and Demand Assessment to quantify potential supply shortage.

7.1.2 Infrastructure Reliability Plan

Valley Water completed its first Infrastructure Reliability Plan (IRP) in 2005 and updated it in 2016. The IRP analyzes several outage scenarios for Valley Water's system, including an earthquake, extreme storm, delta outage, and power outage. Valley Water and retailers agreed on a reliability target during an emergency that Valley Water should be able to restore treated water deliveries to meet the equivalent of a winter month's demand (i.e., February) within 30 days after a major disaster event. Modeling and analyses estimated service restoration time of Valley Water's existing system for minimum winter demands in each of the outage scenarios.

The worst-case outage scenario was a magnitude 7.9 earthquake on the San Andreas fault, which would result in an estimated 30-day outage time before Valley Water can provide minimum treated water demands to retailers. In the Delta outage scenario, modeling demonstrated Valley Water can continue limited service (at an assumed 20% demand reduction) for a 24-month period with no imported water supplies in a normal hydrologic year and starting with normal groundwater supplies. In a regional power outage, Valley Water can operate facilities on backup fuel storage for an estimated 3 to 10 days, or longer given regular external fuel deliveries.

7.1.3 Local Hazard Mitigation Plans

The Robert T. Stafford Disaster Relief and Emergency Assistance Act, as modified by the Federal Disaster Mitigation Act of 2000, requires state and local governments to submit a local hazard mitigation plan (LHMP) to the Federal Emergency Management Agency (FEMA) in order to receive federal hazard mitigation grant funding. While these entities are not federally required

[71] Stanford University and Purissima Hills Water District are below the size threshold requiring agencies to prepare UWMPs and WSCPs.

[72] Per the 2020 UWMP: "Because Valley Water's supply comes from a variety of sources, many factors and events affect water supply availability in any given year. Through its long- term practice, Valley Water has determined that projected end-of-year groundwater storage serves as the best indicator of potential water shortages and early warning signal, and therefore uses it to determine a potential water supply shortage.."

to submit a LHMP, only those that do are eligible for those grants. The LHMP must be updated every five years in order to remain eligible for funding.

LHMPs act as a baseline for how water suppliers can reduce potential threats to property, facilities and the public posed by natural hazards. Valley Water's most recent LHMP was completed in 2017 which, among other things, "identifies capabilities, resources, information, and strategies for building resilience and reducing physical and social vulnerabilities to disasters" (Valley Water, 2017b). Valley Water's LHMP identifies the potential hazards it could face and provides and scores each hazard based on threat level (Valley Water, 2017b). As shown below in **Table 7-1**, drought is assessed with a threat level of "High", and assigned the highest possible score. The LHMP identifies a series of mitigation actions to address drought risks (**Table 7-2**), and Valley Water reports on the status of these mitigation efforts annually. Valley Water's LHMP and annual LHMP reports can be found on their website at https://www.valleywater.org/LHMP.

Table 7-1 Scores and Threat Levels by Hazard

Hazard	Probability	Location	Impact		Total Score	Threat Level
			Primary	Secondary		
Dam failure	3 Likely	4 Extensive	4 Extreme	4 High	48.0	High
Drought	4 Highly likely	4 Extensive	4 Extreme	4 High	64.0	High
Floods	4 Highly likely	4 Extensive	4 Extreme	4 High	64.0	High
Geologic hazards	4 Highly likely	2 Limited	3 Severe	3 Moderate	41.6	Medium
Land subsidence	2 Occasional	2 Limited	4 Extreme	4 High	25.6	Medium
Sea level rise	4 Highly likely	2 Limited	3 Severe	3 Moderate	41.6	Medium
Seismic activity	4 Highly likely	4 Extensive	4 Extreme	4 High	64.0	High
Severe winds	3 Likely	4 Extensive	2 Moderate	2 Limited	33.6	Medium
Wildfire	2 Occasional	3 Significant	3 Severe	3 Moderate	48.0	High

Table 7-2 LHMP Drought Mitigation Actions

Mitigation Number	Mitigation Action	Responsible Division(s)	Potential Funding Source(s)	Estimated Cost	Target Completion Date	Priority (# of Votes)
3.1	Evaluate the long-term impact of climate change on future water supplies, and include more severe drought conditions in water supply planning documents.	Watersheds Water Utility	General Valley Water funds Grant funding	$	Ongoing Every 5 years	High (3)
3.2	Work with retail water suppliers to offer free or low-cost water audits for residents and businesses within Valley Water's service territory.	Water Utility	General Valley Water funds Grant funding Regional water agencies	$$	Ongoing	Low (0)
3.3	Work with retail water suppliers to support real- time water monitoring for all customers.	Water Utility	General Valley Water funds Regional water agencies	$$$	TBD	Low (0)
3.4	In coordination with retail water suppliers, host regular workshops and classes on water conservation, including providing information on drought-tolerant landscaping, available rebates for water retrofits, and water efficiency strategies innew buildings. Continue to offer workshops and classes even when drought conditions are not present. Develop outreach materials for water conservation.	Office of the CEO Water Utility	General Valley Water funds Regional water agencies	$$	Ongoing	Medium (2)
3.5	Increase recycled and purified water supplies and expand the existing recycled and purified water infrastructure.	Water Utility	Public-private partnerships, grants, low interest loans	$$$	TBD	Low (0)
3.6	Explore opportunities to recycle water for non-potable and potable uses.	Water Utility	General Valley Water funds Grant funding	$	Ongoing	Low (0)
3.7	As identified in the Capital Improvement Program (CIP), continue to prioritize water supply improvements as they relate to the risks outlined in this Plan. Coordinate future updates to the CIP to support mitigation actions outlined in this Plan.	Water Utility	Bonds Capital Improvement Program DWR General Valley Water funds	$	Ongoing	Low (0)
3.8	Implement projects that increase the resiliency or reliability of future water supplies.	Water Utility	Bonds Capital Improvement Program General Valley Water funds	$$$	Ongoing	Low (0)

7.1.4 America's Water Infrastructure Act: Risk and Resilience Assessments and Emergency Response Plans

The America's Water Infrastructure Act (AWIA) was signed into law on October 23, 2018 and requires community water systems (including wholesaler and retailer systems) that serve a population of more than 3,300 people to develop and update Risk and Resilience Assessments (RRAs) and Emergency Response Plans (ERPs). These documents are reviewed and, if necessary, updated every five years and require that the water system assess the risks to the system from natural hazards (including droughts) and malevolent acts, resiliency of physical and financial system infrastructure, monitoring practices, any use and storage of certain chemicals, and basic operation and maintenance of the system. The goal of RRAs/ERPs is to help the water supplier identify certain risks and threats to the system and to mitigate those risks or prevent them from occurring. Valley Water and all 13 of its retailers are required to develop RRAs/ERPs and submit them confidentially to the United States Environmental Protection Agency (EPA). Due to their sensitive nature, RRAs and ERPs are not available to the public.

7.2 Recent Drought and Emergency Drought Response

Between 2012 and 2016, historic drought conditions were observed throughout the state of California. While drought effects were observed within Valley Water's service area starting in 2011, available water supplies did not drop below normal stages (as defined by the WSCP) until 2014. By the end of 2014, Valley Water's supplies were projected to reach the "Severe" range (Stage 3: 200,000 AF to 250,000 AF) and thus an Emergency Drought response effort was enacted.

The activities and results from this Emergency Drought response effort were reviewed internally by Valley Water in 2017 to determine what lessons could be learned through their response to this prolonged drought, including the primary challenges faced by Valley Water, major accomplishments of the drought response, and recommendations for future drought response actions. This internal review also covered a variety of topics related to Valley Water's drought response, including securing additional imported water and accelerating their recycled water program. Valley Water's findings related to water conservation actions and recommendations are summarized and presented in the following sections.

7.2.1 Overview of the 2012 - 2016 Drought

California experienced a historic drought from 2012 through 2016. Below average rainfall conditions in Santa Clara County began in 2011 (and for most of the state in 2012), and in January 2014 Governor Brown issued Executive Order B-26-14 declaring California to be in a State of Emergency due to drought. This order remained until April 2017 when Governor Brown lifted the emergency declaration for most of California through Executive Order B-40-17. Over this period, the Governor's office and State agencies implemented a series of actions to reduce water use throughout California in response to the drought.

Likewise, Valley Water took a series of actions to reduce water use among its retail agencies in response to local drought conditions and supply availability. Due to its effective water supply management approaches, Valley Water did not experience shortage conditions until 2014, when

local conditions, combined with extremely low preliminary imported water allocations, moved Valley Water into the "Severe" range as defined by its WSCP (Stage 3: 200,000 AF to 250,000 AF). In response, the Valley Water Board of Directors (Board) took action by calling for short-term water use reductions. The actions taken by the Board were informed by Valley Water's WSCP.

- January 24, 2014 – the Board set a preliminary 2014 water use reduction target equal to 10% of 2013 countywide water use.
- February 25, 2014 – the Board increased the water use reduction target to 20% of 2013 countywide water use. The basis of the Board's decision was evidence of multi-year drought and reduced water supply outlook, including projected groundwater storage. The resolution setting the reduction target also recommended retail water agencies, local municipalities and the County of Santa Clara (County) implement mandatory measures as needed to achieve the water use reduction target.
- November 25, 2014 – the Board extended the 25 February 2014 call for 20% reductions through June 30, 2015.
- March 24, 2015 – the Board called for 30% water use reductions, and recommended that retail water agencies, municipalities and the County implement mandatory measures as needed to accomplish that target, including a two day a week outdoor irrigation schedule.
- November 24, 2015 – the Board extended the call for 30% savings through 30 June 2016.
- June 14, 2016 – the Board approved a resolution to revise the call for water use reductions to 20%, and to increase the allowable days for outdoor irrigation from two to three days a week.
- January 31, 2017 – the Board issued a resolution to extend the call for 20% water use reductions and irrigation to three days a week, and called for local enforcement of water use prohibitions currently in effect.
- June 13, 2017 – the Board issued a voluntary call for 20% reductions consistent and in support of Making Water Conservation a California Way of Life, but removed recommendations for mandatory actions by retailers and municipalities. The Board also recommended that many water waste restrictions be permanent and called for making water conservation a way of life.

Figure 7-1 provides an overview of the key drought milestones and actions taken by the State, Valley Water, Valley Water's retail agencies (excluding Purissima Hills Water District and Stanford University, which were exempt from the reporting and savings requirement), and San Francisco Public Utilities Commission (SFPUC), which supplies water to a subset of Valley Water's retail agencies. **Figure 7-1** shows the retail agencies' 2013 baseline water use, their water use from June 2014 through August 2017, and the cumulative savings achieved by these agencies relative to 2013 use. Based on this, there are two periods of notable decreases in water savings – one following Valley Water's call to reduce water use by 20%, and one following Valley Water's call to reduce water use by 30% (during which the State also implemented the mandatory conservation standards).

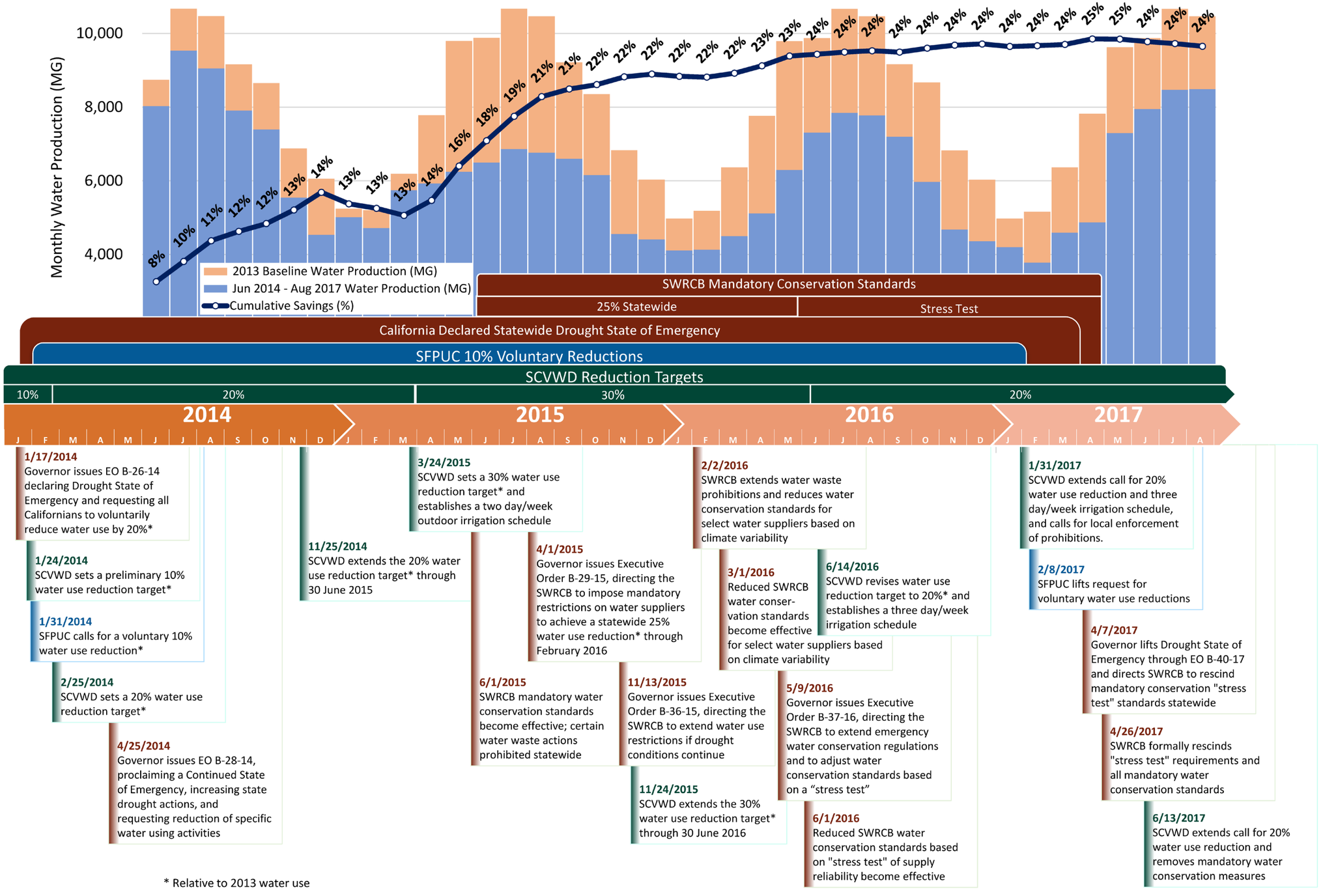


Figure 7-1 Valley Water Retail Agency Drought Response

A key action taken by the State was the imposition of mandatory water reductions (referred to as "conservation standards") to individual urban water retail agencies. Under this requirement, urban water retail agencies over a certain size threshold[73] were assigned a conservation standard ranging from 0% to 32% and required to reduce their total water use to this standard, relative to a 2013 baseline. Agencies were required to report their progress towards these targets to the State Water Resources Control Board (SWRCB) on a monthly basis through May 2016, when the SWRCB switched to a "stress test" approach that allowed urban water retail agencies to evaluate their local supply conditions and implement a conservation target commensurate with their actual available supply.

Table 7-3 lists the mandatory conservation standards assigned to each of Valley Water's retail agencies and the cumulative savings they achieved through the compliance period of June 2015 through May 2016 (SWRCB, 2016). Each retail agency exceeded its conservation standard during this period, with an average savings of 30% per agency.

Table 7-3 Summary of Retail Agency Mandatory Conservation Standards

Retail Agency	Conservation Standard	Cumulative Savings (June 2015 - May 2016)	Met Conservation Standard
California Water Service (CWS), Los Altos District	32%	38.4%	yes
City of Gilroy	24%	27.9%	yes
City of Milpitas	0%(a)	23.2%	yes
City of Morgan Hill	27%	35.1%	yes
City of Mountain View	16%	32.4%	yes
City of Palo Alto	24%	31.6%	yes
City of Santa Clara	16%	22.9%	yes
City of Sunnyvale	16%	28.7%	yes
Great Oaks Water Company	20%	33.0%	yes
Purissima Hills Water District	n/a	n/a	n/a
San José Municipal Water System	20%	30.0%	yes
San Jose Water Company	20%	32.2%	yes
Stanford University	n/a	n/a	n/a

(a) Milpitas conservation standard was revised from 12% to 0%.

7.2.2 Major Water Conservation Actions Taken by Valley Water

As part of their response to the 2012 – 2016 drought, Valley Water authorized an increase in funding for outreach and education efforts related to water conservation. This included increasing staffing for certain conservation programs and establishing a hotline for water waste reporting by the public, as well as employing water waste inspectors to respond to those calls. Valley Water allocated funding to increase rebates for some conservation programs to encourage participation, including the Landscape Rebate Program, Graywater Laundry to Landscape Rebate

[73] Urban water suppliers serving more than 3,000 customers or that deliver more than 3,000 AFY of water were required to comply.

Programs, and Commercial Rebate Programs. The Safe, Clean Water and Natural Flood Protection Program (Safe, Clean Water Program) was also established, among other things, to provide research grants to fund pilot studies for new conservation programs and efficient technologies by funneling input and ideas from the community.

Coordination with and between Valley Water and the retail agencies, as well as the cities they serve, with regards to their conservation program implementation and water conservation targets was a key component of Valley Water's drought response. This was essential to ensuring that messaging was consistent amongst retailers and was useful in implementing water conservation actions. For example, a majority of water retailers served by Valley Water adopted the same two day per week outdoor irrigation watering restriction due to this active coordination.

Valley Water also ensured that its own facilities were a model of water conservation for its retailers, agencies, and customers. Valley Water aggressively scaled back water use at their facilities, including installation of drip irrigation devices and fixing leaks. These actions show to the public that Valley Water did its part to meet water demand targets and reduce water waste.

7.2.3 Success Highlights

Many actions taken by Valley Water to increase water conservation and facilitate water demand reductions were successful in helping to meet water demand targets. The increases in funding to Valley Water's conservation programs and outreach efforts, including increasing rebates for select conservation programs, were considered a large contributor to Valley Water meeting its water demand reduction targets. The coordination of retailers, cities and the County in creating consistent messaging regarding reduction targets and water use prohibitions were also seen as significant contributing factors in reducing water demands. Community support, including implementation of the Safe, Clean Water Program and operation of the water waste inspector program were also seen as strong drivers in increasing the public's knowledge, awareness and participation in conservation measures and programs.

7.2.4 Future Recommendations

Valley Water's internal review included the development of recommendations for future drought response actions. These recommendations largely build on the actions that Valley Water considered successful in meeting its water demand conservation and reduction goals during the 2012-2016 drought. The recommendations also identify means to overcome certain implementation challenges.

- **Internal Coordination –** The need for strong internal coordination was found to be important in all aspects of Valley Water's drought response. Specific actions include frequent communication and updates with the Board and strengthening internal messaging on water conservation and water use targets.
- **Continue Strong External Communication –** Relations with the media, the public and key stakeholders, and water retailers were essential to meeting water use reduction goals, including continuing close coordination with and amongst retailers. Specific actions

include meeting early and often with retail agencies to develop consistent messaging and approaches, such as a coordinated day per week irrigation schedule.

- **Continuing the Water Waste Inspector Program –** This program was successful in identifying water waste and increasing community involvement.
- **Continuing the Safe, Clean Water Program –** The Safe, Clean Water Program was found to be an effective way of converting conservation program ideas into action and provided an opportunity for community involvement in the drought response process. Successful projects include rebate for private well users for nitrate removal treatment systems and installation of cisterns, rain gardens, and rain barrels on city and community properties.
- **Investing in Outcome Evaluations[74] –** Not enough information was gathered regarding specific outcomes of drought response actions, making it difficult to determine which actions were the most impactful in achieving water savings. Investing funds into research, such as quantification of water savings, surveys or focus groups, could be an effective way of pinpointing which strategies produced the best results, such as greater participation rates and higher water savings.

The above recommendations for water conservation actions can serve as a framework for specific actions that Valley Water can take to prepare for and respond to future water shortage or drought scenarios.

7.3 Drought Rebound and Demand Hardening

As customer water use becomes more efficient, water use as measured on a per capita basis will decline. **Appendix E** presents an analysis of per capita water use that evaluates how water use patterns have changed and are projected to change throughout the Valley Water service area over time and through 2025. This analysis reveals that responding to future droughts may be an increasing challenge.

During the 2012-2016 drought, Valley Water's retail agencies reduced their water use by approximately 30%, and through 2018 water use has not fully rebounded to pre-drought conditions. In fact, retail agency water use in 2018 was only about 7% greater than water use in 2016. Water savings during the drought would likely have resulted from a combination of behavioral changes (such as irrigating less) and more permanent fixture/device changes (such as replacing old fixtures and removing turf). The observed increase in per capita water use (i.e., the 7%) is likely the result of behavioral changes and may represent the potential for short-term savings opportunities in a future shortage. Customers whose water use has not rebounded are assumed to be more "demand-hardened" than they were previously, which will make future drought cutbacks more difficult to achieve.

Depending on the water savings needed in the current or future droughts or water shortages, Valley Water will likely need to increase outreach and other efforts to achieve the same savings

[74] The Bay Area Water Supply and Conservation Agency did complete a comprehensive drought response evaluation, with support from EKI:
http://bawsca.org/uploads/userfiles/files/BAWSCA%20Drought%20Report%20FINAL_forPrinting_REVISED.pdf

results as were achieved during the 2012-2016 drought period. Even so, due to demand hardening, the same level of savings may not be feasible. For example, if Valley Water wants to achieve a 30% water use reduction target, the effective per capita water use for its retail agencies would have to be approximately 78 gallons per capita per day (GPCD) on average, which is significantly lower than any of the retail agencies' historical per capita values. Thus, Valley Water should assess the degree of demand hardening in the District as part of future drought responses.

8 Program Monitoring and Evaluation

Valley Water has a very successful and robust conservation program that has demonstrated an ability to save a significant amount of water and to be flexible and adaptable to the needs of its retail agencies and their customers. The section below identifies recommendations for methods of program monitoring and evaluation to support the continued adaptive management of Valley Water's conservation program to ensure that its long-term water conservation targets and the needs of the County and retail agencies are met.

8.1 Long-Term Conservation Goal Monitoring

As identified in Section 6.1, Valley Water will need to increase implementation in its conservation programs in order to reach its 2030 and 2040 conservation targets. Valley Water's Conservation Tracking Model estimates the amount of water saved through both passive savings and active conservation savings. This model should be kept up to date with respect to conservation program implementation. Periodic review of model results will allow Valley Water to assess its progress towards meeting its conservation targets, and to proactively identify the need to increase or adjust conservation program implementation, including through specific program targeting efforts.

8.1.1 Conservation Program Participation by Retail Agency

As highlighted by the analyses in Sections 3.4 and 5.2, the level of customer participation in many programs vary by retail agency, and at times not all retail agencies are aware of all conservation programs offered through Valley Water. It is therefore recommended that Valley Water periodically conduct an assessment of relative program participation by retail agency to identify areas of low participation and to work with retail agencies to increase customer awareness of these programs.

8.1.2 Geospatial Evaluation of Program Participation

The analyses presented in Section 5 can be used as a framework for evaluating program effectiveness and equity of program participation. If Valley Water finds that its program implementation rates are not making adequate progress towards its long-term conservation targets, Valley Water can leverage the results of the analyses of the five key programs presented in Section 5 to identify specific customer subsectors to target with marketing and outreach in order to increase program participation. In particular, it is recommended that Valley Water periodically conduct the geospatial analyses presented in Section 5.2 on these and other key programs to monitor changes in spatial distribution to proactively identify areas where customers appear to be underrepresented by participation in key programs. Then, based on the results of these analyses, Valley Water may assess the benefit of conducting further analyses and/or implementing a more targeted marketing approach.

8.2 Water Use Monitoring

8.2.1 Water Use by Retail Agencies

As a wholesale water supplier, it is difficult for Valley Water to track water use by end use. The Water Use Profiles included in Section 2.2.2 for each water agency provide a snapshot of key

water use metrics by each agency, to help Valley Water understand how water is being used within the County. These profiles, or a similar set of metrics, can be periodically updated by Valley Water in order to monitor relative changes in water use by customers in each sector, as well as each agency. In particular, we recommend periodically updating and tracking percentage and total water use by sector (total residential vs. non-residential) and changes in per capita water use. These metrics can be obtained from the data each agency (with the exception of Stanford University and Purissima Hills Water District) are required to report to the State Water Resources Control Board (SWRCB) every month (see the SWRCB website: https://www.waterboards.ca.gov/water_issues/programs/conservation_portal/conservation_reporting.html). With these data, Valley Water can assess the overall and relative changes in water use by major end sector to inform changes or adjustments to its water conservation programs, as needed. **Appendix E** provides an estimate of per capita water use based on currently available information.

8.2.2 Annual Water Use Objectives

As discussed in Section 3.2, the California Department of Water Resources (DWR) and the SWRCB are currently working to establish to establish standards for retail agencies to calculate annual water use objectives, which will become conservation targets that agencies will need to begin to report on in 2023 and comply with by 2027. These annual water use objectives will be calculated based on the collective sum of the following water uses: (1) indoor residential use; (2) outdoor residential use; (3) outdoor commercial, industrial, and institutional (CII) use with dedicated irrigation meters; and (4) distribution system water losses. The DWR and the SWRCB are also working to establish performance measures for CII water use and appropriate variances for unique uses that can have a material effect on water use of an urban retail water supplier.

As these standards continue to evolve, we recommend that Valley Water works with its retail agencies to understand how their water use relates to the anticipated standards. If the retail agencies are not able to comply with the new objective, Valley Water could tailor Valley Water's conservation programs to support the retail agencies in their needs to manage demand.

8.3 Drought and Other Water Shortage Conditions

As part of the recent Making Water Conservation a California Way of Life[75] changes to the Urban Water Management Plan (UWMP) Act, Valley Water and its retail agencies are required to conduct annual assessments of supply sufficiency to meet demand in the forthcoming year, in order to determine whether or not a water shortage condition is likely to occur. While similar assessments are made by every agency as needed, the new requirements make this process more formal, and require reporting to DWR on an annual basis. As part of the annual assessment

[75] In 2018, the California State Legislature enacted two policy bills, SB 606 and AB 1668, to establish a new foundation for long-term improvements in water conservation and drought planning to adapt to climate change and the resulting longer and more intense droughts in California. These two bills, referred to as "Making Water Conservation a California Way of Life" amend existing law to provide expanded and new authorities and requirements to enable permanent changes and actions for those purposes. The primary goals of the legislation are to improve water use efficiency, eliminate water waste, strengthen local drought resilience, and improve agricultural water use efficiency and drought planning.

process, Valley Water will provide its retail agencies with an outlook of supply sufficiency over the next year, assuming that the following year is dry, and each retail agency will make an assessment of the likelihood of water shortage conditions that takes into account all of its available supplies (e.g., including local supplies and those purchased from the San Francisco Public Utilities Commission).

It is recommended that Valley Water coordinates with its retailers on the annual assessment process so that both Valley Water and its retailers can understand the full supply reliability picture. The annual assessment will help Valley Water to better anticipate and plan for potential conservation program changes in response to the drought, including either a collective response needed by Valley Water, or a likely increase in participation by customers of retail agencies more significantly affected by water shortages.

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Appendix A

Valley Water's Water Supply and Reliability

Appendix A
Summary of Water Supply Sources and Reliability

This Appendix provides a description of each of Valley Water's supply sources and the key supply reliability issues relevant to each based on assessments provided in the Water Supply Master Plan 2040 (Valley Water, 2019b), 2020 Urban Water Management Plan (Valley Water, 2021), and Groundwater Management Plan (Valley Water, 2016a).[1]

1. Groundwater Supplies

The county overlies the Santa Clara Subbasin of the Santa Clara Valley Basin (DWR 2-009.02), the Llagas Area Subbasin of the Gilroy-Hollister Valley Basin (DWR 3-003.01), and very limited portions of the San Mateo Plain Subbasin of the Santa Clara Valley Basin (DWR 2-009.03) and the North San Benito Subbasin of the Gilroy-Hollister Valley Basin (DWR 3-003.05). Valley Water does not typically deliver groundwater to customers, but does have some limited emergency groundwater pumping capacity. Instead, it manages the groundwater subbasins for the benefit of its groundwater customers and the county at large. Both the Santa Clara and Llagas Area subbasins are designated as high priority basins under DWR's 2019 Phase 2 Basin Prioritization, the North San Benito Subbasin is designated as a medium priority basin, and the San Mateo Plain Subbasin is designated as a low priority basin (DWR, 2019b). As such, the Santa Clara, Llagas Area, and North San Benito subbasins are subject to the requirements of the Sustainable Groundwater Management Act (SGMA), including the preparation of and management under a Groundwater Sustainability Plan (GSP) or alternative GSP administered by a Groundwater Sustainability Agency (GSA).

Valley Water serves as the GSA for both the Santa Clara Subbasin and the Llagas Area subbasin, which are located entirely within the county. Valley Water is also the GSA for the portion of the North San Benito Subbasin within the county. As Valley Water has been actively managing its groundwater resources for decades, it submitted its groundwater management plan (2016 Groundwater Management Plan Santa Clara and Llagas Subbasins; Valley Water, 2016a) as an Alternative GSP for both subbasins, which was approved by DWR in July 2019. The Groundwater Management Plan (2016a) describes groundwater supply management objectives as follows:

> *Using the District's overall water supply management objectives, the following sustainability goals related to groundwater supply reliability and protection were developed:*
>
> - *Groundwater supplies are managed to optimize water supply reliability and minimize land subsidence.*

[1] See Bibliography section in Water Conservation Strategic Plan for full citations.

- *Groundwater is protected from contamination, including salt water intrusion.*

These describe the overall objectives of the District's groundwater management programs. The basin management strategies below are used to meet the sustainability goals. Many of these strategies have overlapping benefits, acting to improve water supply reliability, minimize subsidence, and protect or improve groundwater quality. The strategies are listed below and are described in detail in Chapter 6 of [the Groundwater Management Plan].

1. *Manage groundwater in conjunction with surface water.*
2. *Implement programs to protect and promote groundwater quality.*
3. *Maintain and develop adequate groundwater models and monitoring networks.*
4. *Work with regulatory and land use agencies to protect recharge areas, promote natural recharge, and prevent groundwater contamination.*

The Groundwater Management Plan (2016a) concludes that:

The District's proactive groundwater management programs and activities have resulted in sustainable groundwater conditions in the Santa Clara and Llagas subbasins, and continued planning, investments, and coordination will be needed to address future water supply challenges. Groundwater demands are projected to increase in the future, and the District is coordinating with water retailers and other interested stakeholders during the development of the Water Supply Master Plan, which will recommend various actions and investments needed to address projected future shortfalls during multi-year droughts.

To maintain the long-term viability of groundwater resources, the following actions are recommended:

1. *Maintain existing conjunctive water management programs and evaluate opportunities for enhancement or increased efficiency.*
2. *Continue to aggressively protect groundwater quality through District programs and collaboration with land use agencies, regulatory agencies, and basin stakeholders.*
3. *Continue to incorporate groundwater sustainability in District planning efforts.*
4. *Maintain adequate monitoring programs and modeling tools.*
5. *Continue and enhance groundwater management partnerships with water retailers and land use agencies.*
6. *Evaluate the potential new authorities provided by SGMA.*

As documented in the 2016 Groundwater Management Plan, Valley Water's water supply strategy since the 1930s has been to maximize conjunctive use, the coordinated management of surface and groundwater supplies, to enhance water supply reliability and avoid land subsidence. Local groundwater resources make up the foundation of the county's water supply, but they need

to be augmented by Valley Water's comprehensive water management activities in order to reliably meet the needs of county residents, businesses, agriculture, and the environment (Valley Water, 2021g). These activities include managed recharge of imported and local supplies and in-lieu groundwater recharge through the provision of treated surface water and raw water, acquisition of supplemental water supplies, and water conservation and recycling (Valley Water, 2021). Although most of the groundwater pumped is a result of Valley Water managed recharge programs, the subbasins provide some groundwater supply resulting from the percolation of rainfall in the recharge areas and natural seepage through local creeks and streams (natural groundwater recharge).[2] On average, natural groundwater recharge provides about 61,000 AFY of supply (Valley Water, 2019b). The estimated operational storage capacity of the groundwater subbasins is up to 548,000 AF and Valley Water's managed recharge capacity is up to about 144,000 AFY (Valley Water, 2021).The groundwater subbasins serve as an extensive conveyance network, allowing water to move from the recharge areas to individual groundwater wells. The groundwater subbasins provide water storage, allowing water to be carried over from the wet seasons to the dry season and even from wet years to dry years, which enhances the reliability of Valley Water's overall supply portfolio.

As required by SGMA, Valley Water will submit the five-year update to the approved Alternative to a GSP (2021 Groundwater Management Plan) to DWR by January 1, 2022. Valley Water is also supporting efforts led by the San Benito County Water District to develop a GSP for the North San Benito Subbasin. After adoption by both GSAs, the GSP will be submitted to DWR prior to the January 31, 2022 deadline.

2. Local Surface Water Supplies

Valley Water currently has 20 appropriative water rights licenses and one filed water right permit with the State Water Resources Control Board totaling over 227,300 AFY (Valley Water, 2021). Local reservoirs capture rainfall and run-off. This water is used for groundwater recharge, irrigation, or sent to a drinking water treatment plant. Currently, Valley Water surface water supplies are constrained by an average of about 44,000 AFY due to operating restrictions on local reservoirs for seismic safety (Valley Water, 2019b). Improvements to Anderson and Guadalupe Dams are modeled to be completed before 2030 and improvements to Calero and Almaden Dams before 2035. On average, Valley Water's local surface water supplies will provide about 83,000 AFY in 2040 (Valley Water, 2019b). On average, San Jose Water and Stanford University's local surface water supplies provide about 11,000 AFY (Valley Water, 2019b).

[2] Valley Water (Valley Water, 2021) includes natural groundwater recharge as a source of supply for long-term water supply planning purposes, because it contributes to the available groundwater supply. Natural recharge includes all uncontrolled recharge, including the deep percolation of rainfall, septic system and/or irrigation return flows, and natural seepage through creeks. Based on estimates from Valley Water's groundwater flow and Water Evaluation and Planning (WEAP) models, future average natural groundwater recharge is projected to be fairly constant over the planning horizon.

Future average local surface water supply is projected to increase, based on Water Evaluation and Planning (WEAP) modeling, over the planning horizon as dam improvements are made and operating capacity restrictions can be lifted (Valley Water, 2021g). As demands increase, Valley Water's ability to utilize excess wet period surface water supplies will also increase.

Local surface water supplies are vulnerable to hydrologic variability, with most reservoirs sized for annual operations. In wetter years, Valley Water is challenged to capture all available supply due to capacity constraints and flood protection needs. In drier years, Valley Water is challenged to maintain its groundwater recharge program due to reduced storage in local reservoirs, reduced imported water allocations, and regulations and permit conditions that require Valley Water to maintain environmental stream flows (Valley Water, 2021).

Several factors can impact Valley Water's reservoir operations and its use of surface water rights, including meeting reservoir operation rules designed to reduce flood risk, maintaining storage levels for environmental or recreation purposes, dam safety requirements, and managing total Valley Water supplies for reliability.

In 1996, a water rights complaint was filed at the SWRCB indicating that Valley Water water supply operations on Coyote Creek, Guadalupe River, and Stevens Creek impact steelhead trout and Chinook salmon (Valley Water, 2021). In 1997, the Central California Coast Steelhead was listed as a threatened species under Federal Endangered Species Act (ESA). To address the complaint and ESA issues, Valley Water, Guadalupe-Coyote Resource and Wildlife Service (USFWS), and National Marine Fisheries Service (NMFS), participated in the Fisheries and Aquatic Habitat Collaborative Effort (FAHCE) to develop a Settlement Agreement. The Settlement Agreement was initiated in 2003, and a key provision is the Fish Habitat Restoration Plan, which proposes changes in reservoir releases to support instream flow needs for salmonids, channel enhancements, monitoring and adaptive management, in addition to several fish habitat improvements already completed as early FAHCE implementation (Valley Water, 2021).

Table A-1. Reservoir Capacities, Restrictions, and Water Supply Impacts from Restrictions (Valley Water, 2021).

Reservoir	Reservoir Capacity (AF)	Restricted Capacity (AF)	Restricted Capacity (%)
Almaden	1,555	1,443	93%
Anderson	89,278	2,820	3%[1]
Calero	9,738	4,414	45%
Coyote	22,541	11,843	53%
Guadalupe	3,320	2,134	64%
Stevens Creek	3,056	No restriction	-
Lexington	18,534	No restriction	-
Chesbro	7,967	No restriction	-
Uvas	9,688	No restriction	-
Vasona	463	No restriction	-
TOTAL	**166,140**	**62,362**	-
[1] 3% is Deadpool.			

3. Imported Water Supplies

3.1 State Water Project and Central Valley Project

Imported supplies are used to meet a large percentage of county's water needs. Imported water conveyed through the Delta via the SWP and CVP is used to supply Valley Water's drinking water treatment plants, groundwater recharge facilities, and irrigators. On average, the majority of Delta-conveyed supply is delivered to treatment plants, the rest used for recharge, and a small percentage is delivered to customers for irrigation use (Valley Water, 2019b). In addition, when available, Valley Water stores excess Delta-conveyed supplies in the Semitropic Groundwater Bank and San Luis Reservoir, and locally in Anderson and Calero Reservoirs. Valley Water has a contract for 100,000 AFY of SWP water and 152,500 AFY of CVP water (Valley Water, 2019b). However, the actual amount of water allocated under these contracts each year is typically less than these contractual amounts and depends on hydrology and regulatory restrictions. For example, the average allocation of Delta-conveyed water projected in 2020 was 171,000 AFY (Valley Water, 2019b). However, without additional investments, Valley Water expects average allocations to further decline over time (Valley Water, 2019b). The Water Supply Master Plan 2040 assumes average Delta-conveyed imported water use within Santa Clara County will differ from SWP and CVP average allocated supplies due to carryover losses in extreme wet years and evaporation from surface water reservoirs.

Valley Water's SWP and CVP water supplies are also subject to a number of additional constraints including regulatory requirements to protect fisheries and water quality in the Delta, and

conveyance limitations. Delta-conveyed supplies are also at risk from Delta levee failures due to seismic threats and flooding, sea level rise and climate change, declining populations of protected fish species, and water quality variations. Many water quality variations are addressed by blending sources and/or switching sources to the drinking water treatment plants. Algae and disinfection byproduct precursors have been especially challenging during recent drought conditions. To address at least some of these constraints, Valley Water continues to evaluate the costs and benefits of participating in the Delta Conveyance Project relative to other water supply options such as developing additional local supplies, developing new storage options such as Pacheco Reservoir, securing and optimizing Valley Water's existing water system, and expanding water conservation (Valley Water, 2021).

The SWRCB recently amended the San Francisco Bay/Sacramento-San Joaquin Delta Estuary Water Quality Control Plan (Bay-Delta Plan Amendment) to establish flow and revise salinity objectives for the San Joaquin River and its major salmon bearing tributaries. The flow requirements of the Bay-Delta Plan Amendment will not be implemented until updates to the Sacramento River and Delta portions of the Bay-Delta Plan are completed, and an implementation program is adopted through water rights proceedings. The Sacramento River and Delta updates could impose additional flow requirements on the Sacramento River and its tributaries, which is the primary source of Valley Water's State and federal imported water supplies. Hence, such flow requirements imposed by the Bay-Delta Plan Amendment are likely to reduce Valley Water's imported water supplies. However, Valley Water filed a lawsuit in January 2019 challenging the Bay-Delta Plan Amendment, asking the state court to determine whether the state has taken proper action to impose a requirement for 40% of unimpaired flow in San Joaquin River tributaries, including the Tuolumne River, within a range of 30-50% (Valley Water, 2019b). In addition to Valley Water's lawsuit, ten other lawsuits were filed in state court by California public entities and non-profits regarding the Bay-Delta Plan Amendment. The Judicial Council of California coordinated these lawsuits for trial before one judge in Sacramento Superior Court. The United States also filed lawsuits challenging the Bay-Delta Plan Amendment, one in state court and one in federal court. Valley Water dismissed its lawsuit in September 2020; however, many other lawsuits are still in process (Valley Water, 2019b).

While lawsuits are pending resolution, Valley Water continues to work with state officials, conservation organizations, and other water agencies to develop settlement agreements (otherwise known as "Voluntary Agreements"). The Voluntary Agreements are anticipated to include habitat restoration and other measures that can benefit fish and wildlife, while reducing the amount of required unimpaired flow specified in the Phase One Amendment and future Bay-Delta Plan amendments (Valley Water, 2019b).

In addition to developing local supplies, securing and optimizing Valley Water's existing local water system, expanding water storage options, and expanding water conservation, Valley Water is participating in the Delta Conveyance Project. The Delta Conveyance Project involves constructing alternative conveyance to divert water from the Sacramento River north of the Delta

and deliver it to SWP and CVP pumps at the southern end of the Delta (Valley Water, 2019b). The goal is to reduce environmental impacts of diversions, help maintain existing deliveries, improve the ability to do transfers, and protect water quality from sea level rise and levee failure events. The project definition of the new Delta Conveyance Project is currently under review by the State, following Governor Newsom's decision to adopt a new approach to Delta conveyance that evaluates a single, smaller, capacity tunnel project.

3.2 San Francisco Public Utilities Commission Regional Water System

Santa Clara County began receiving water from the San Francisco Public Utilities Commission (SFPUC) Regional Water System (RWS) to supplement local supplies in 1939. This water is provided to north county cities with access to the RWS. On average, the SFPUC delivers about 55,000 AFY to Santa Clara County (Valley Water, 2019b). This amount is expected to increase slightly to 63,000 AFY in normal years by 2045 as SFPUC customer demands increase. While SFPUC water is not distributed through Valley Water, it is included here to reflect its role in the overall water portfolio for Santa Clara County. Factors that may affect future reliability of the SFPUC RWS supply are discussed below.

The water available to SFPUC's retail and wholesale customers from the RWS is constrained by hydrology, physical facilities, and the institutional parameters that allocate the water supply of the Tuolumne River. In addition, statewide regulations and other factors can impact the system reliability. For example, based on an analysis by the SFPUC and the Bay Area Water Supply and Conservation Agency (BAWSCA), if the Bay-Delta Plan Amendment is implemented as adopted, the proposed unimpaired flow volumes would significantly reduce water supply available through the RWS during future drought conditions, and BAWSCA member agencies, including City of Mountain View, City of Palo Alto, City of Milpitas, City of Sunnyvale, and City of Santa Clara, would be required to reduce their water use by as much as 50% during drought years (SFPUC, 2021).

In a Water Supply Assessment recently prepared by SFPUC for a proposed development in San Francisco, SFPUC provided a detailed discussion of the factors contributing to the significant uncertainties surrounding the Bay-Delta Plan Amendment (SFPUC, 2019). This discussion is excerpted below:

> *The SWRCB has stated that it intends to implement the Bay-Delta Plan Amendment on the Tuolumne River by the year 2022, assuming all required approvals are obtained by that time. But implementation of the Plan Amendment is uncertain for several reasons. First, under the Clean Water Act, the United States Environmental Protection Agency (U.S. EPA) must approve the water quality standards identified in the Plan Amendment within 90 days from the date the approval request is received. It is uncertain whether the U.S. EPA will approve or disapprove the water quality standards. Furthermore, the determination could result in litigation.*

Second, since adoption of the Bay-Delta Plan Amendment, over a dozen lawsuits have been filed in both state and federal court, challenging the SWRCB's adoption of the Bay-Delta Plan Amendment, including a legal challenge filed by the federal government, at the request of the U.S. Department of Interior, Bureau of Reclamation. That litigation is in the early stage and there have been no dispositive court rulings as of this date.

Third, the Bay-Delta Plan Amendment is not self-implementing and does not allocate responsibility for meeting its new flow requirements to the SFPUC or any other water rights holders. Rather, the Plan Amendment merely provides a regulatory framework for flow allocation, which must be accomplished by other regulatory and/or adjudicatory proceedings, such as a comprehensive water rights adjudication or, in the case of the Tuolumne River, the 401 certification process in the Federal Energy Regulatory Commission's relicensing proceeding for Don Pedro Dam. The license amendment process is currently expected to be completed in the 2022-23 timeframe. This process and the other regulatory and/or adjudicatory proceedings would likely face legal challenges and have lengthy timelines, and quite possibly could result in a different assignment of flow responsibility (and therefore a different water supply impact on the SFPUC).

Fourth, in recognition of the obstacles to implementation of the Bay-Delta Plan Amendment, SWRCB Resolution No. 2018-0059 adopting the Bay-Delta Plan Amendment directed staff to help complete a "Delta watershed-wide agreement, including potential flow measures for the Tuolumne River" by March 1, 2019, and to incorporate such agreements as an "alternative" for a future amendment to the Bay-Delta Plan to be presented to the SWRCB "as early as possible after December 1, 2019." In accordance with the SWRCB's instruction, on March 1, 2019, SFPUC, in partnership with other key stakeholders, submitted a proposed project description for the Tuolumne River that could be the basis for a voluntary substitute agreement with the SWRCB ("March 1st Proposed Voluntary Agreement"). On March 26, 2019, the Commission adopted Resolution No. 19-0057 to support SFPUC's participation in the Voluntary Agreement negotiation process. To date, those negotiations are ongoing under the California Natural Resources Agency and the leadership of the Newsom administration.[3] The negotiations for a voluntary agreement have made significant progress since an initial framework was presented to the SWRCB on December 12, 2018. The package submitted on March 1, 2019 is the product of renewed discussions since Governor Newsom took office. While significant work remains, the package represents an important step forward in bringing together diverse California water interests.

For all these reasons, whether and when the Bay-Delta Plan Amendment will be implemented, and how those amendments if implemented will affect the SFPUC's water supply is currently uncertain and possibly speculative.

[[3] California Natural Resources Agency. "Voluntary Agreements to Improve Habitat and Flow in the Delta and its Watersheds." http://resources.ca.gov/initiatives/voluntary-agreements/. Accessed Sept 17, 2020.]

In addition, although SFPUC and the SWRCB are undergoing voluntary settlement agreement negotiations, the details of the proposed voluntary settlement agreement alternative are not currently public. The ultimate results of these negotiations and consequent impacts on future drought supply availability for the SFPUC RWS are unclear.

4. Recycled Water and Desalination

A growing source of water supply for Santa Clara County is recycled and purified water (Valley Water, 2019b). Using recycled water helps augment drinking water and groundwater supplies through in-lieu recharge; provides a reliable, drought-resilient, locally-controlled water supply; and reduces reliance on imported water. Recycled water is currently about 6 percent (19,000 AFY) of the county's supply and is distributed for non-potable uses such as landscape and agricultural irrigation, industrial cooling, and dual plumbed facilities (Valley Water, 2019b). This recycled water is produced at the four publicly-owned wastewater plants in the county—Palo Alto, Sunnyvale, San José/Santa Clara, and South County Regional Wastewater Authority (SCRWA). In addition, Valley Water completed its Countywide Water Reuse Master Plan[3] (CoRe Plan) in 2021 (Valley Water, 2021) that will outline its approach to achieving its target—that recycled water, including both non-potable and potable reuse, is 10 percent of the county's water supply by 2025.

Reuse water is a local water supply source that is not dependent on rainfall, and is generally considered drought-resistant and highly reliable (Valley Water, 2019b). It is municipal wastewater that has been treated to levels that make it appropriate for various non-drinking water) non-potable purposes. In addition, Valley Water provides advanced treated Purified water since 2016 to South Bay Water Recycling to improve the quality of the non-potable supply via the Silicon Valley Advanced Water Purification Center (SVAWPC). SVAWPC uses technology to create Purified water that meets or exceeds all state and federal drinking water standards. Non-potable reuse is projected to increase from about 19,000 AFY in calendar year 2020 to about 39,000 AFY in 2040. In addition, Valley Water's CoRe Plan outlines Valley Water's opportunities and strategies toward achieving up to 24,000 AFY for potable water reuse.

5. References

Valley Water, 2016a. 2016 Groundwater Management Plan, Santa Clara and Llagas Subbasins, Santa Clara Valley Water District, dated November 2016.

Valley Water, 2019b. Water Supply Master Plan 2040, Santa Clara Valley Water District, dated November 2019.

Valley Water, 2021. 2020 Urban Water Management Plan, Santa Clara Valley Water District, dated June 2021.

[3] The draft CoRe Plan is available at: https://fta.valleywater.org/fl/XNyG7Fja6T#folder-link/.

Appendix B

Retail Agency Survey Questions

Appendix B

Retail Agency Survey

This appendix provides a description of survey responses from the 11 retail agencies that responded to the comprehensive survey distributed in August 2020 to all 13 retail agencies. The goal of the survey was to better quantify and understand: (1) what water conservation programs agencies and customers are utilizing, (2) what drives the agencies' and customers' needs to increase water conservation, and (3) what additional programs the agencies and customers may benefit from. This information is intended to help Valley Water understand and identify programs and services that would be most valuable and responsive to the various water conservation drivers within its service area. A copy of the survey questions is provided as Attachment B-1 to this Appendix.

1. Review of Current Programs

The survey aimed to increase understanding of what programs were most utilized by the retail agencies and their water customers, and to understand how effective and useful the Valley Water conservation programs are viewed to be.

Figure B-1 shows that for the majority of programs, the retail agencies are aware of Valley Water's offerings. Programs where a majority of agencies report not using or being unaware include pre-rinse sprayers, Our City Forest's Lawn Busters rebate, submeter rebate program, Advanced Metering Infrastructure (AMI) meters, landscape maintenance consultation program, and home water use reports.

The retail agencies were asked to rank the effectiveness of current Valley Water conservation programs on a scale of 1 (not effective) to 5 (very effective) and to indicate how each program should be prioritized over the next 5 to 10 years from low, medium, to high. Overall, the retail agencies found Valley Water's programs to be highly effective, rating the programs as a whole an average of 4.5 out of 5.

The programs considered most effective were Inline Drip Irrigation, Landscape Maintenance Consultation Program, and Home Water Use Reports. Our City Forest's Lawn Busters program and AMI Meters were rated highly effective, but only a few agencies participate in these programs (**Figure B-1**). Agencies rated device programs as being very effective, but the agencies ranked the prioritization as low to medium. The Landscape Rebate Program offerings were overall ranked highly for effectiveness and prioritization. Notably, agencies ranked rain barrels, cisterns, and rain gardens as effective, but low to medium priority. For rebate programs and services, the effectiveness and prioritization rankings were generally consistent. Agencies ranked

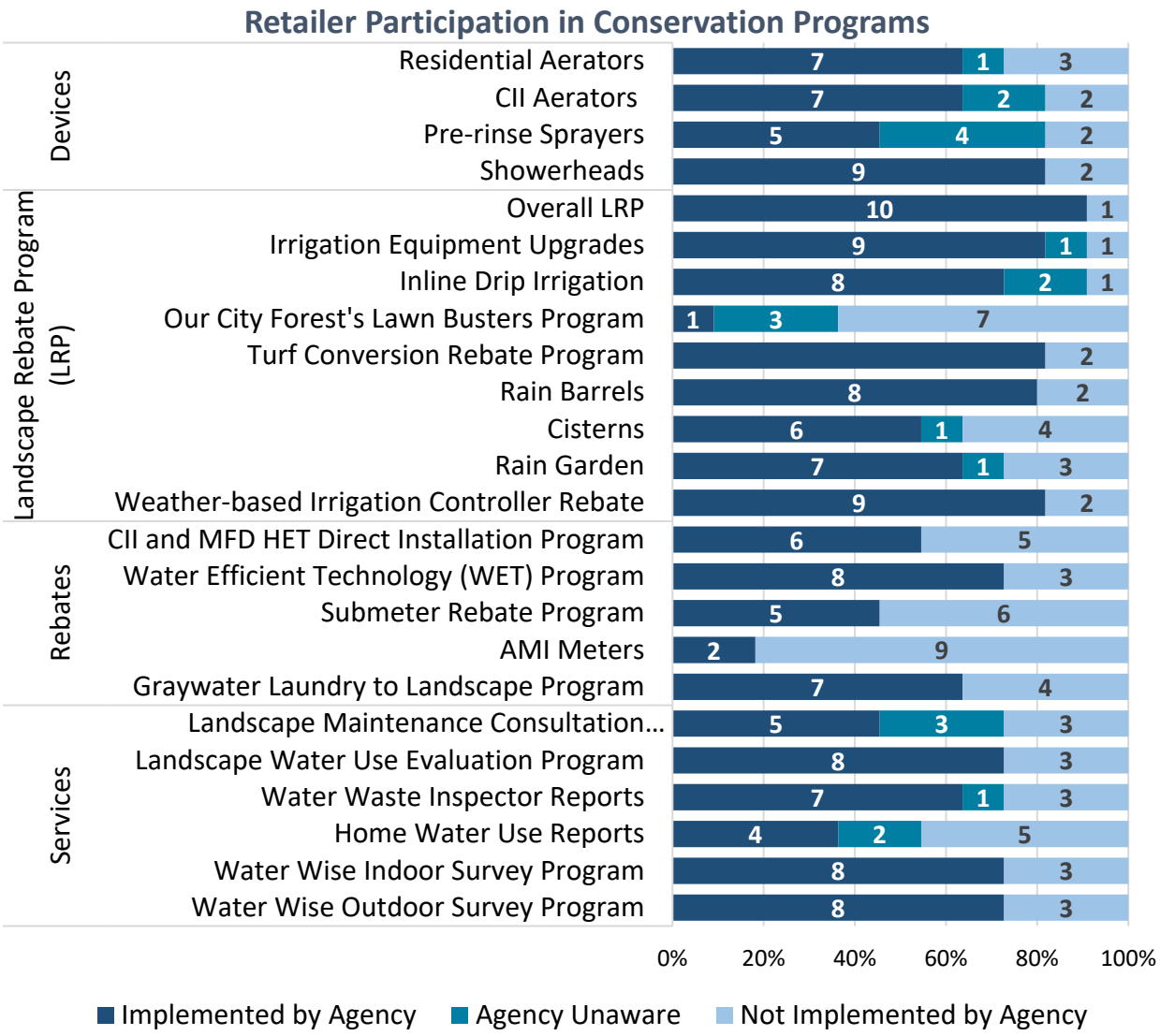


Figure B-1 Retailer Participation in Conservation Programs

rebate programs and services as medium to high priority, except for the Graywater Laundry to Landscape Program, which was ranked low to medium priority.

Eight of the thirteen retail agencies are members of the Bay Area Water Supply and Conservation Agency (BAWSCA), which offers its own water conservation programs. **Table B-1** lists the percentage of retail agencies that offer particular BAWSCA water conservation programs for the eight BAWSCA member agencies out of 11 retail agencies that completed the survey. Based on this, there are several programs offered by BAWSCA that retail agencies do not participate in, including High Efficiency Toilet (HET) Rebates, Sprinkler Nozzles, Turf Replacement, Large Landscape Audits, Water-Wise School Education Program, Tuolumne River Trust School Education Program, and WaterSense Fixtures Bulk Pricing Program.

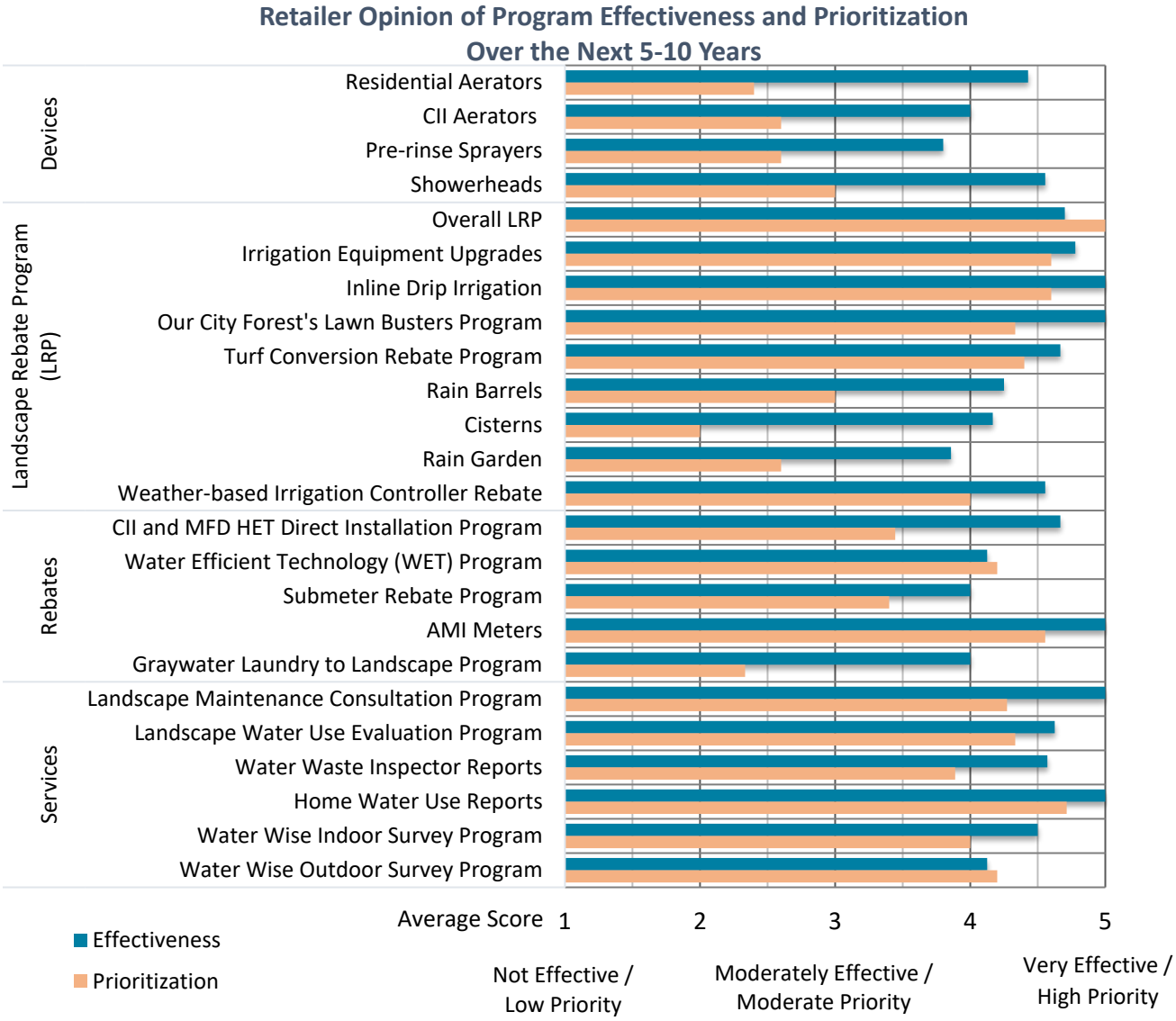


Figure B-2 Retailer Opinion of Program Effectiveness and Prioritization Over the Next 5-10 Years

The survey also asked the retail agencies to report feedback they have received from their customers regarding the water conservation programs offered by Valley Water. Overall the agencies reported positive feedback and most feedback from customers focused on the rebate programs. The retail agencies reported that they often heard from customers regarding the landscape rebate program, toilet rebates, and washing machine rebates. Summarized below are several comments that agencies have received from customers:

- Customers generally like and are appreciative of the programs.
- Customers wish the rebates covered more of the material cost.

- The rebate system can be cumbersome and difficult to navigate. However, this could be in response to customers using the older system.
- Customers always appreciate that there are rebates available for projects that they would like to complete.[1]
- Customers that participated in the landscape rebate program reported that Valley Water staff were very helpful during the rebate process.

Table B-1 Participation in BAWSCA Water Conservation Programs

BAWSCA Programs	Participation by Valley Water/ BAWSCA Members
"Making Conservation a Way of Life" Strategic Plan	89%
Regional Water Demands and Conservation Projections (DSS Model)	89%
Water Conservation Database (WCDB)	89%
Public Outreach	56%
Water Efficient Landscape Education Classes	44%
Water-Wise Gardening in the Bay Area Landscape Educational Tool	44%
Home Water Use Reports	22%
EarthCapades Assemblies School Education Program	11%
Native Gardening Tours and Symposiums	11%
Rain Barrel Rebates	11%
Free Sprinkler Nozzles Programs	0%
High Efficiency Toilet (HET) Rebates	0%
Large Landscape Audits	0%
Lawn Be Gone! Turf Replacement Rebates	0%
Tuolumne River Trust School Education Program	0%
WaterSense Fixtures Bulk Pricing Program	0%
Water-Wise School Education Kits and Curriculum	0%

In addition, the survey asked the retail agencies to report feedback received from management and/or governing body and the responses were also positive. Summarized below are several comments received from the agencies' management and/or governing body:

- Agencies appreciate that these programs are offered to their customers and value the programs.
- Agencies would like to see even higher participation in programs and for Valley Water to follow up with customers who expressed interest in a rebate program, but did not fully complete an application.
- Valley Water could provide better outreach to retail managers and the community about the vast amount of rebate programs offered.

[1] This may suggest that a high proportion of participants are free-riders, who would have taken the same action regardless of the rebate.

- Agencies would like to see more timely reporting on program participation.

2. Agency Drivers

In order to understand how big of a water conservation driver new legislation (AB 1668 and SB 606) were perceived to be, the retail agencies were asked how well they felt their agencies were currently positioned the meet the new water use targets and if they anticipated making changes to their water conservation approaches as a result. The results from these questions are shown on **Figure B-3**. Of the retail agencies that responded, all but one agency reported that they were not sure if their agency was well positioned to meet the future water use targets, and over half reported that they were not sure if they anticipated changing their approach to water conservation. This uncertainty may be a result of the lack of availability of information and direction from the California Department of Water Resources at this stage of development of the annual water use objectives. However, given this lack of information, it is prudent to proactively check-in with agencies and program offerings to evaluate if the offerings are supporting the retail agencies' needs as the water use objective standards are developed. Five of the eleven agencies identified a specific program or type of program that could help their agency be better positioned to meet the annual water use objectives. The responses included AMI, Landscape Water Use Evaluation Program, recycled water, grant funding for staff, staff to assist with examining measurements, and commercial audit program.

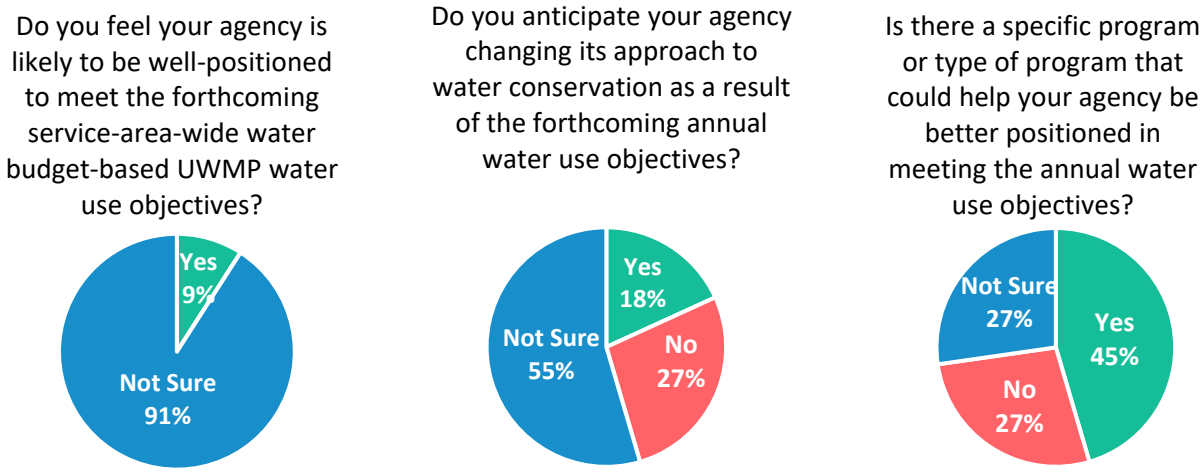


Figure B-3 Retailer Opinion on Forthcoming Annual Water Use Objectives

As part of various planning efforts, retail agencies project future water demands for their service areas and assess these demands relative to anticipated future water supplies. As shown on **Figure B-4**, each retail agency was asked how this future supply reliability is characterized in their

planning documents.[2] Four of the eleven agencies reported that continued water conservation would support future water supply reliability. Survey respondents were asked of any new water supply development efforts or related infrastructure expansions are currently planned or being implemented in their service area. Nine out of 11 retail agencies reported that they were in the process of one or more of these efforts. Specifically, seven agencies reported plans for additional or expanded use of recycled water, and four agencies reported plans for development of new groundwater supply sources. Additionally, the following are being planned by one agency each:

- AMI Conversion Project,
- Development of new emergency and drought-relief water supply sources,
- Development of new water supplies through transfers or agreements,
- Expansion of water or wastewater treatment plant capacity, and
- Stormwater capture.

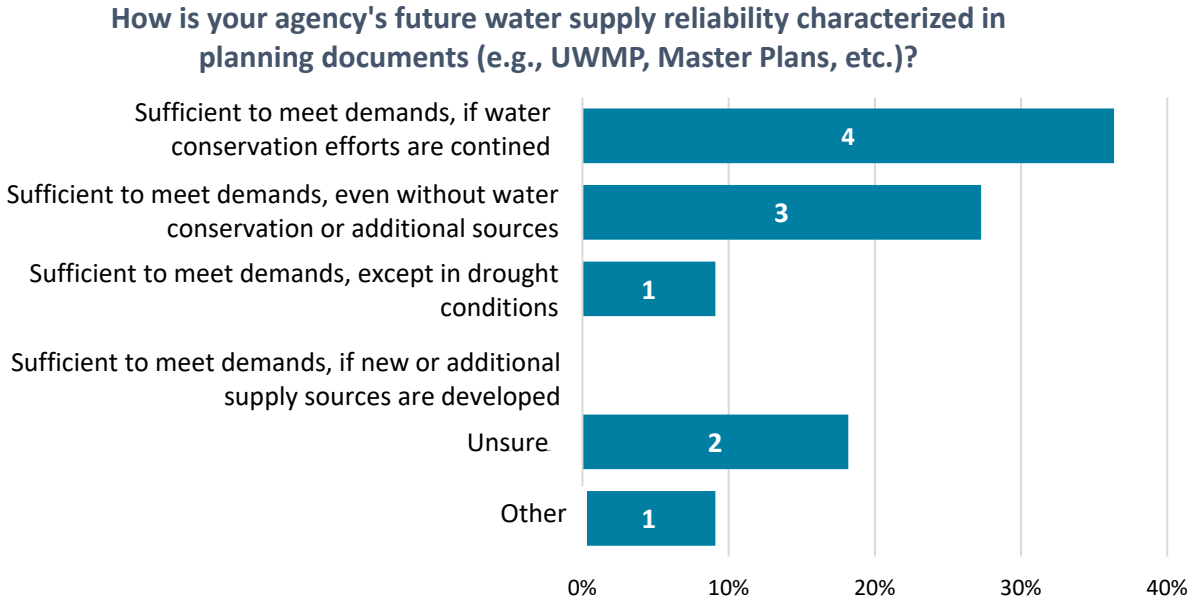


Figure B-4 Retail Agency Characterization of Water Supply Reliability

The survey asked retail agencies how strong of a driver certain factors are in their agency's need to increase water conservation (**Figure B-5**). The strongest drivers identified were the forthcoming annual water use objectives, customers and community have a desire for sustainability, and reduced short-term water supply reliability during drought conditions.

[2] The one agency that indicated Other responded that the agency's future water supply reliability is characterized as (1) sufficient to meet demand, if water conservation efforts are continued, (2) sufficient to meet demands, even without water conservation or additional sources, and (3) sufficient to meet demands, except in drought conditions.

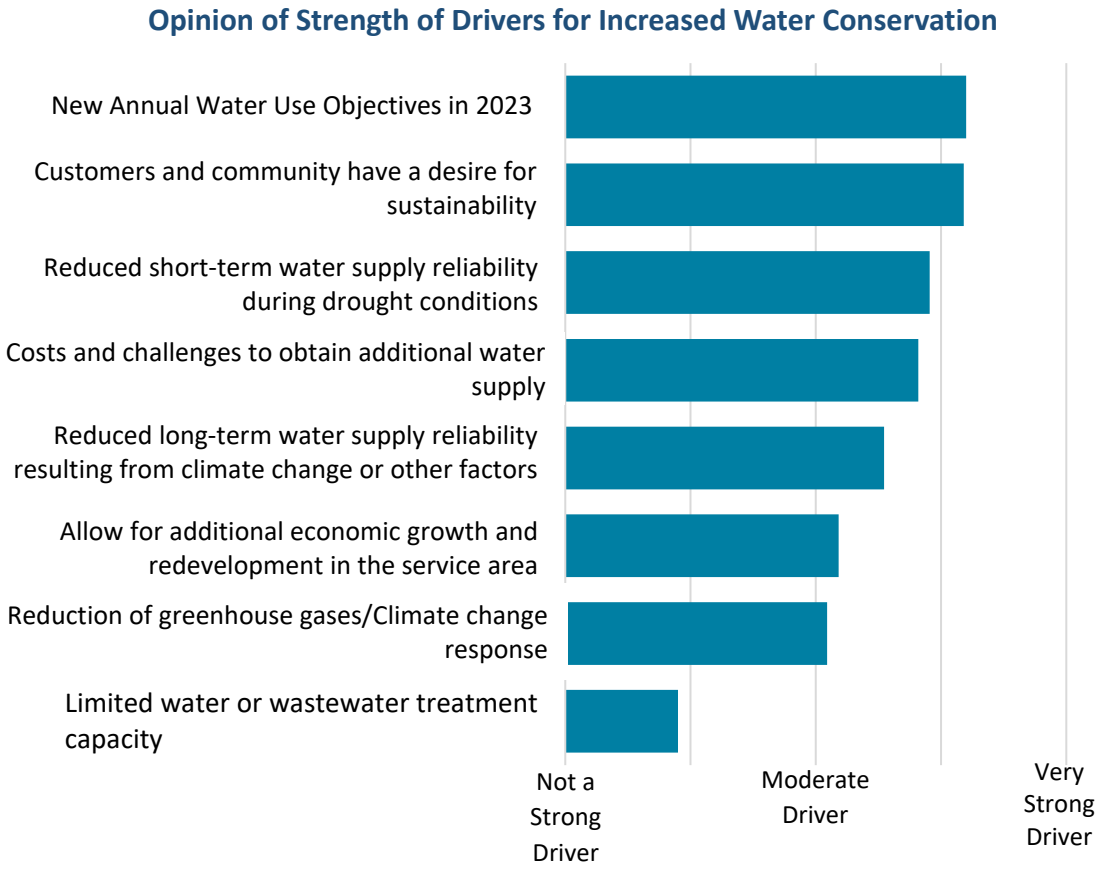


Figure B-5 Opinion of Strength of Drivers for Increased Water Conservation

3. Preferences and Priorities for Future Programs

Retail agencies were asked several questions regarding their preferences and opportunities they see for future water conservation programs, including how much opportunity to increase water conservation they felt exists in each of several water use sectors.

As shown on **Figure B-6**, the retail agencies ranked outdoor water use in both residential and CII sectors as having the greatest overall potential for increased water conservation. For outdoor use, residential is seen as having a greater potential than CII for water conservation, and for indoor use, CII is seen as having a greater potential than residential for water conservation. Customer and distribution system water loss control and recycled water use also rank higher than indoor use for having greater potential for water conservation.

The agency survey was administered several months into the 2019 novel coronavirus (COVID-19) pandemic and it is undetermined if the pandemic will cause long-lasting changes to water use. The agencies surveyed reported a variety of impacts to their water use during Spring – Summer of 2020 (**Figure B-7**). The majority of retail agencies (six of the eleven agencies that responded) reported a slight increase in consumption. The retail agencies that had increased water use also

have residential use as the largest sector. The six agencies that reported slight increase in use have an average of 22% of water use in the CII sector. Of the two agencies that responded experiencing a decrease in consumption, one is a university that was operating at a greatly reduced capacity and reported significant decrease in water consumption during this period and the other reported a slight decrease in consumption and has a lower residential use by sector (48% of total water use) compared to the other retail agencies. It is unclear if or how long the observed trends will continue, but if these shifts are long-term, the opportunity for water conservation savings may also change (e.g., increased residential indoor use may increase the savings associated with premium high efficiency toilets).

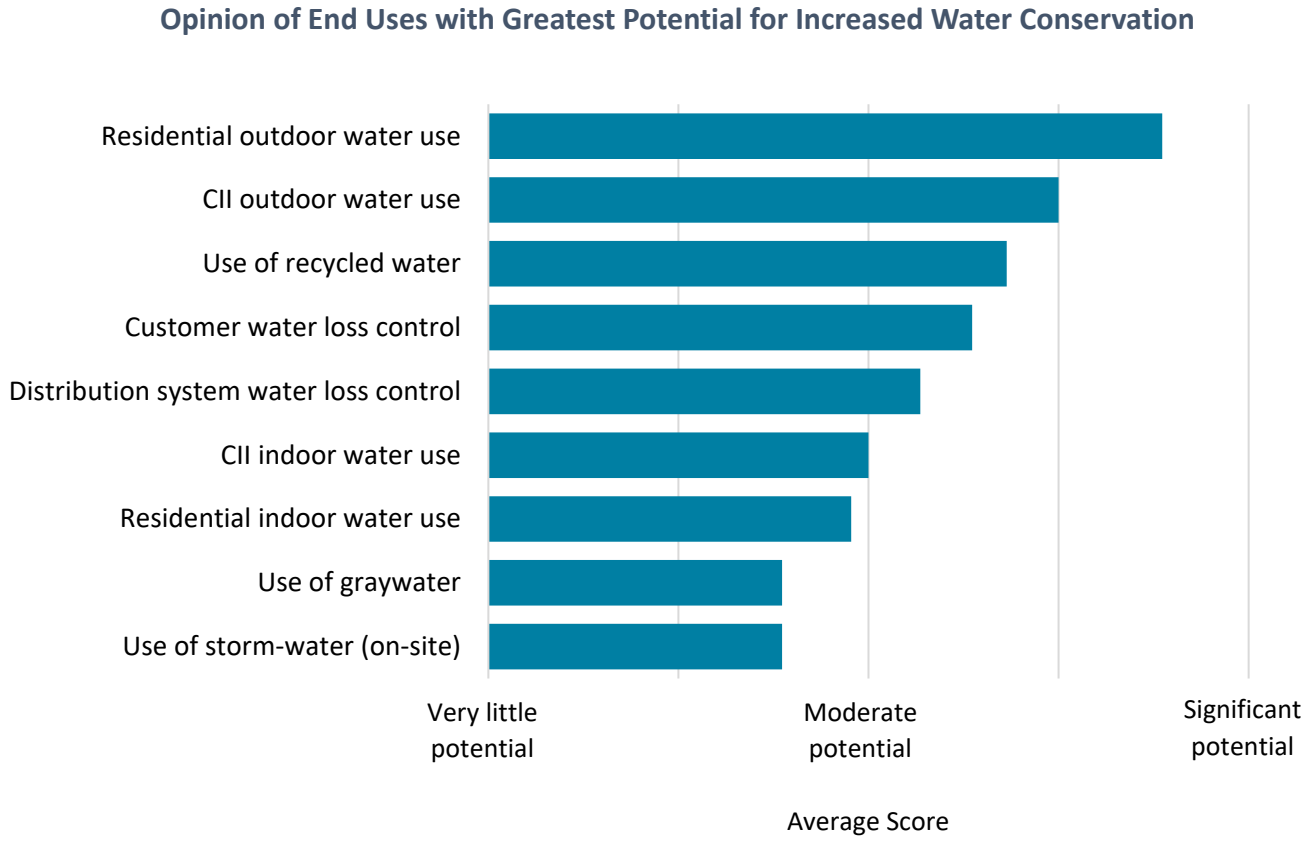


Figure B-6 Sectors and End Uses with Potential for Increased Water Conservation

Figure B-2 from the previous section shows how agencies prioritize the current Valley Water programs. Most agencies ranked programs that target residential outdoor water use as high priority. For example, all of the 11 agencies surveyed ranked the overall Landscape Rebate Program (LRP) as high priority, eight of the agencies ranked Irrigation Equipment Upgrades and Inline Drip Irrigation as high priority, and seven of the agencies ranked Turf Conversion Rebate Program and Landscape Maintenance Consultation Program as high priority. However, not all programs targeted to residential outdoor use ranked highly. Programs including Cisterns, Rain

Garden, Rain Barrels, and Graywater Laundry to Landscape Program were prioritized as low-medium.

The retail agencies were asked about their interest in a suite of possible future programs (**Figure B-8**). Programs with the highest levels of interest for Valley Water to take a lead role in implementing included those targeting: (1) water loss (i.e., customer-level leak detection and/or leak repair, and detailed water use surveys or audits [residential or CII]), (2) public outreach (i.e., public workshops and classes, public engagement and marketing campaigns, customer-focused digital interactive resources), and (3) programs specifically for disadvantaged communities or households.

The retail agencies were asked their opinion on what Valley Water services work best and what Valley Water could do to better help their customers conserve water. Agencies responded that Valley Water's services administrating and processing rebates and programs, communication and outreach, and cost-sharing offerings work best. When asked about improvements that Valley Water could implement to better help their service area conserve water, the agencies' responses included:

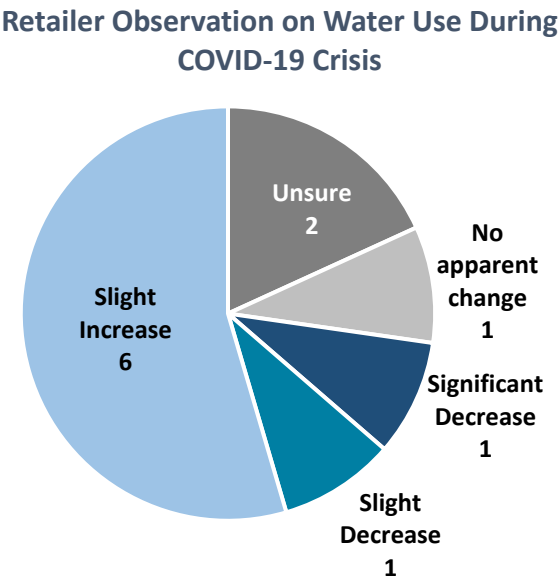


Figure B-7 Retailer Observation on Water Use During COVID-19 Crisis

- Increase attention to CII programs and outreach.
- Expansion on non-potable water programs, including recycled water use for public irrigation.
- Provide support for agency staff to be kept informed and trained on the most current Valley Water's offerings available, offer grant funding to support agency staff.
- Improve coordination between Valley Water and agency staff and more timely and frequent reporting of rebate participation.
- Improve coordinate between Valley Water and BAWSCA program offerings.

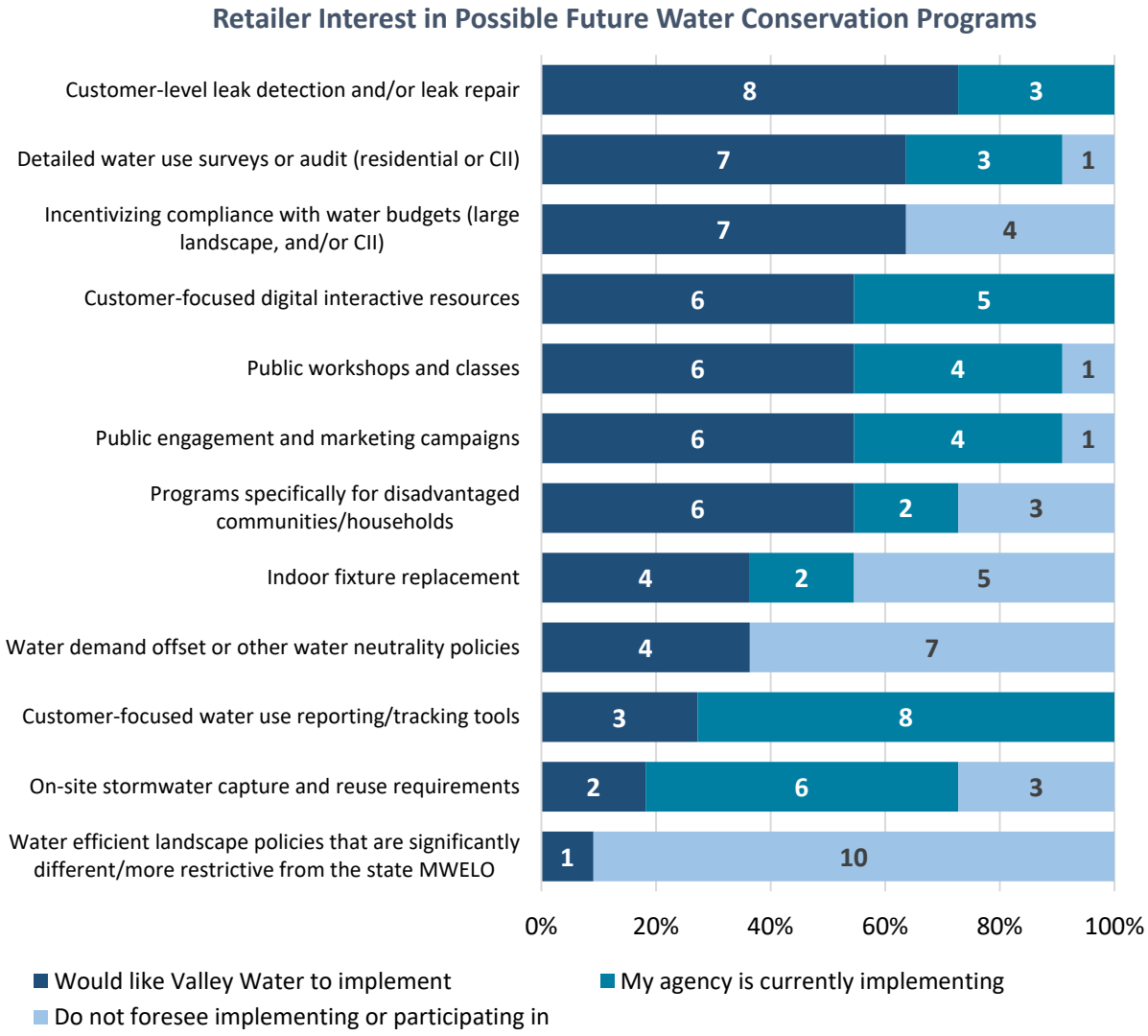


Figure B-8 Retailer Interest in Future Water Conservation Programs

4. Key Survey Take-Aways

Based on the results of this survey, the retail agencies are very supportive of Valley Water's conservation programs and efforts and have a broad interest in continuing existing or similar programs, as well as being open to new and different programs. The survey also provided key insight on opportunities for Valley Water to enhance or expand its support to its retail agencies:

- The survey highlighted a gap in knowledge among some retail agencies about the full scope of the current conservation program offerings. For example, many retail agencies were not aware that several programs existed, specifically, Pre-Rinse Sprayers, Our City Forest's Lawn Busters Program, and Landscape Maintenance Consultation Program.

- Retail agencies considered Our City Forest's Lawn Busters and AMI Meters to be highly effective, but few agencies are currently participating in these programs.
- Retail agencies expressed interest in programs for leak detection/repair and water use survey/audits, but also already have high participation in current conservation programs that target these goals, such as Landscape Water Use Evaluation Program, Water Waste Inspector Reports, Water Wise Indoor Survey DIY Kit, and Water Wise Outdoor Survey Program. Valley Water has the opportunity to promote similar programs with lower participation, including Home Water Use Reports and Landscape Maintenance Consultation Program.
- Retail agencies would like to understand why customers sometimes begin a rebate application, but do not fully complete and submit it.
- Retail agencies are generally unsure of their ability to meet forthcoming annual water use objectives, and identified several programs that they feel will help them to achieve these future objectives, including AMI, Landscape Water Use Evaluation Program, recycled water, grant funding for staff, staff to assist with examining measurements, and commercial audit program.
- Retail agencies see the greatest potential for water conservation in outdoor residential and CII water use. Customer and distribution system water loss control and recycled water use are also seen as having significant conservation savings potential.
- Retail agencies would like support from Valley Water to keep staff informed and trained on the most current offerings. Additionally, retail agencies would like better outreach to the community to advertise conservation programs, but to inform the retail agency before doing so in order for the retail agency to be well-informed and to coordinate with other non-Valley Water programs that they offer.

Attachment B-1

Retail Agency Survey Questions



Valley Water Retail Agency Survey to Support Development of the Water Conservation Strategic Plan

This survey will be used to support the development of Valley Water's Water Conservation Strategic Plan. This survey will take approximately 30 minutes. The results of this survey will be reviewed and compiled by EKI and presented to Valley Water in a summarized format.

We thank you for your time in providing comprehensive responses and your responses will help how we evaluate and assess water conservation programs in the county, which may help your service area use water more sustainably and stay in compliance with new requirements from AB 1668/SB 606 and other future regulations. For questions please contect Kat Wuelfing (EKI) at kwuelfing@ekiconsult.com or (650)292-9127.

* Required

Email address *

Your email

Name: *

Your answer

Title: *

Your answer

Agency: *

Your answer

Phone Number: *

Your answer

If different from above, who should we contact with questions about this survey or other information relevant to Valley Water's Water Conservation Strategic Plan? Please provide name, title, and contact information.

Your answer

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Valley Water Retail Agency Survey to Support Development of the Water Conservation Strategic Plan

* Required

Current Water Conservation Programs

1a) In your opinion, how effective are Valley Water's water conservation programs as a whole in your agency's service area? *

- 1 - Not Effective
- 2
- 3 - Moderately Effective
- 4
- 5 - Very Effective

1b) Below is a list of water conservation programs currently or recently offered by Valley Water. In your opinion, how effective are each of these programs in your agency's service area? If your agency does not participate in a specified program, please mark "Not used by my agency."

Devices *

	1 - Not Effective	2	3 - Moderately Effective	4	5 - Very Effective	Not used by my agency	Not aware of program
Residential Aerators (1.0 and 1.5 gpm aerators)	○	○	○	○	○	○	○
CII Aerators (0.5 gpm aerators)	○	○	○	○	○	○	○
Pre-rinse Sprayers	○	○	○	○	○	○	○
Showerheads	○	○	○	○	○	○	○

Landscape Rebate Program (LRP) *

	1 - Not Effective	2	3 - Moderately Effective	4	5 - Very Effective	Not used by my agency	Not aware of program
Overall Program	○	○	○	○	○	○	○
Irrigation Equipment Upgrades, excludes drip irrigation rebate	○	○	○	○	○	○	○
Inline Drip Irrigation	○	○	○	○	○	○	○
Our City Forest's Lawn Busters Program	○	○	○	○	○	○	○
Turf Conversion Rebate Program	○	○	○	○	○	○	○
Rain Barrels	○	○	○	○	○	○	○
Cisterns	○	○	○	○	○	○	○
Rain Garden	○	○	○	○	○	○	○

Weather-based Irrigation Controller Rebate	○	○	○	○	○	○	○

Rebates *

	1 - Not Effective	2	3 - Moderately Effective	4	5 - Very Effective	Not used by my agency	Not aware of program
CII and MFD HET Direct Installation Program (CII and apartments of 4 or more units)	○	○	○	○	○	○	○
Water Efficient Technology (WET) Program	○	○	○	○	○	○	○
Submeter Rebate Program	○	○	○	○	○	○	○
AMI Meters	○	○	○	○	○	○	○
Graywater Laundry to Landscape Program	○	○	○	○	○	○	○

Services *

	1 - Not Effective	2	3 - Moderately Effective	4	5 - Very Effective	Not used by my agency	Not aware of program
Landscape Maintenance Consultation Program	○	○	○	○	○	○	○
Landscape Water Use Evaluation Program (Large Landscape Program with Waterfluence)	○	○	○	○	○	○	○
Water Waste Inspector Reports	○	○	○	○	○	○	○
Home Water Use Reports	○	○	○	○	○	○	○
Water Wise Indoor Survey Program (DIY kits for residents)	○	○	○	○	○	○	○
Water Wise Outdoor Survey Program (Irrigation	○	○	○	○	○	○	○

system
inspections)

1c) What feedback, if any, have you received from your management and/or governing body regarding the water conservation programs offered by Valley Water? *

Your answer

1d) What feedback, if any, have you received from your customers regarding the water conservation programs offered by Valley Water? *

Your answer

2) In addition to conservation programs offered by Valley Water, do you participate in any of the following programs administered through the Bay Area Water Supply and Conservation Agency (BAWSCA)? *

	Yes	No	Not a BAWSCA member
Water Efficient Landscape Education Classes	○	○	○
Water-Wise Gardening in the Bay Area Landscape Educational Tool	○	○	○
Native Gardening Tours and Symposiums	○	○	○
Water Conservation Database (WCDB)	○	○	○
"Making Conservation a Way of Life" Strategic Plan	○	○	○
Regional Water Demands and Conservation Projections (DSS Model)	○	○	○
Public Outreach	○	○	○
High Efficiency Toilet (HET) Rebates	○	○	○

Home Water Use Reports	○	○	○
Free Sprinkler Nozzles Programs	○	○	○
Lawn Be Gone! Turf Replacement Rebates	○	○	○
Rain Barrel Rebates	○	○	○
Large Landscape Audits	○	○	○
Water-Wise School Education Kits and Curriculum	○	○	○
EarthCapades Assemblies School Education Program	○	○	○
Tuolumne River Trust School Education Program	○	○	○
WaterSense Fixtures Bulk Pricing Program	○	○	○

3a) List any additional water conservation programs currently offered by your agency, Valley Water, and BAWSCA (if applicable). Please give the full program name and, if needed, a short description.

Your answer

3b) Please describe any planned or anticipated changes to the water conservation program offerings you indicated above. *

Your answer

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Valley Water Retail Agency Survey to Support Development of the Water Conservation Strategic Plan

* Required

Water Conservation Drivers

Per the Making Water Conservation a California Way of Life Executive Order (B-37-16), and corresponding legislation (AB-1668/SB-606), revisions have recently been made to Urban Water Management Plans (UWMP) requirements, including the addition of new annual water use objectives that will require continued water conservation beyond 2020. The following questions are intended to help Valley Water understand the factors motivating water conservation and efficiency efforts across its service area, including, and in addition to, the new water conservation legislation.

The new annual water use objectives and calculation methodologies are still under development by Department of Water Resources (DWR). Compliance for these annual water use objectives will be met through a combination of: (1) residential indoor water use, (2) landscape irrigation water use, and (3) water loss. Separate performance-based standards are being considered for commercial/institutional/industrial water use. Agencies will need to begin to comply with these annual water use objectives in 2023.

4a) Do you feel your agency is likely to be well-positioned to meet the forthcoming service-area-wide water budget-based UWMP water use objectives? *

- ◯ Yes

- [ ] No
- [ ] Not sure

4b) Do you anticipate your agency changing its approach to water conservation as a result of the forthcoming annual water use objectives? Please explain. *

Your answer

4c) Is there a specific program or type of program that could help your agency be better positioned in meeting the annual water use objectives? Please explain. *

Your answer

4d) How is your agency's future water supply reliability characterized in planning documents (e.g., UWMP, Master Plans, etc.)? *

- [ ] Sufficient to meet demands, if water conservation efforts are continued
- [ ] Sufficient to meet demands, if new or additional supply sources are developed
- [ ] Sufficient to meet demands, except in drought conditions
- [ ] Sufficient to meet demands, even without water conservation or additional sources
- [ ] Other:

4e) Are any of the following efforts currently planned or implemented in your agency's service area? Please indicate independent efforts by your agency. Check all that apply. *

- [ ] Development of new water supplies through transfers or agreements
- [ ] Development of new groundwater supply sources
- [ ] Development of new emergency and drought-relief water supply sources
- [ ] Addition or expanded use of recycled water
- [ ] Expansion of water or wastewater treatment plant capacity
- [ ] None of the above
- [ ] Other: _____

4f) Please describe any planning efforts for the efforts identified above.

Your answer

5a) In your opinion, how strong of a driver are each of the factors below in your agency's need to increase water conservation? *

	1 - Not a strong driver	2	3 - Moderate driver	4	5 -Very strong driver	Not applicable
New Annual Water Use Objectives in 2023	○	○	○	○	○	○
Costs and challenges to obtain additional water supply	○	○	○	○	○	○
Limited water or wastewater treatment capacity	○	○	○	○	○	○
Reduced long-term water supply reliability resulting from climate change or other factors	○	○	○	○	○	○
Reduced short-term water supply reliability during drought conditions	○	○	○	○	○	○
Allow for						

additional economic growth and redevelopment in the service area	○	○	○	○	○	○
Customers and community have a desire for sustainability	○	○	○	○	○	○
Reduction of greenhouse gases/Climate change response	○	○	○	○	○	○

5b) Please discuss any additional drivers not included above.

Your answer

5c) Please discuss any other factors that contribute to your agency's need or desire to increase water conservation planning and/or implementation.

Your answer

6) In recent months, have you seen a change in your total water use consumption, corresponding to your customer's response to the COVID-19 crisis? *

- ◯ Significant increase in consumption
- ◯ Slight increase in consumption
- ◯ No apparent change
- ◯ No apparent change, but shifts between customer classes
- ◯ Slight decrease in consumption
- ◯ Significant decrease in consumption
- ◯ I don't know

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Valley Water Retail Agency Survey to Support Development of the Water Conservation Strategic Plan

* Required

Potential Future Programs

Valley Water is working to develop its Water Conservation Strategic Plan, which will evaluate and identify potential water conservation programs to be implemented over the next 20 year planning horizon. The following questions are intended to help Valley Water identify water conservation programs that will be most useful and beneficial to customers and customer agencies in its service area.

7) In your agency's service area, what water use sectors and/or end uses do you think have the greatest potential for increased water conservation? *

	1 - Very little potential	2	3 - Moderate potential	4	5 - Significant potential
Residential indoor water use	○	○	○	○	○
Residential outdoor water use	○	○	○	○	○
CII indoor water use	○	○	○	○	○
CII outdoor water use	○	○	○	○	○
Distribution system water loss control	○	○	○	○	○
Customer water loss control	○	○	○	○	○
Use of recycled water	○	○	○	○	○
Use of graywater	○	○	○	○	○
Use of storm-water (on-site)	○	○	○	○	○

8a) Various water conservation program types and approaches are listed below. For each, please list your agency's interest in participating in, or providing such programs to, your customers. Please indicate specific program details in the following question. *

	My agency is currently implementing	Would like Valley Water to implement	Do not foresee implementing or participating in
Indoor fixture replacement	○	○	○
Detailed water use surveys or audit (residential or CII)	○	○	○
Customer-level leak detection and/or leak repair	○	○	○
Programs specifically for disadvantaged communities/households	○	○	○
Water demand offset or other water neutrality policies	○	○	○
Water efficient landscape policies that are significantly different/more restrictive from the state Model Water Efficient Landscape Ordinance (MWELO)	○	○	○
Incentivizing compliance with water budgets (large landscape, and/or CII)	○	○	○

On-site stormwater capture and reuse requirements	○	○	○
Public workshops and classes	○	○	○
Public engagement and marketing campaigns	○	○	○
Customer-focused water use reporting/tracking tools	○	○	○
Customer-focused digital interactive resources	○	○	○

8b) For the programs above that your agency indicated interest, please provide specific program details.

Your answer

8c) For other program types and approaches not listed above, please list here.

Your answer

9a) Below is a list of water conservation programs currently or recently offered by Valley Water. As Valley Water considers what programs may be offered in the future, please indicate how you feel each program should be prioritized over the next 5 to 10 years.

Devices *

	Low Priority	Medium Priority	High Priority	No Preference
Residential Aerators (1.0 and 1.5 gpm aerators)	○	○	○	○
CII Aerators (0.5 gpm aerators)	○	○	○	○
Pre-rinse Sprayers	○	○	○	○
Showerheads	○	○	○	○

Landscape Rebate Program (LRP) *

	Low Priority	Medium Priority	High Priority	No Preference
Overall Program	○	○	○	○
Irrigation Equipment Upgrades, excludes drip irrigation rebate	○	○	○	○
Inline Drip Irrigation	○	○	○	○
Our City Forest's Lawn Busters Program	○	○	○	○
Turf Conversion Rebate Program	○	○	○	○
Rain Barrels	○	○	○	○
Cisterns	○	○	○	○
Rain Garden	○	○	○	○
Weather-based Irrigation Controller Rebate	○	○	○	○

Rebates *

	Low Priority	Medium Priority	High Priority	No Preference
CII and MFD HET Direct Installation Program (CII and apartments of 4 or more units)	○	○	○	○
Water Efficient Technology (WET) Program	○	○	○	○
Submeter Rebate Program	○	○	○	○
AMI Meters	○	○	○	○
Graywater Laundry to Landscape Program	○	○	○	○

Services *

	Low Priority	Medium Priority	High Priority	No Preference
Landscape Maintenance Consultation Program	○	○	○	○
Landscape Water Use Evaluation Program (Large Landscape Program with Waterfluence)	○	○	○	○
Water Waste Inspector Reports	○	○	○	○
Home Water Use Reports	○	○	○	○
Water Wise Indoor Survey Program (DIY kits for residents)	○	○	○	○
Water Wise Outdoor Survey Program (Irrigation system inspections)	○	○	○	○

9b) Are there any water conservation programs that you would like to provide to your customers in the future? If yes, please describe the programs you would like to see offered by Valley Water. *

Your answer

9c) Have you received any feedback or requests from the public for new water conservation programs in your agency's service area? Please describe. *

Your answer

10) Are there any additional factors that have not been covered here that you would like Valley Water to consider through the Water Conservation Strategic Plan? Please describe. *

Your answer

11) In your opinion, what is working best in how Valley Water helps your service area conserve water? *

Your answer

12) In your opinion, what could Valley Water do better in helping your service area to conserve water? *

Your answer

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Appendix C

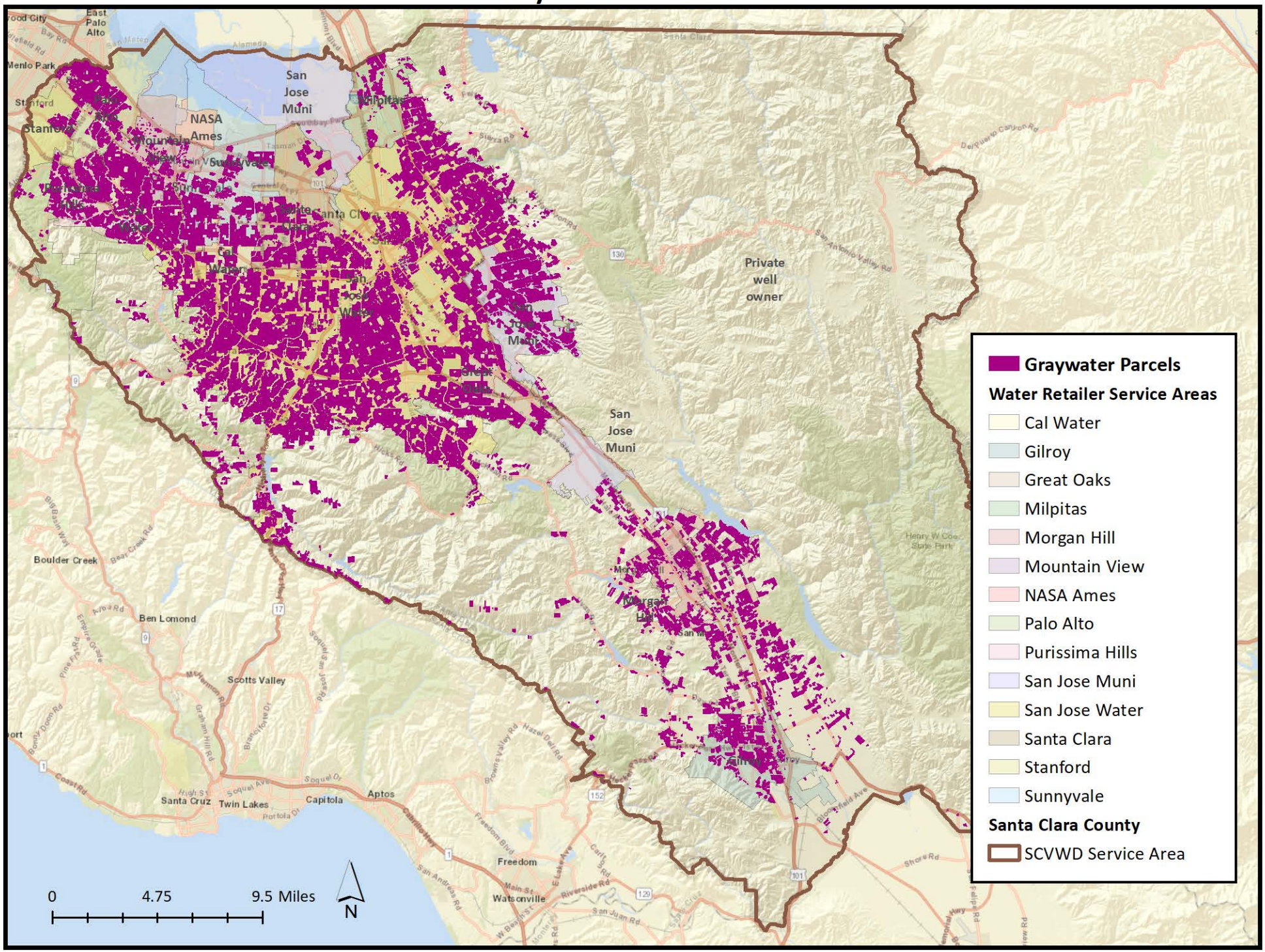
Water Conservation Program Analysis

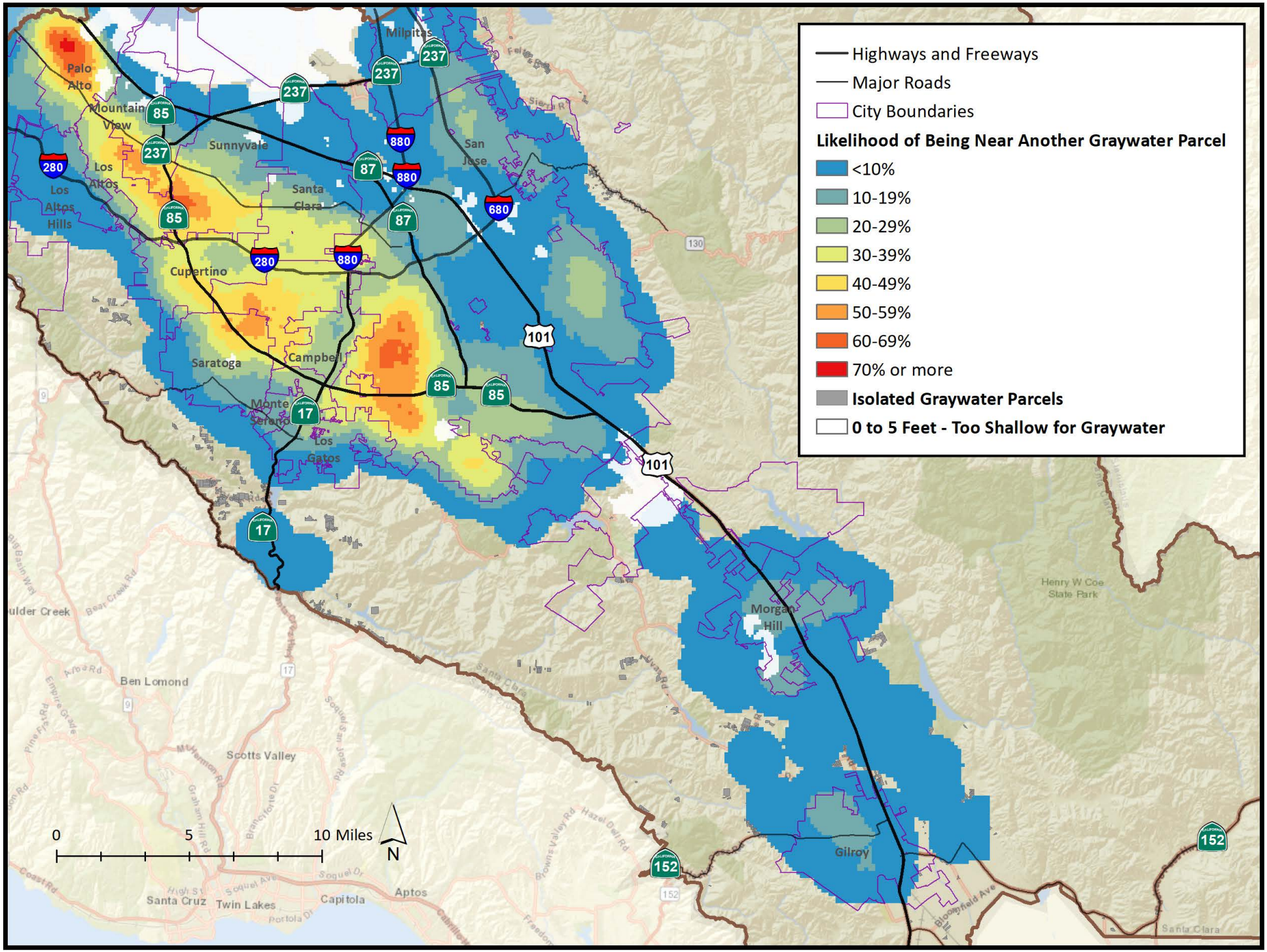
Appendix C

Water Conservation Program Analyses by Retail Agency

Figure C-1	Graywater Parcel Eligibility Conducted by Valley Water
Figure C-2	Proximity of Graywater Parcels to Other Graywater Parcels Conducted by Valley Water
Figure C-3	Landscape Rebate Program Hot Spot Analysis Conducted by Valley Water
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Table C-2	Graywater Programs Participation by Residential Building Age
Table C-3	LRP Landscape Conversion and WBIC Rebates Program Participation by Residential Building Age
Table C-4	Submeter Rebate Program Participation by Residential Building Age
Table C-5	Water Wise Survey Program Participation by Residential Building Age
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Table C-7	LRP Landscape Conversion and WBIC Rebates Program Participation by CII Building Age
Table C-8	HET Program Participation by Median Household Income
Table C-9	Graywater Rebate Program Participation by Median Household Income
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Table C-13	HET Program Participation by Median Household Age
Table C-14	Graywater Programs Participation by Median Household Age
Table C-15	LRP Landscape Conversion and WBIC Rebates Program Participation by Median Household Age
Table C-16	Submeter Rebate Program Participation by Median Household Age
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Table C-18	HET Program Participation by Percentage of Renters
Table C-19	Graywater Programs Participation by Percentage of Renters
Table C-20	LRP Landscape Conversion and WBIC Rebates Program Participation by Percentage of Renters
Table C-21	Submeter Rebate Program Participation by Percentage of Renters
Table C-22	Water Wise Survey Program Participation by Percentage of Renters

Graywater Parcels




Highways and Freeways
Major Roads
City Boundaries
Likelihood of Being Near Another Graywater Parcel
<10%
10-19%
20-29%
30-39%
40-49%
50-59%
60-69%
70% or more
Isolated Graywater Parcels
0 to 5 Feet - Too Shallow for Graywater
Palo Alto
Mountain View
Sunnyvale
Milpitas
San Jose
Los Altos
Los Altos Hills
Santa Clara
Cupertino
Saratoga
Campbell
Monte Sereno
Los Gatos
Morgan Hill
Gilroy
Ben Lomond
Scotts Valley
Santa Cruz
Twin Lakes
Capitola
Aptos
Henry W Coe State Park
0
5
10 Miles
N

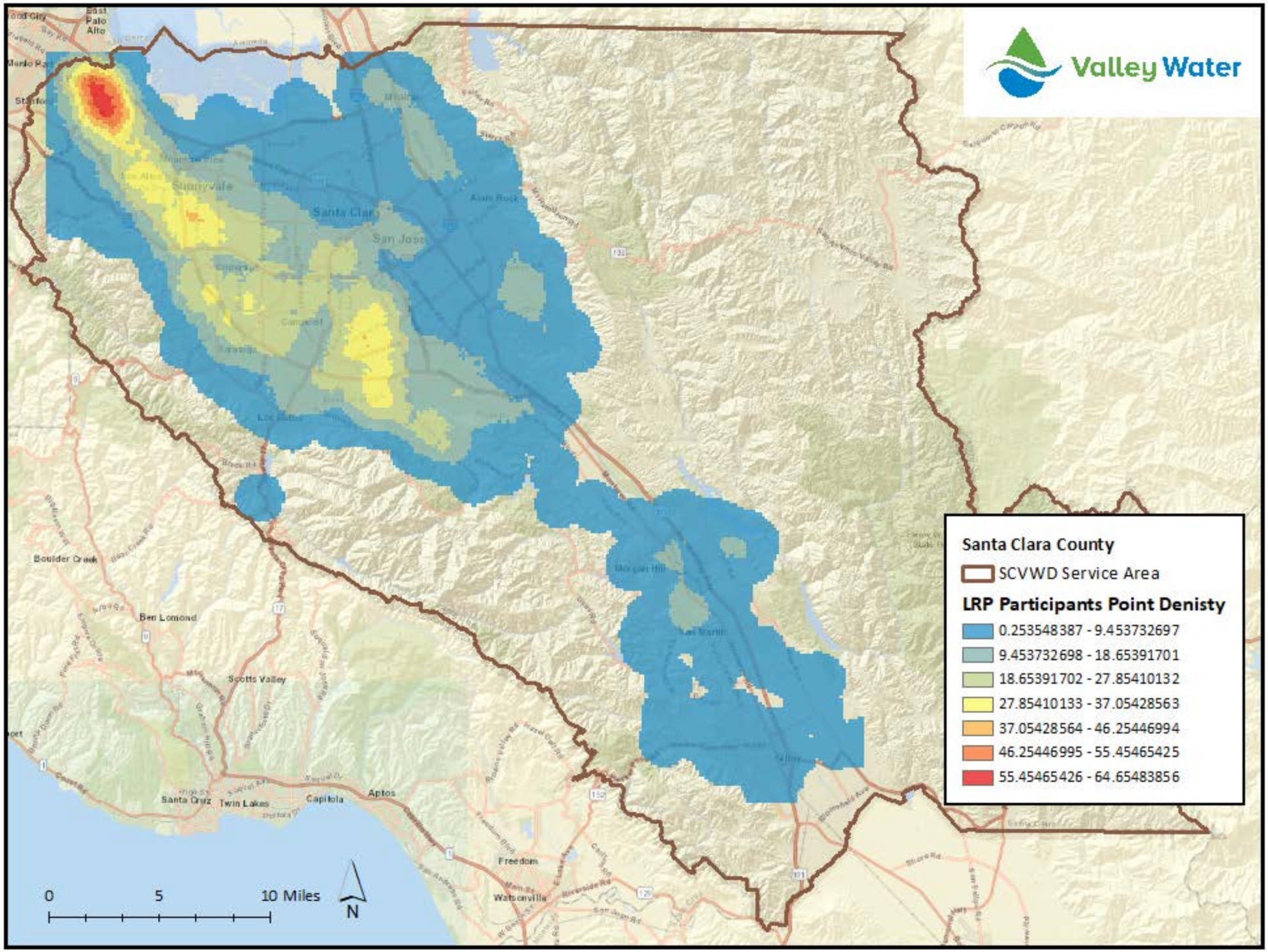
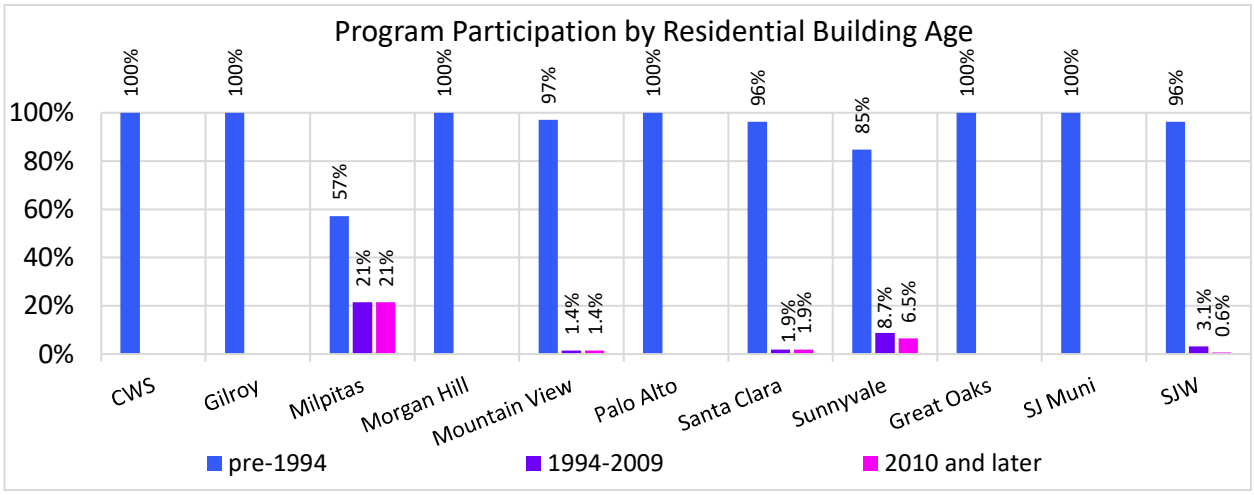

Valley Water
Santa Clara County
SCVWD Service Area
LRP Participants Point Denisty
0.253548387 - 9.453732697
9.453732698 - 18.65391701
18.65391702 - 27.85410132
27.85410133 - 37.05428563
37.05428564 - 46.25446994
46.25446995 - 55.45465425
55.45465426 - 64.65483856
Sunnyvale
Santa Clara
San Jose
Los Gatos
Boulder Creek
Ben Lomond
Scotts Valley
Santa Cruz
Twin Lakes
Capitola
Aptos
Freedom
Watsonville
Morgan Hill
Gilroy
0
5
10 Miles
N

Table C-1
HET Program Participation by Residential Building Age
Valley Water, Water Conservation Strategic Plan

Percentage of Participating Residential Customers by Retail Agency (a, b)	Avg Year Built	Avg Lot Size (sq ft)	Avg Building Interior Size	Building Age		
				pre-1994	1994-2009	2010 and later
CWS - Los Altos	1970	96,344	29,337	100%	0%	0%
City of Gilroy	1963	39,979	11,763	100%	0%	0%
City of Milpitas	1982	353,527	113,972	57%	21%	21%
City of Morgan Hill	1981	194,285	21,616	100%	0%	0%
City of Mountain View	1967	103,513	34,439	97%	1.4%	1.4%
City of Palo Alto	1960	57,271	24,011	100%	0%	0%
City of Santa Clara	1970	67,546	35,206	96%	1.9%	1.9%
City of Sunnyvale	1971	110,157	50,382	85%	8.7%	6.5%
Great Oaks Water Company	1972	436,895	136,473	100%	0%	0%
Purissima Hills Water District	--	--	--	--	--	--
San José Municipal Water System	1978	207,249	63,562	100%	0%	0%
San Jose Water Company	1969	86,469	29,462	96%	3.1%	0.6%
Stanford University	--	--	--	--	--	--
No Retail Agency	--	--	--	--	--	--



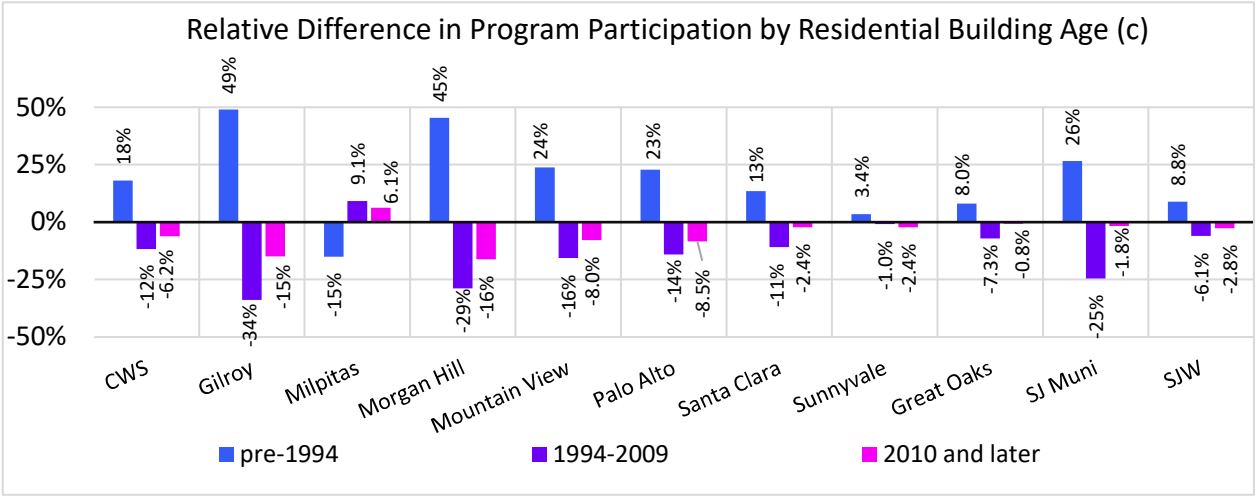


Table C-1
HET Program Participation by Residential Building Age
Valley Water, Water Conservation Strategic Plan

Abbreviations:

CWS = California Water Service
CII = commercial, industrial, and institutional
HET = high efficiency toilets
MFD = multi-family dwelling
SJ Muni = San José Municipal Water System
SJW = San Jose Water

Notes:

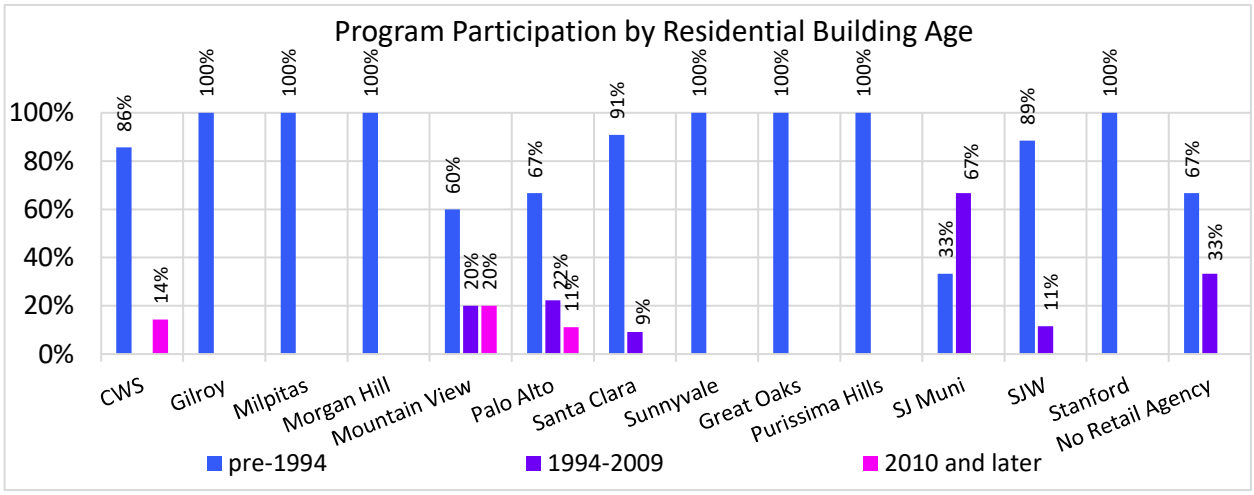
(a) Participants included in this analysis are limited to multi-family customers for which location data are available.
(b) Several programs have had limited participation. The small sample size should be considered when evaluating these results. For this program, Purissima Hills Water District, Stanford University, and regions with no retail agency had zero participants. Great Oaks Water Company had 1 participant and SJ Muni had 2 participants.
(c) Relative difference is calculated as the percentage of program participation by income group minus the overall percentage of residential customers by income group within the retail agency boundary.

References:

1. Santa Clara County, 2020. Santa Clara County Assessor Parcel Data, provided via Valley Water, 22 September 2020.

Table C-2
Graywater Programs Participation by Residential Building Age
Valley Water, Water Conservation Strategic Plan

Percentage of Participating Residential Customers by Retail Agency (a, b)	Avg Year Built	Avg Lot Size (sq ft)	Avg Building Interior Size	Building Age		
				pre-1994	1994-2009	2010 and later
CWS - Los Altos	1969	19,608	2,156	86%	0%	14%
City of Gilroy	1985	6,154	2,132	100%	0%	0%
City of Milpitas	1965	5,607	1,371	100%	0%	0%
City of Morgan Hill	1973	22,932	2,466	100%	0%	0%
City of Mountain View	1964	7,548	1,421	60%	20%	20%
City of Palo Alto	1943	9,436	2,274	67%	22%	11%
City of Santa Clara	1958	5,649	1,270	91%	9%	0%
City of Sunnyvale	1957	6,873	1,732	100%	0%	0%
Great Oaks Water Company	1977	5,500	1,502	100%	0%	0%
Purissima Hills Water District	1979	64,363	3,879	100%	0%	0%
San José Municipal Water System	1994	9,340	2,479	33%	67%	0%
San Jose Water Company	1952	7,776	1,678	89%	11%	0%
Stanford University	1980	13,872	2,239	100%	0%	0%
No Retail Agency	1975	79,526	2,228	67%	33%	0%



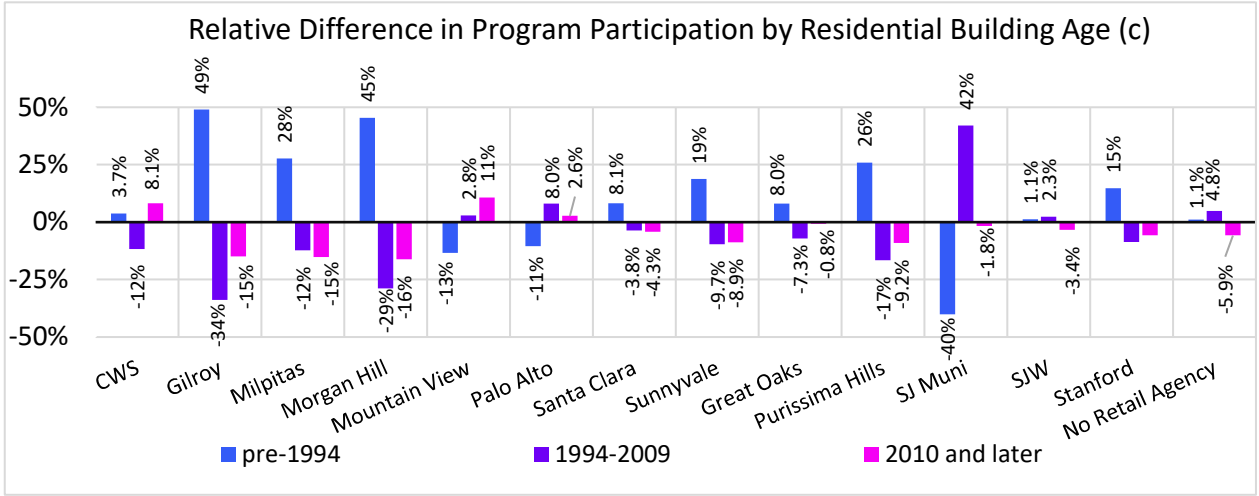


Table C-2
Graywater Programs Participation by Residential Building Age
Valley Water, Water Conservation Strategic Plan

Abbreviations:

CWS = California Water Service
SJ Muni = San José Municipal Water System
SJW = San Jose Water

Notes:

(a) Residential customers include both single-family and multi-family customers (nearly all participants are single family customers). Participants included in this analysis are limited to those for which location data are available.

(b) Several programs have had limited participation. The small sample size should be considered when evaluating these results. For this program, City of Gilroy and Stanford University had 1 participant each. City of Milpitas and Great Oaks Water Company had 2 participants each.

(c) Relative difference is calculated as the percentage of program participation by income group minus the overall percentage of residential customers by income group within the retail agency boundary.

References:

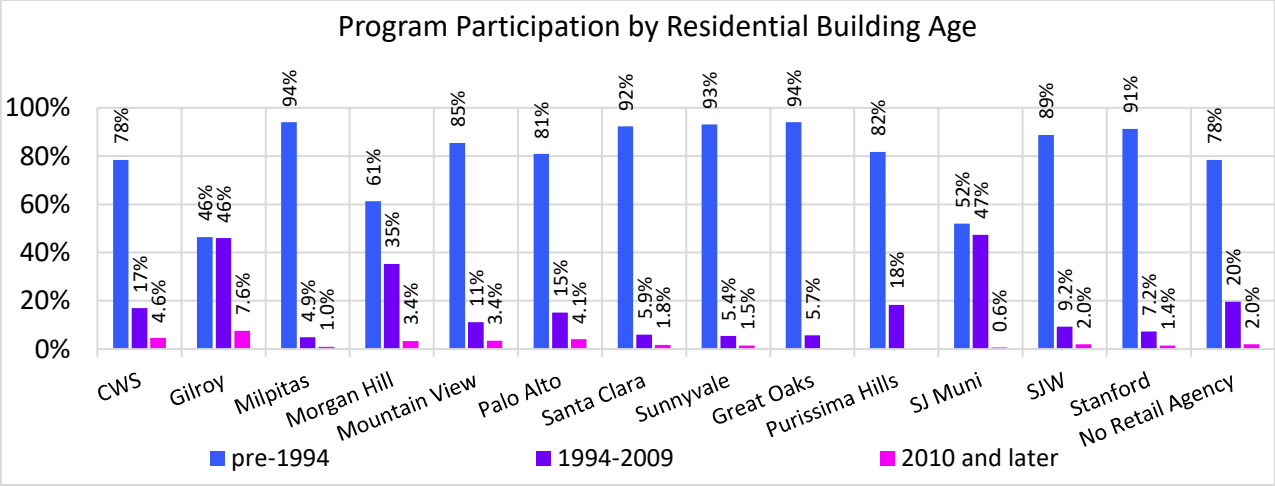
1. Santa Clara County, 2020. Santa Clara County Assessor Parcel Data, provided via Valley Water, 22 September 2020.

Table C-3

LRP Landscape Conversion and WBIC Rebates Program Participation by Residential Building Age

Valley Water, Water Conservation Strategic Plan

Percentage of Participating Residential Customers by Retail Agency (a)	Avg Year Built	Avg Lot Size (sq ft)	Avg Building Interior Size (sq ft)	Building Age		
				pre-1994	1994-2009	2010 and later
CWS - Los Altos	1981	73,555	29,435	78%	17%	4.6%
City of Gilroy	1987	155,863	17,107	46%	46%	7.6%
City of Milpitas	1981	125,701	53,554	94%	4.9%	1.0%
City of Morgan Hill	1984	113,704	25,705	61%	35%	3.4%
City of Mountain View	1976	135,953	48,583	85%	11%	3.4%
City of Palo Alto	1973	143,735	54,847	81%	15%	4.1%
City of Santa Clara	1970	133,075	35,781	92%	5.9%	1.8%
City of Sunnyvale	1973	144,860	49,693	93%	5.4%	1.5%
Great Oaks Water Company	1980	832,985	79,918	94%	5.7%	0.3%
Purissima Hills Water District	1982	478,560	132,678	82%	18%	0%
San José Municipal Water System	1991	182,885	51,638	52%	47%	0.6%
San Jose Water Company	1974	106,020	34,223	89%	9.2%	2.0%
Stanford University	1956	1,369,805	3,192	91%	7.2%	1.4%
No Retail Agency	1977	478,121	59,885	78%	20%	2.0%



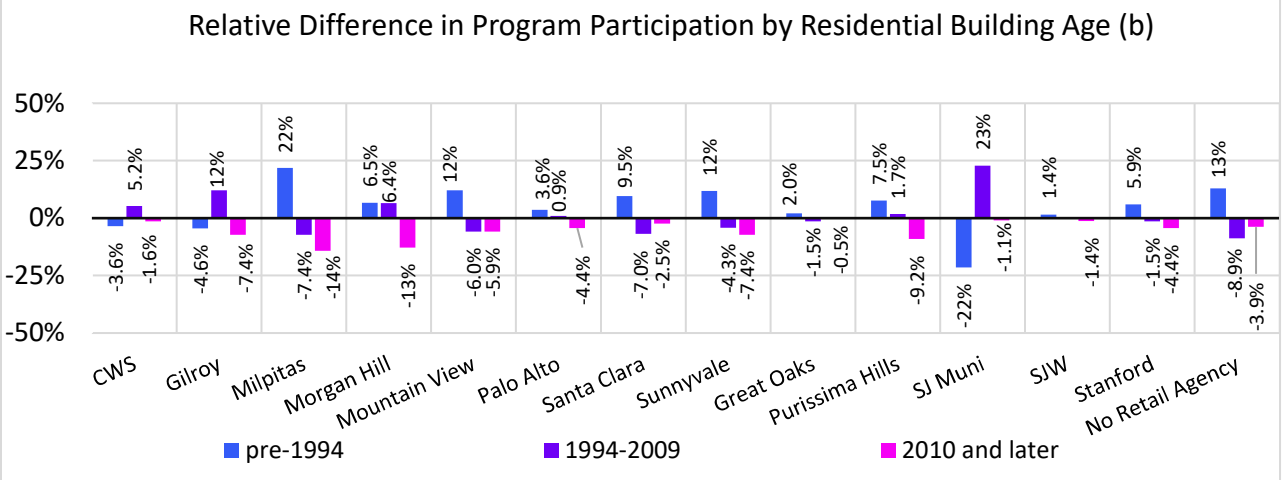


Table C-3

LRP Landscape Conversion and WBIC Rebates Program Participation by Residential Building Age

Valley Water, Water Conservation Strategic Plan

Abbreviations:

CWS = California Water Service
LRP = Landscape Rebate Program
SJ Muni = San José Municipal Water System
SJW = San Jose Water
WBIC = Weather-Based Irrigation Controller

Notes:

(a) Residential customers include both single-family and multi-family customers. Participants included in this analysis are limited to those for which location data are available.

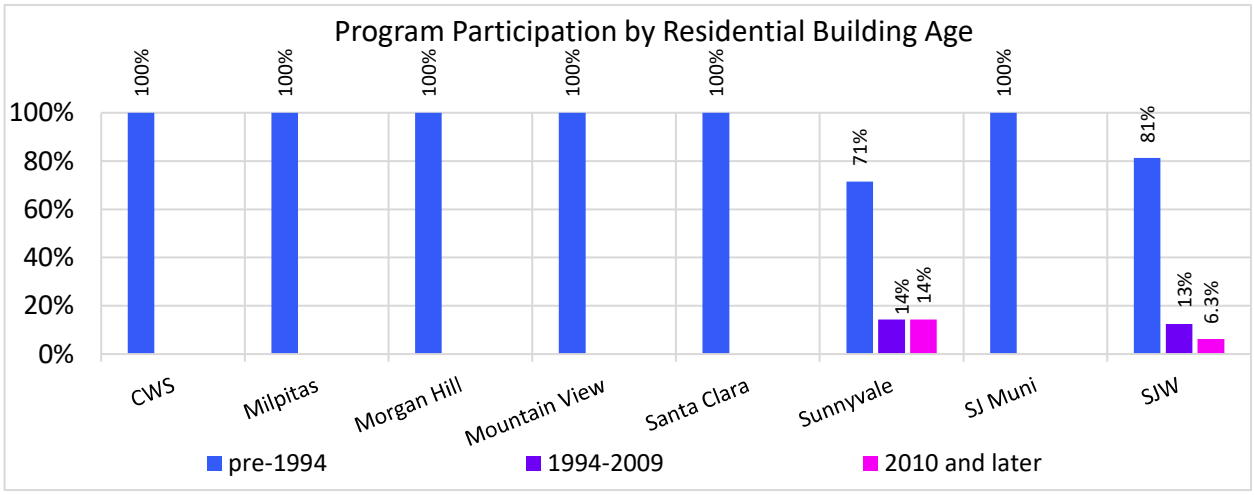
(b) Relative difference is calculated as the percentage of program participation by income group minus the overall percentage of residential customers by income group within the retail agency boundary.

References:

1. Santa Clara County, 2020. Santa Clara County Assessor Parcel Data, provided via Valley Water, 22 September 2020.

Table C-4
Submeter Rebate Program Participation by Residential Building Age
Valley Water, Water Conservation Strategic Plan

Percentage of Participating Residential Customers by Retail Agency (a, b)	Avg Year Built	Avg Lot Size (sq ft)	Avg Building Interior Size	Building Age		
				pre-1994	1994-2009	2010 and later
CWS - Los Altos	1973	1,609	1,386	100%	0%	0%
City of Gilroy	--	--		--	--	--
City of Milpitas	1962	8,004	1,716	100%	0%	0%
City of Morgan Hill	1969	448,345	4,319	100%	0%	0%
City of Mountain View	1964	554,329	2,296	100%	0%	0%
City of Palo Alto	--	--		--	--	--
City of Santa Clara	1961	8,960	2,855	100%	0%	0%
City of Sunnyvale	1980	1,145,218	4,083	71%	14%	14%
Great Oaks Water Company	--	--		--	--	--
Purissima Hills Water District	--	--		--	--	--
San José Municipal Water System	1978	592,198	5,617	100%	0%	0%
San Jose Water Company	1972	480,496	2,847	81%	13%	6.3%
Stanford University	--	--		--	--	--
No Retail Agency	--	--		--	--	--



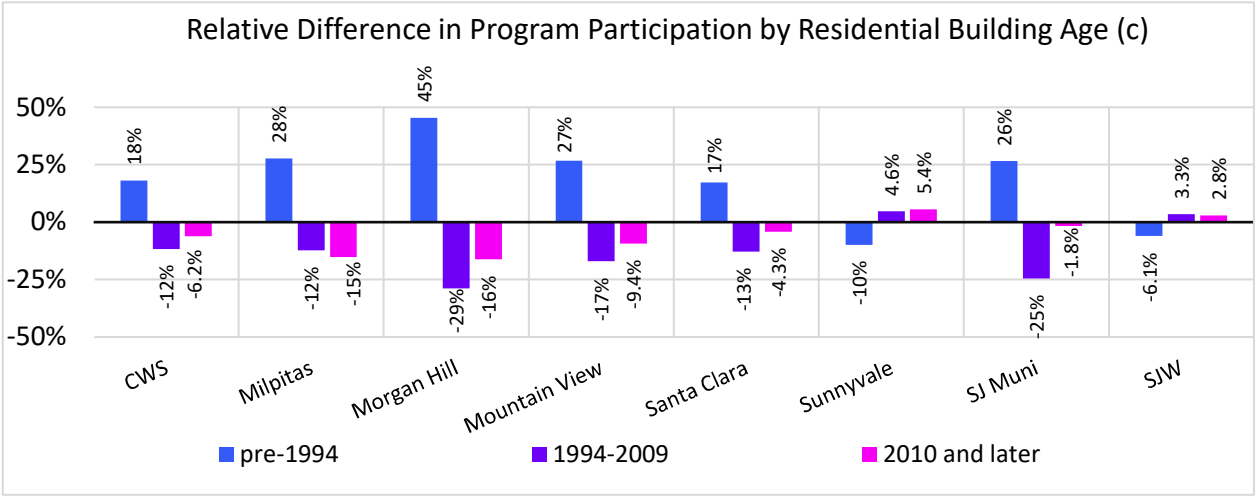


Table C-4
Submeter Rebate Program Participation by Residential Building Age
Valley Water, Water Conservation Strategic Plan

Abbreviations:

CWS = California Water Service
SJ Muni = San José Municipal Water System
SJW = San Jose Water

Notes:

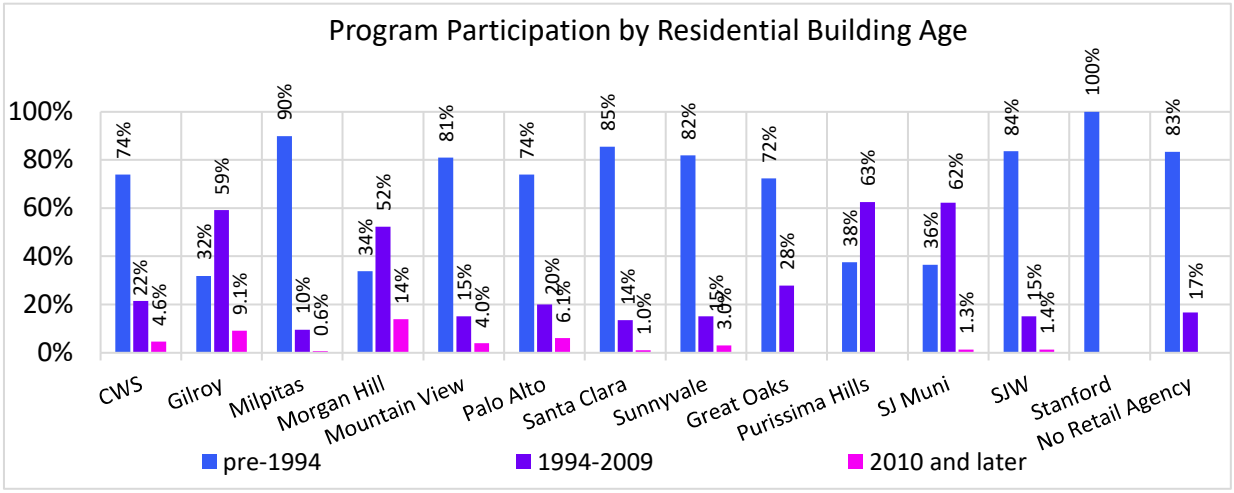
(a) Participants included in this analysis are limited to multi-family customers for which location data are available.
(b) Several programs have had limited participation. The small sample size should be considered when evaluating these results. For this program, City of Gilroy, City of Palo Alto, Great Oaks Water Company, Purissima Hills Water District, Stanford University, and regions with no retail agency had no participants and thus are not shown in the charts.
(c) Relative difference is calculated as the percentage of program participation by income group minus the overall percentage of residential customers by income group within the retail agency boundary.

References:

1. Santa Clara County, 2020. Santa Clara County Assessor Parcel Data, provided via Valley Water, 22 September 2020.

Table C-5
Water Wise Survey Program Participation by Residential Building Age
Valley Water, Water Conservation Strategic Plan

Percentage of Participating Residential Customers by Retail Agency (a, b)	Avg Year Built	Avg Lot Size (sq ft)	Avg Building Interior Size (sq ft)	Building Age		
				pre-1994	1994-2009	2010 and later
CWS - Los Altos	1972	16,809	2,651	74%	22%	4.6%
City of Gilroy	1990	9,803	2,326	32%	59%	9.1%
City of Milpitas	1977	7,765	2,053	90%	10%	0.6%
City of Morgan Hill	1995	11,543	2,622	34%	52%	14%
City of Mountain View	1970	7,252	2,189	81%	15%	4.0%
City of Palo Alto	1964	8,353	2,230	74%	20%	6.1%
City of Santa Clara	1962	11,811	4,612	85%	14%	1.0%
City of Sunnyvale	1968	6,859	1,926	82%	15%	3.0%
Great Oaks Water Company	1980	5,854	1,724	72%	28%	0%
Purissima Hills Water District	1988	48,188	4,286	38%	63%	0%
San José Municipal Water System	1993	12,487	2,982	36%	62%	1.3%
San Jose Water Company	1968	15,968	3,843	84%	15%	1.4%
Stanford University	1963	15,024	2,495	100%	0%	0%
No Retail Agency	1976	47,882	1,864	83%	17%	0%



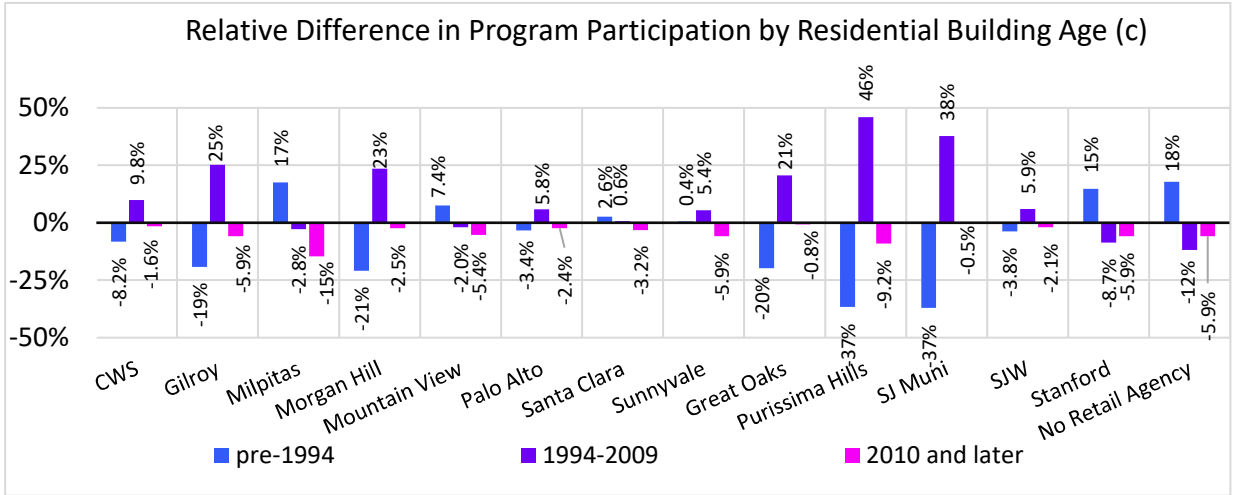


Table C-5
Water Wise Survey Program Participation by Residential Building Age
Valley Water, Water Conservation Strategic Plan

Abbreviations:

CWS = California Water Service
SJ Muni = San José Municipal Water System
SJW = San Jose Water

Notes:

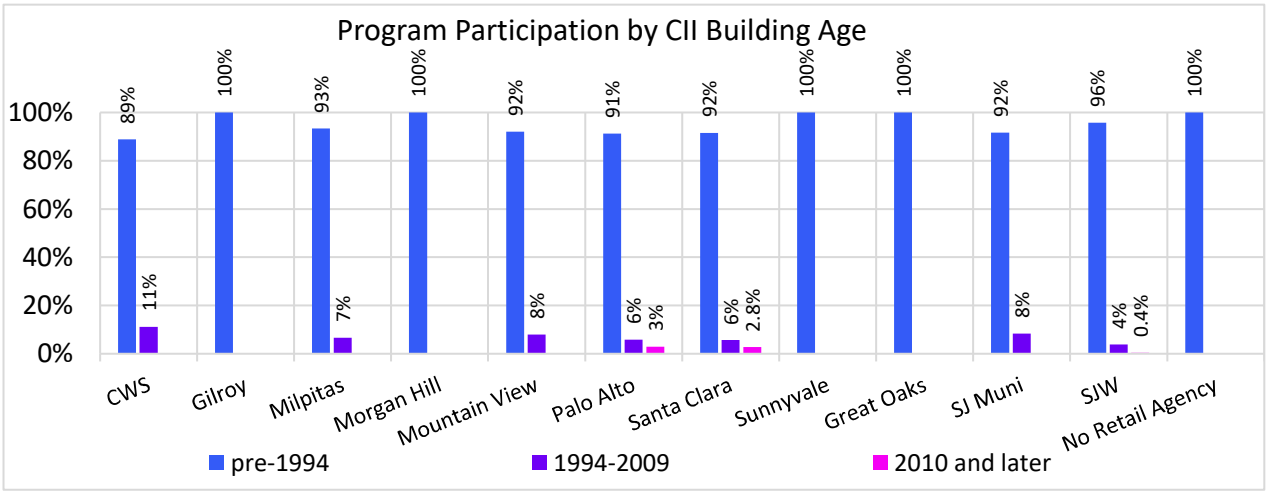
(a) Residential customers include both single-family and multi-family customers. Participants included in this analysis are limited to those for which location data are available.
(b) Several programs have had limited participation. The small sample size should be considered when evaluating these results. For this program, regions with no retail agency had 6 participants and Purissima Hills Water District had 8 participants.
(c) Relative difference is calculated as the percentage of program participation by building age minus the overall percentage of residential customers by building age within the retail agency boundary.

References:

1. Santa Clara County, 2020. Santa Clara County Assessor Parcel Data, provided via Valley Water, 22 September 2020.

Table C-6
HET Program Participation by CII Building Age
Valley Water, Water Conservation Strategic Plan

Percentage of Participating CII Customers by Retail Agency (a)	Building Age		
	pre-1994	1994-2009	2010 and later
CWS - Los Altos	89%	11%	0%
City of Gilroy	100%	0%	0%
City of Milpitas	93%	7%	0%
City of Morgan Hill	100%	0%	0%
City of Mountain View	92%	8%	0%
City of Palo Alto	91%	6%	3%
City of Santa Clara	92%	6%	2.8%
City of Sunnyvale	100%	0%	0%
Great Oaks Water Company	100%	0%	0%
Purissima Hills Water District	--	--	--
San José Municipal Water System	92%	8%	0%
San Jose Water Company	96%	4%	0.4%
Stanford University	--	--	--
No Retail Agency	100%	0%	0%



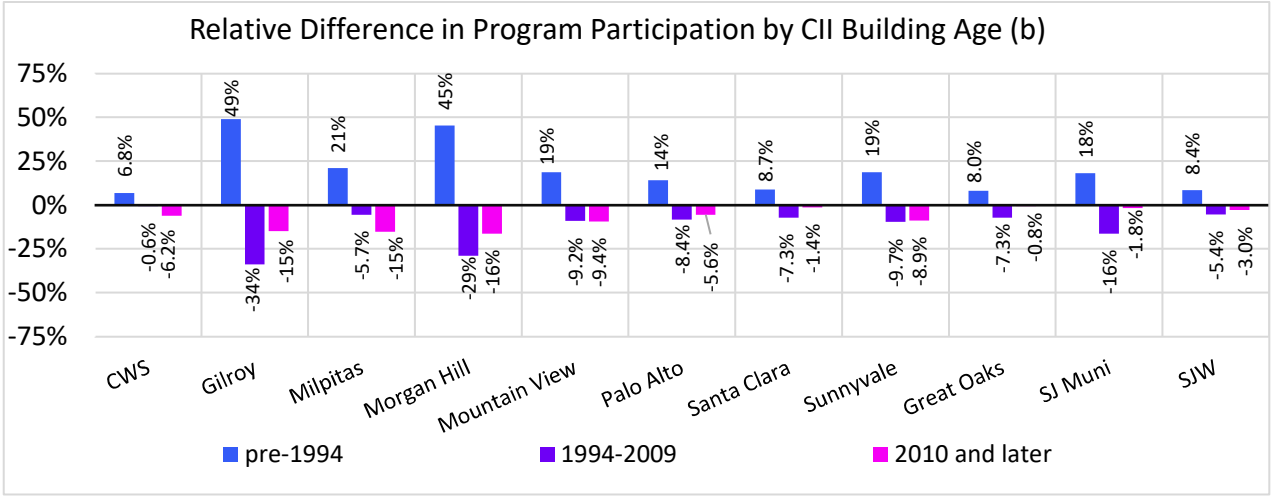


Table C-6
HET Program Participation by CII Building Age
Valley Water, Water Conservation Strategic Plan

Abbreviations:

CWS = California Water Service
CII = commercial, industrial, and institutional
HET = high efficiency toilets
MFD = multi-family dwelling
SJ Muni = San José Municipal Water System
SJW = San Jose Water

Notes:

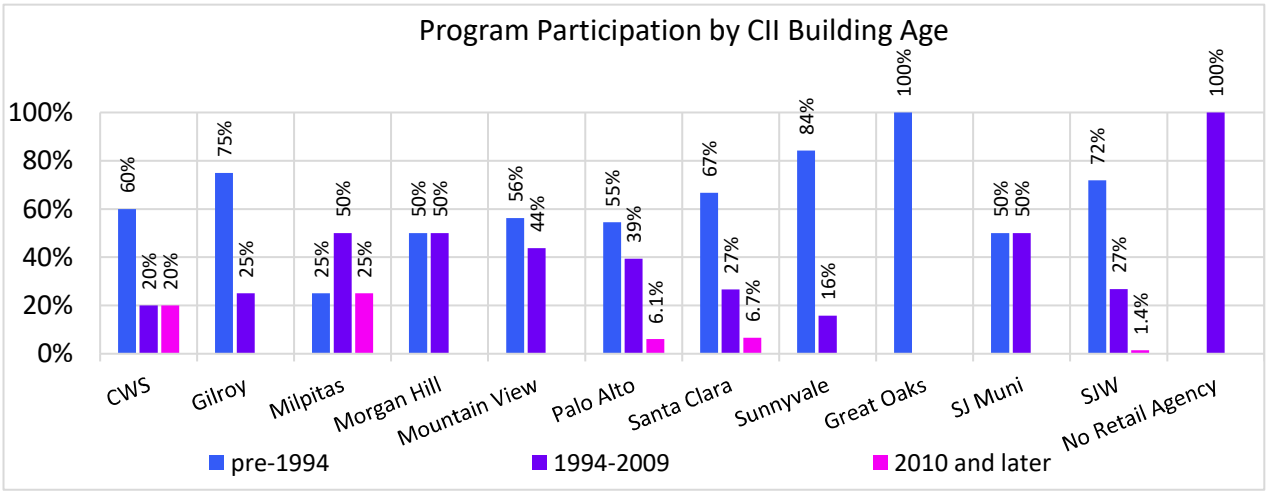
(a) Several programs have had limited participation. The small sample size should be considered when evaluating these results. For this program, Purissima Hills Water District and Stanford University had zero participants. Regions with no retail agency had 2 participants.
(b) Relative difference is calculated as the percentage of program participation by building age minus the overall percentage of residential customers by building age within the retail agency boundary.

References:

1. Santa Clara County, 2020. Santa Clara County Assessor Parcel Data, provided via Valley Water, 22 September 2020.

Table C-7
LRP Landscape Conversion and WBIC Rebates Program Participation by CII Building Age
Valley Water, Water Conservation Strategic Plan

Percentage of Participating Residential Customers by Retail Agency (a)	Building Age		
	pre-1994	1994-2009	2010 and later
CWS - Los Altos	60%	20%	20%
City of Gilroy	75%	25%	0.0%
City of Milpitas	25%	50%	25%
City of Morgan Hill	50%	50%	0%
City of Mountain View	56%	44%	0%
City of Palo Alto	55%	39%	6.1%
City of Santa Clara	67%	27%	6.7%
City of Sunnyvale	84%	16%	0%
Great Oaks Water Company	100%	0%	0%
Purissima Hills Water District	--	--	--
San José Municipal Water System	50%	50%	0%
San Jose Water Company	72%	27%	1.4%
Stanford University	--	--	--
No Retail Agency	0%	100%	0%



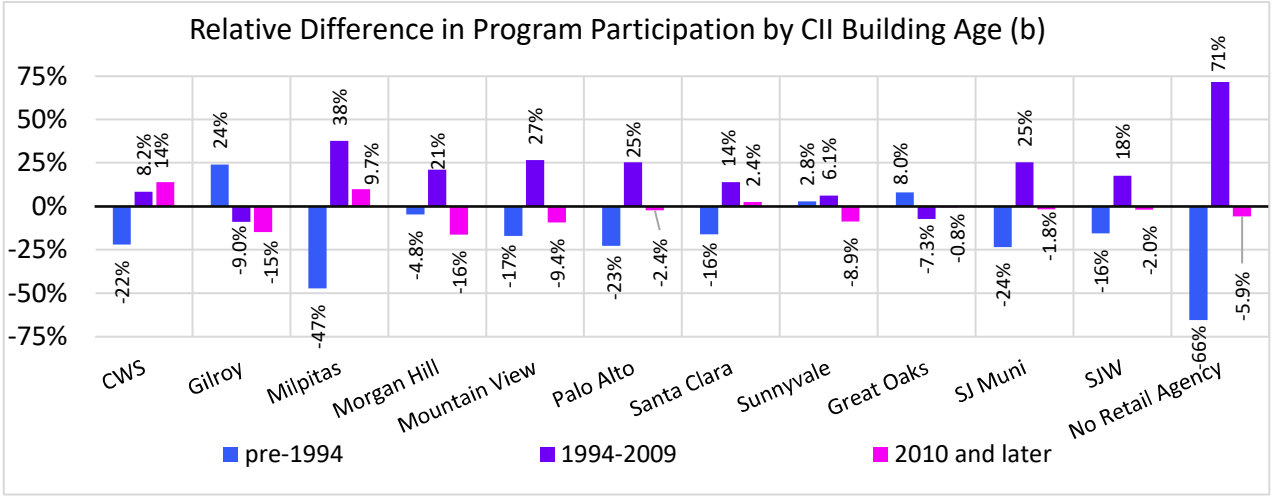


Table C-7

LRP Landscape Conversion and WBIC Rebates Program Participation by CII Building Age

Valley Water, Water Conservation Strategic Plan

Abbreviations:

CWS = California Water Service
LRP = Landscape Rebate Program
SJ Muni = San José Municipal Water System
SJW = San Jose Water
WBIC = Weather-Based Irrigation Controller

Notes:

(a) Several programs have had limited participation. The small sample size should be considered when evaluating these results. For this program, Purissima Hills Water District and Stanford University had zero participants. Regions with no retail agency had 1 participants.

(b) Relative difference is calculated as the percentage of program participation by building age minus the overall percentage of residential customers by building age within the retail agency boundary.

References:

1. Santa Clara County, 2020. Santa Clara County Assessor Parcel Data, provided via Valley Water, 22 September 2020.

Table C-8
HET Program Participation by Median Household Income
Valley Water, Water Conservation Strategic Plan

Percentage of Participating Residential Customers by Retail Agency (b, c)	Number of Participants	Median Household Income (a)				
		Very Low Income <$59,850	Low Income $59,850 - $85,050	Moderate Income $85,050 - 135,250	High Income $135,250 - $169,050	Very High Income >$169,050
CWS - Los Altos	7	0%	0%	14%	57%	29%
City of Gilroy	20	5.0%	45%	50%	0%	0%
City of Milpitas	22	23%	9.1%	14%	55%	0%
City of Morgan Hill	6	0%	33%	67%	0%	0%
City of Mountain View	68	1.5%	7.4%	66%	12%	13%
City of Palo Alto	54	13%	11%	35%	17%	24%
City of Santa Clara	50	8.0%	24%	60%	2.0%	6.0%
City of Sunnyvale	86	0%	3.5%	66%	21%	9.3%
Great Oaks Water Company	1	100%	0%	0%	0%	0%
Purissima Hills Water District	--	--	--	--	--	--
San José Municipal Water System	2	50%	0%	0%	50%	0%
San Jose Water Company	156	16%	28%	47%	4.5%	3.8%
Stanford University	--	--	--	--	--	--
No Retail Agency	1	0%	0%	0%	0%	100%

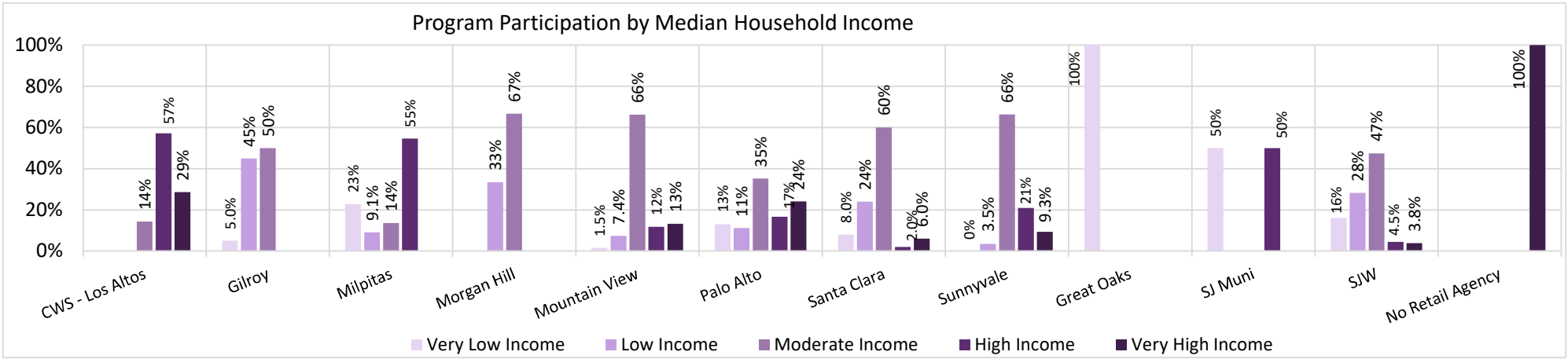
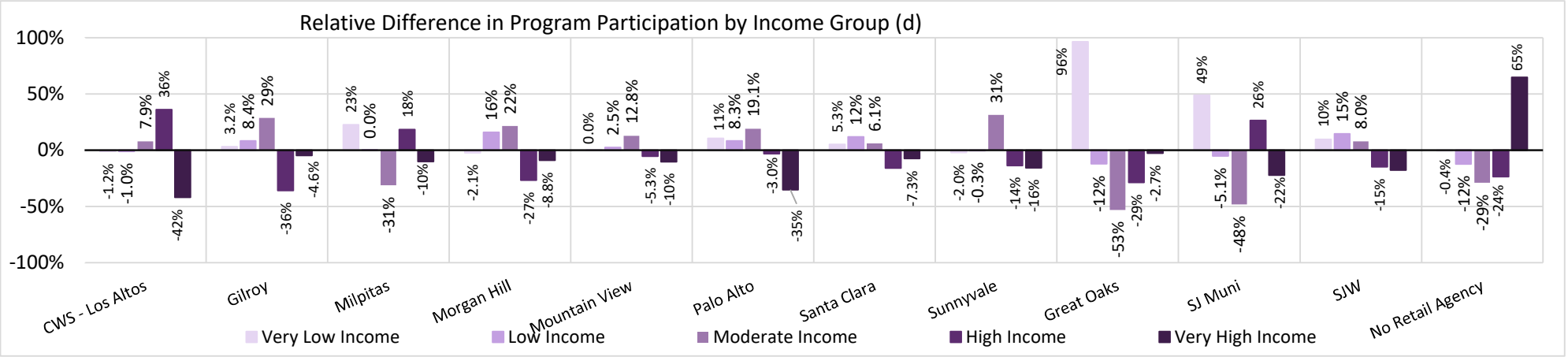


Table C-8
HET Program Participation by Median Household Income
Valley Water, Water Conservation Strategic Plan



Abbreviations:

CWS = California Water Service
CII = commercial, industrial, and institutional
HET = high efficiency toilets
HCD = California Department of Housing and Community Development
MFD = multi-family dwelling
SJ Muni = San José Municipal Water System
SJW = San Jose Water

Notes:

(a) Household income is based on estimated 2018 median household income by Census Block Group, per Census (2020). Income level groupings are based on California Department of Housing and Community Development ("HCD") income levels for Santa Clara County for a 3-person household in 2018 (HCD, 2018). Low income includes extremely low and very low groupings. The average persons per household is 2.97 for Santa Clara County.
(b) Residential customers include both single-family and multi-family customers. Participants included in this analysis are limited to those for which location data are available.
(c) Several programs have had limited participation. The small sample size should be considered when evaluating these results. For this program, Stanford University and Purissima Hills Water District had no participants with available location data.
(d) Relative difference is calculated as the percentage of program participation by income group minus the overall percentage of residential customers by income group within the retail agency boundary.

References:

1. Census, 2020. 2014-2018 American Community Survey (ACS) 5-year estimates. TIGER/Line Shapefiles by Block Group, https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-data.html, United States Census Bureau, downloaded July 2020.
2. HCD, 2018. Memorandum: State Income Limits for 2018, California Department of Housing and Community Development, dated 26 April 2018.

Table C-9
Graywater Programs Participation by Median Household Income
Valley Water, Water Conservation Strategic Plan

Percentage of Participating Residential Customers by Retail Agency (b, c)	Number of Participants	Median Household Income (a)				
		Very Low Income <$59,850	Low Income $59,850 - $85,050	Moderate Income $85,050 - 135,250	High Income $135,250 - $169,050	Very High Income >$169,050
CWS - Los Altos	7	0%	0%	0%	14%	86%
City of Gilroy	1	0%	0%	0%	100%	0%
City of Milpitas	2	0%	0%	100%	0%	0%
City of Morgan Hill	3	0%	0%	0%	100%	0%
City of Mountain View	4	0%	0%	25%	25%	50%
City of Palo Alto	3	0%	0%	33%	0%	67%
City of Santa Clara	10	0%	20%	20%	30%	30%
City of Sunnyvale	12	8.3%	8.3%	8.3%	42%	33%
Great Oaks Water Company	1	0%	100%	0%	0%	0%
Purissima Hills Water District	3	0%	0%	0%	0%	100%
San José Municipal Water System	3	0%	0%	0%	33%	67%
San Jose Water Company	61	10%	16%	34%	13%	26%
Stanford University	1	0%	0%	0%	0%	100%
No Retail Agency	9	0%	11%	33%	22%	33%

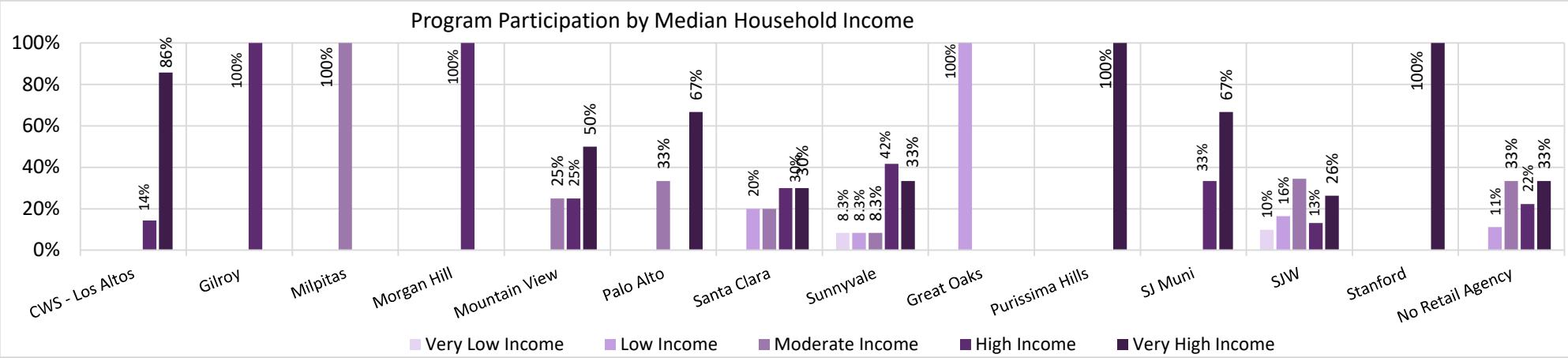
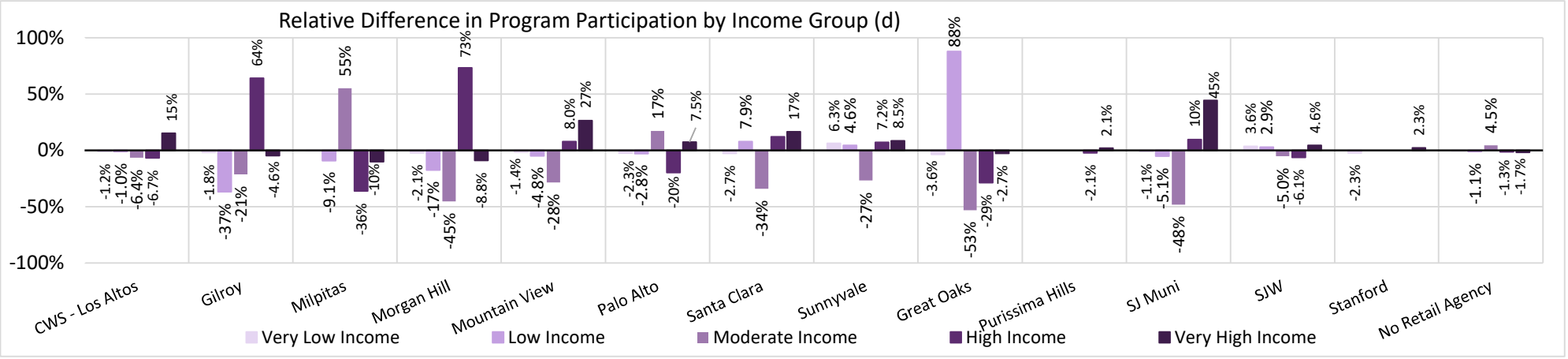


Table C-9
Graywater Programs Participation by Median Household Income
Valley Water, Water Conservation Strategic Plan



Abbreviations:

CWS = California Water Service
HCD = California Department of Housing and Community Development
MFD = multi-family dwelling
SJ Muni = San José Municipal Water System
SJW = San Jose Water

Notes:

(a) Household income is based on estimated 2018 median household income by Census Block Group, per Census (2020). Income level groupings are based on California Department of Housing and Community Development ("HCD") income levels for Santa Clara County for a 3-person household in 2018 (HCD, 2018). Low income includes extremely low and very low groupings. The average persons per household is 2.97 for Santa Clara County.
(b) Residential customers include both single-family and multi-family customers. Participants included in this analysis are limited to those for which location data are available.
(c) Several programs have had limited participation. The small sample size should be considered when evaluating these results.
(d) Relative difference is calculated as the percentage of program participation by income group minus the overall percentage of residential customers by income group within the retail agency boundary.

References:

1. Census, 2020. 2014-2018 American Community Survey (ACS) 5-year estimates. TIGER/Line Shapefiles by Block Group, https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-data.html, United States Census Bureau, downloaded July 2020.
2. HCD, 2018. Memorandum: State Income Limits for 2018, California Department of Housing and Community Development, dated 26 April 2018.

Table C-10

LRP Landscape Conversion and WBIC Rebates Program Participation by Median Household Income

Valley Water, Water Conservation Strategic Plan

Percentage of Participating Residential Customers by Retail Agency (b, c)	Number of Participants	Median Household Income (a)				
		Very Low Income <$59,850	Low Income $59,850 - $85,050	Moderate Income $85,050 - 135,250	High Income $135,250 - $169,050	Very High Income >$169,050
CWS - Los Altos	594	1.7%	0.17%	2.9%	14%	81%
City of Gilroy	194	0.52%	33%	13%	50%	3.6%
City of Milpitas	200	0.50%	7.0%	43%	41%	8.5%
City of Morgan Hill	405	0%	8.9%	54%	30%	6.7%
City of Mountain View	449	3.1%	1.8%	45%	15%	35%
City of Palo Alto	1,047	1.2%	1.8%	16%	17%	65%
City of Santa Clara	487	1.8%	8.2%	59%	22%	9.4%
City of Sunnyvale	824	2.5%	2.3%	17%	28%	50%
Great Oaks Water Company	327	0.31%	5.8%	54%	35%	4.9%
Purissima Hills Water District	71	0%	0%	0%	4.2%	96%
San José Municipal Water System	458	0.44%	7.0%	29%	20%	43%
San Jose Water Company	5,322	1.3%	7.0%	30%	25%	37%
Stanford University	67	0%	0%	0%	0%	100%
No Retail Agency	100	1.0%	8.0%	49%	21%	21%

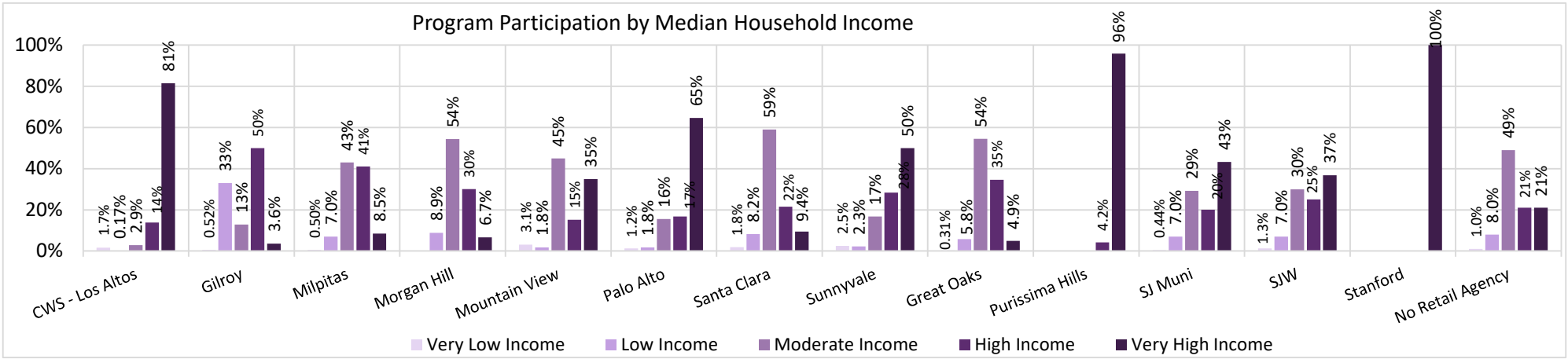
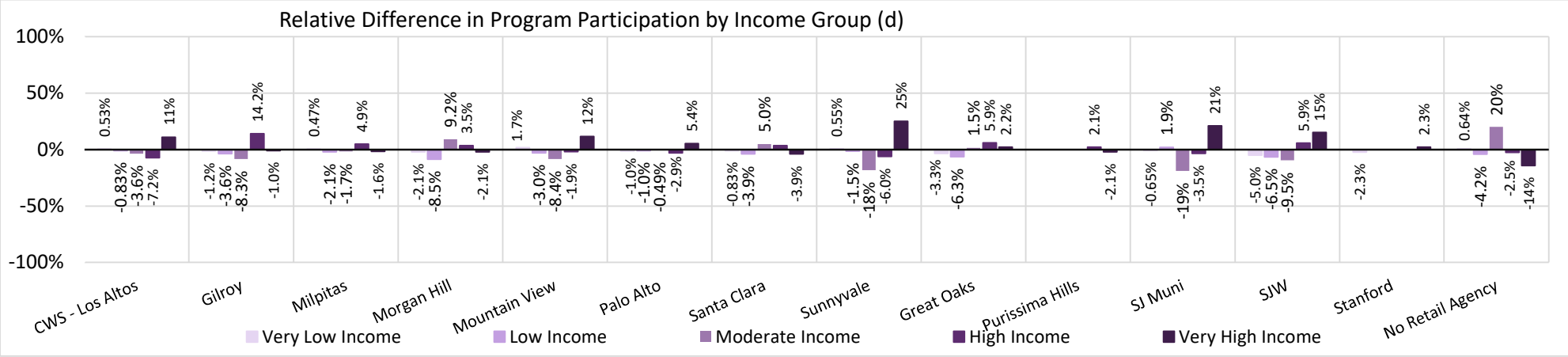


Table C-10

LRP Landscape Conversion and WBIC Rebates Program Participation by Median Household Income

Valley Water, Water Conservation Strategic Plan



Abbreviations:

CWS = California Water Service
HCD = California Department of Housing and Community Development
LRP = Landscape Rebate Program and Community Development
MFD = multi-family dwelling
SJ Muni = San José Municipal Water System
SJW = San Jose Water
WBIC = Weather-based irrigation controller

Notes:

(a) Household income is based on estimated 2018 median household income by Census Block Group, per Census (2020). Income level groupings are based on California Department of Housing and Community Development ("HCD") income levels for Santa Clara County for a 3-person household in 2018 (HCD, 2018). Low income includes extremely low and very low groupings. The average persons per household is 2.97 for Santa Clara County.

(b) Residential customers include both single-family and multi-family customers. Participants included in this analysis are limited to those for which location data are available.

(c) Relative difference is calculated as the percentage of program participation by income group minus the overall percentage of residential customers by income group within the retail agency boundary.

References:

1. Census, 2020. 2014-2018 American Community Survey (ACS) 5-year estimates. TIGER/Line Shapefiles by Block Group, https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-data.html, United States Census Bureau, downloaded July 2020.
2. HCD, 2018. Memorandum: State Income Limits for 2018, California Department of Housing and Community Development, dated 26 April 2018.

Table C-11

Submeter Rebate Program Participation by Median Household Income

Valley Water, Water Conservation Strategic Plan

Percentage of Participating Residential Customers by Retail Agency (b, c)	Number of Participants	Median Household Income (a)				
		Very Low Income <$59,850	Low Income $59,850 - $85,050	Moderate Income $85,050 - 135,250	High Income $135,250 - $169,050	Very High Income >$169,050
CWS - Los Altos	2	0%	0%	0%	100%	0%
City of Gilroy	--	--	--	--	--	--
City of Milpitas	1	0%	0%	100%	0%	0%
City of Morgan Hill	2	50%	0%	50%	0%	0%
City of Mountain View	3	0%	0%	100%	0%	0%
City of Palo Alto	--	--	--	--	--	--
City of Santa Clara	1	0%	100%	0%	0%	0%
City of Sunnyvale	8	0%	13%	50%	25%	13%
Great Oaks Water Company	--	--	--	--	--	--
Purissima Hills Water District	--	--	--	--	--	--
San José Municipal Water System	3	0%	67%	33%	0%	0%
San Jose Water Company	16	25%	31%	38%	0%	6.3%
Stanford University	--	--	--	--	--	--
No Retail Agency	--	--	--	--	--	--

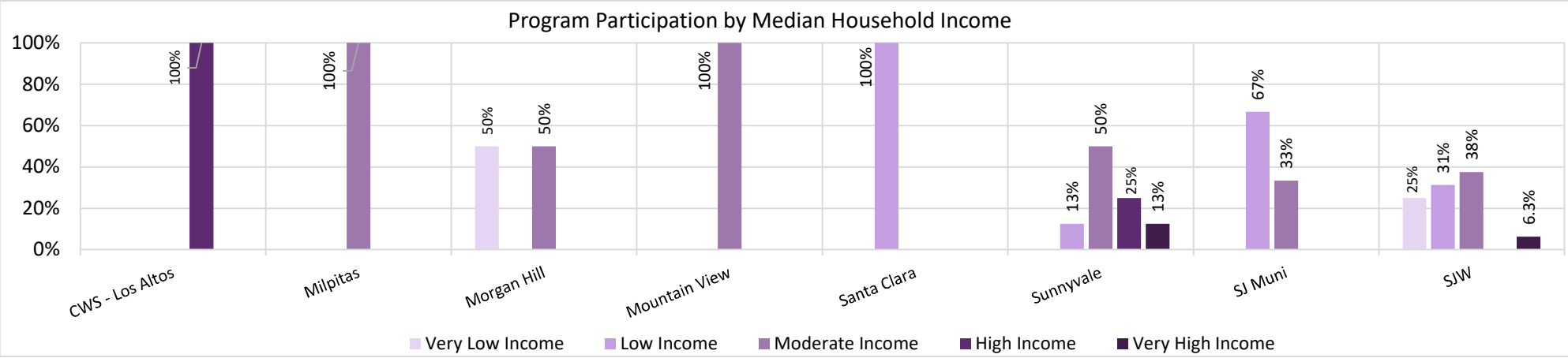
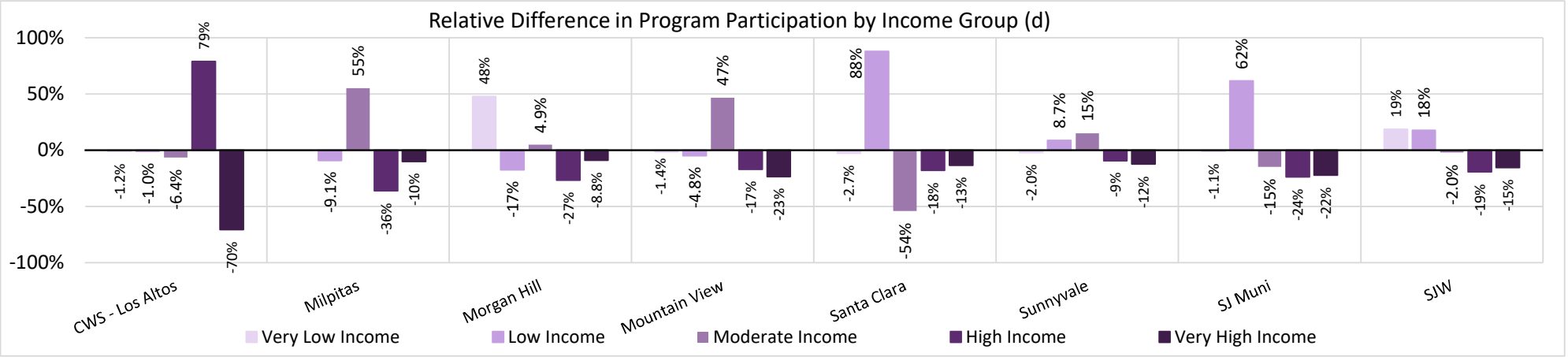


Table C-11

Submeter Rebate Program Participation by Median Household Income

Valley Water, Water Conservation Strategic Plan



Abbreviations:

CWS = California Water Service
HCD = California Department of Housing and Community Development
MFD = multi-family dwelling
SJ Muni = San José Municipal Water System
SJW = San Jose Water

Notes:

(a) Household income is based on estimated 2018 median household income by Census Block Group, per Census (2020). Income level groupings are based on California Department of Housing and Community Development ("HCD") income levels for Santa Clara County for a 3-person household in 2018 (HCD, 2018). Low income includes extremely low and very low groupings. The average persons per household is 2.97 for Santa Clara County.

(b) Residential customers include both single-family and multi-family customers. Participants included in this analysis are limited to those for which location data are available.

(c) Several programs have had limited participation. The small sample size should be considered when evaluating these results. For this program, only San Jose Water Company had more than 10 participants with available location data

(d) Relative difference is calculated as the percentage of program participation by income group minus the overall percentage of residential customers by income group within the retail agency boundary.

References:

1. Census, 2020. 2014-2018 American Community Survey (ACS) 5-year estimates. TIGER/Line Shapefiles by Block Group, https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-data.html, United States Census Bureau, downloaded July 2020.
2. HCD, 2018. Memorandum: State Income Limits for 2018, California Department of Housing and Community Development, dated 26 April 2018.

Table C-12

Water Wise Survey Program Participation by Median Household Income

Valley Water, Water Conservation Strategic Plan

Percentage of Participating Residential Customers by Retail Agency (b, c)	Number of Participants	Median Household Income (a)				
		Very Low Income <$59,850	Low Income $59,850 - $85,050	Moderate Income $85,050 - 135,250	High Income $135,250 - $169,050	Very High Income >$169,050
CWS - Los Altos	61	4.9%	0%	0%	11%	84%
City of Gilroy	20	5.0%	15%	10%	60%	10%
City of Milpitas	147	0%	6.8%	37%	44%	12%
City of Morgan Hill	56	0%	7.1%	54%	21%	18%
City of Mountain View	264	3.4%	2.7%	39%	11%	44%
City of Palo Alto	211	1.9%	0.47%	10%	17%	71%
City of Santa Clara	90	4.4%	6.7%	56%	21%	12%
City of Sunnyvale	64	4.7%	6.3%	20%	38%	31%
Great Oaks Water Company	36	0%	0%	58%	28%	14%
Purissima Hills Water District	8	0%	0%	0%	13%	88%
San José Municipal Water System	156	0%	3.2%	21%	17%	58%
San Jose Water Company	140	9.3%	10%	33%	20%	28%
Stanford University	10	0%	0%	0%	0%	100%
No Retail Agency	6	0%	17%	67%	17%	0%

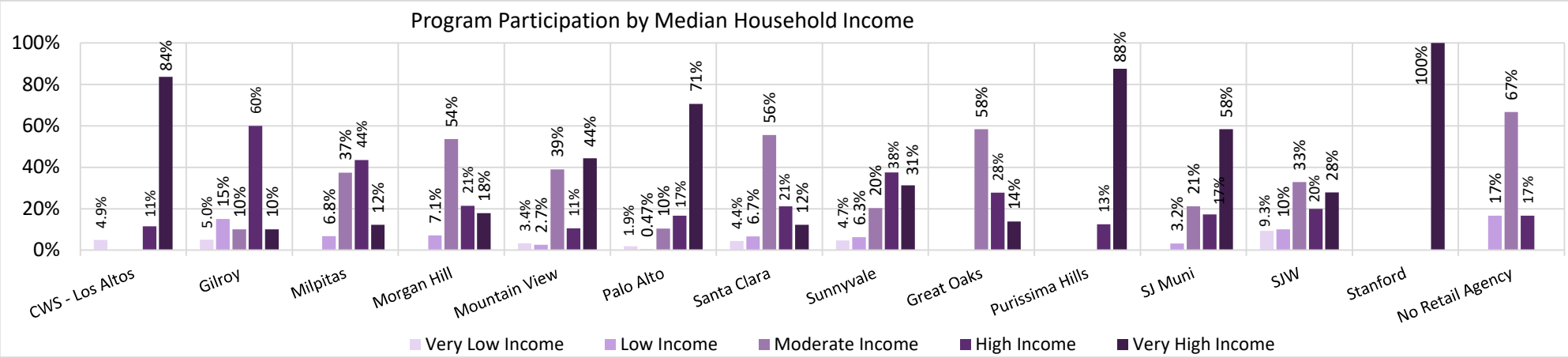
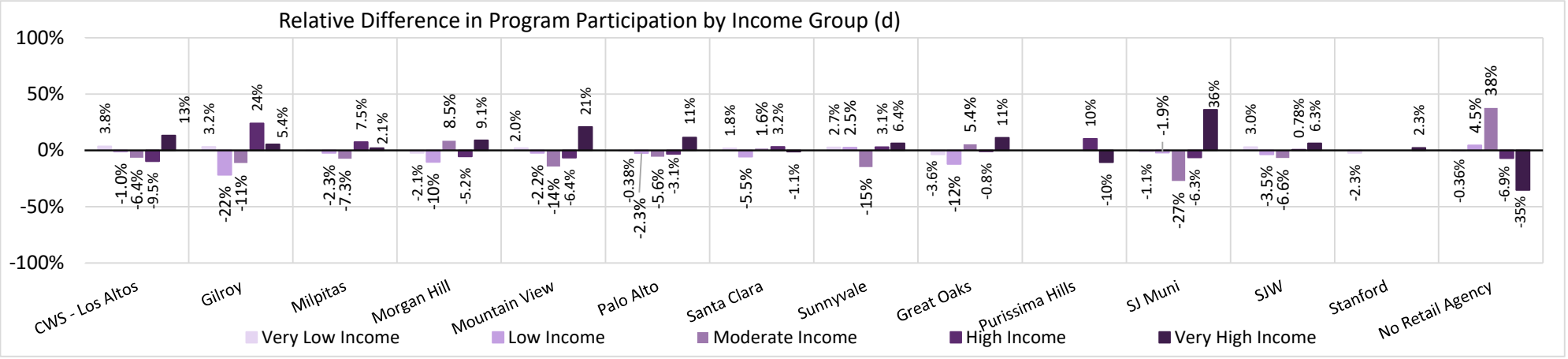


Table C-12

Water Wise Survey Program Participation by Median Household Income

Valley Water, Water Conservation Strategic Plan



Abbreviations:

CWS = California Water Service
CII = commercial, industrial, and institutional
HET = high efficiency toilets
HCD = California Department of Housing and Community Development
MFD = multi-family dwelling
SJ Muni = San José Municipal Water System
SJW = San Jose Water

Notes:

(a) Household income is based on estimated 2018 median household income by Census Block Group, per Census (2020). Income level groupings are based on California Department of Housing and Community Development ("HCD") income levels for Santa Clara County for a 3-person household in 2018 (HCD, 2018). Low income includes extremely low and very low groupings. The average persons per household is 2.97 for Santa Clara County.

(b) Residential customers include both single-family and multi-family customers. Participants included in this analysis are limited to those for which location data are available.

(c) Several programs have had limited participation. The small sample size should be considered when evaluating these results. For this program, Stanford University and Purissima Hills Water District had no more than 10 participants with available location data.

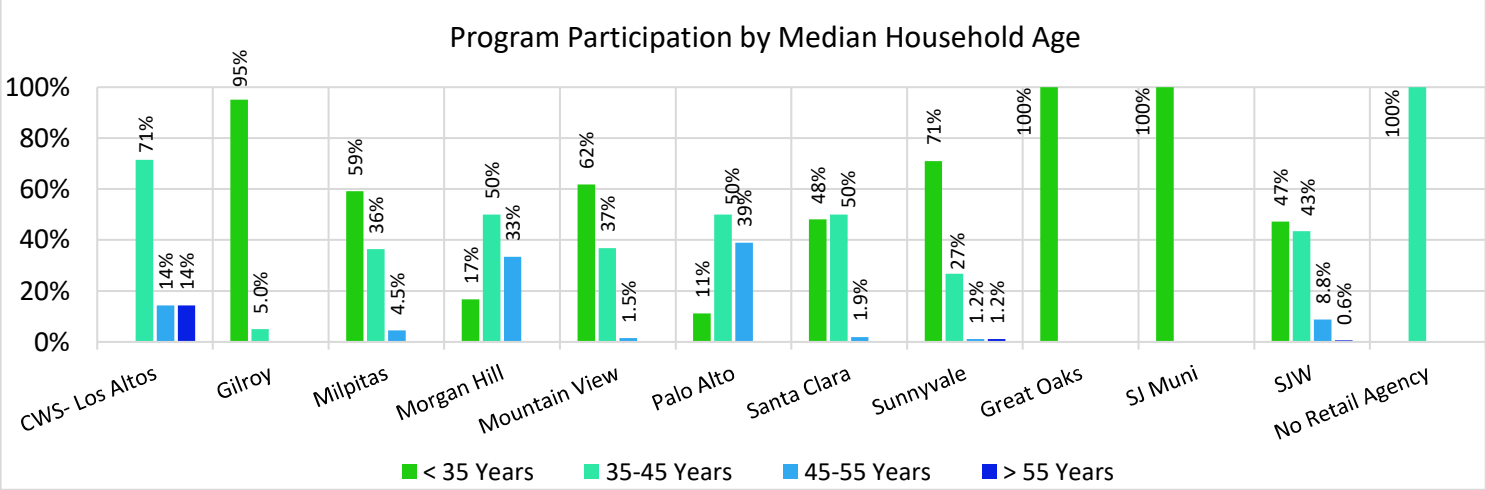
(d) Relative difference is calculated as the percentage of program participation by income group minus the overall percentage of residential customers by income group within the retail agency boundary.

References:

1. Census, 2020. 2014-2018 American Community Survey (ACS) 5-year estimates. TIGER/Line Shapefiles by Block Group, https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-data.html, United States Census Bureau, downloaded July 2020.
2. HCD, 2018. Memorandum: State Income Limits for 2018, California Department of Housing and Community Development, dated 26 April 2018.

Table C-13
HET Program Participation by Median Household Age
Valley Water, Water Conservation Strategic Plan

Percentage of Participating Residential Customers by Retail Agency (b, c)	Number of Participants	Median Household Age (a)			
		< 35 Years	35-45 Years	45-55 Years	> 55 Years
CWS - Los Altos	7	0%	71%	14%	14%
City of Gilroy	20	95%	5.0%	0%	0%
City of Milpitas	22	59%	36%	4.5%	0%
City of Morgan Hill	6	17%	50%	33%	0%
City of Mountain View	68	62%	37%	1.5%	0%
City of Palo Alto	54	11%	50%	39%	0%
City of Santa Clara	52	48%	50%	1.9%	0%
City of Sunnyvale	86	71%	27%	1.2%	1.2%
Great Oaks Water Company	1	100%	0%	0%	0%
Purissima Hills Water District	--	--	--	--	--
San José Municipal Water System	2	100%	0%	0%	0%
San Jose Water Company	159	47%	43%	8.8%	0.6%
Stanford University	--	--	--	--	--
No Retail Agency	1	0%	100%	0%	0%



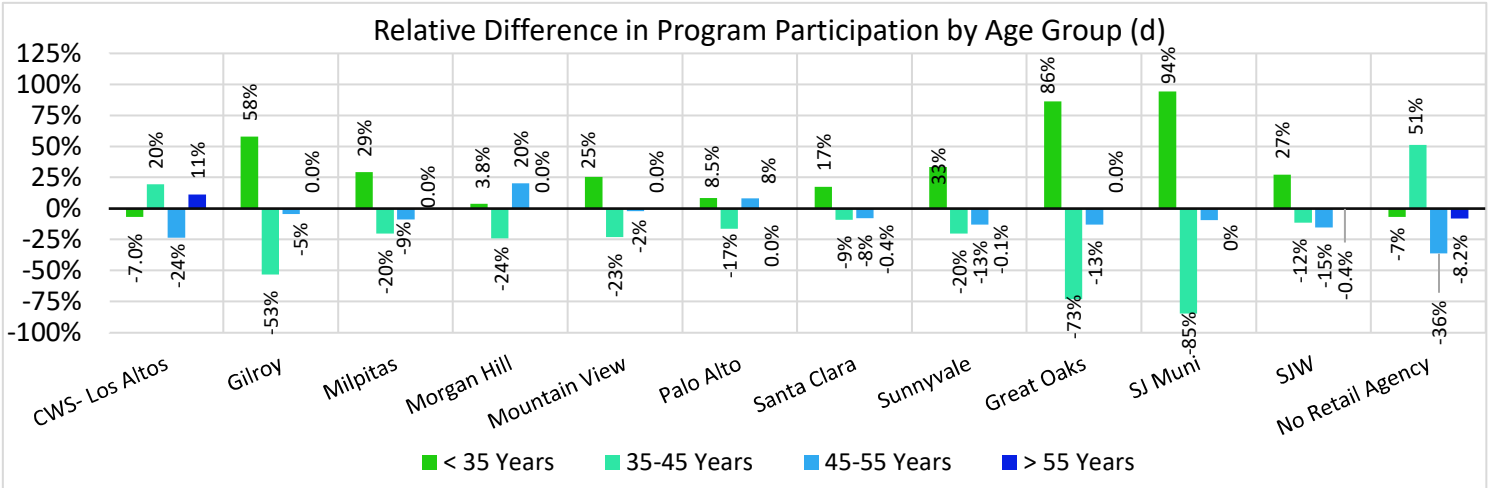


Table C-13
HET Program Participation by Median Household Age
Valley Water, Water Conservation Strategic Plan

Abbreviations:

CWS = California Water Service
CII = commercial, industrial, and institutional
HET = high efficiency toilets
MFD = multi-family dwelling
SJ Muni = San José Municipal Water System
SJW = San Jose Water

Notes:

(a) Median household age is based on the estimated median age of household members by Census Block Group, per Census (2020).

(b) Residential customers include both single-family and multi-family customers. Participants included in this analysis are limited to those for which location data are available.

(c) Several programs have had limited participation. The small sample size should be considered when evaluating these results. For this program, Stanford University and Purissima Hills Water District had no participants with available location data.

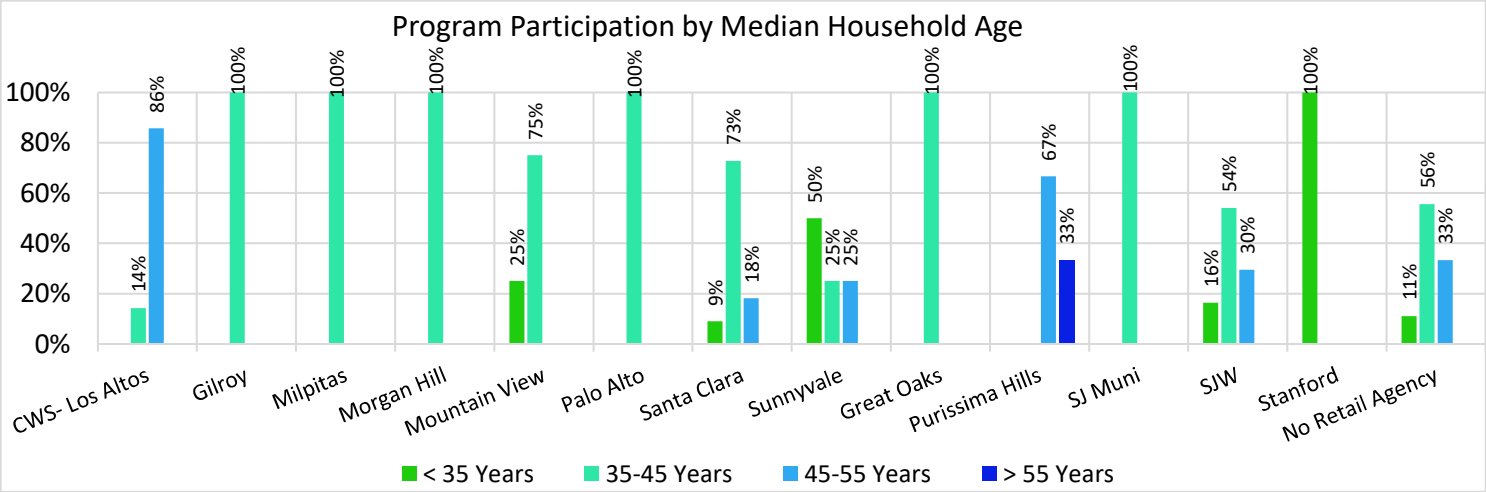
(d) Relative difference is calculated as the percentage of program participation by age group minus the overall percentage of residential customers by age group within the retail agency boundary.

References:

1. Census, 2020. 2014-2018 American Community Survey (ACS) 5-year estimates. TIGER/Line Shapefiles by Block Group, https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-data.html, United States Census Bureau, downloaded July 2020.

Table C-14
Graywater Programs Participation by Median Household Age
Valley Water, Water Conservation Strategic Plan

Percentage of Participating Residential Customers by Retail Agency (b, c)	Number of Participants	Median Household Age (a)			
		< 35 Years	35-45 Years	45-55 Years	> 55 Years
CWS - Los Altos	7	0%	14%	86%	0%
City of Gilroy	1	0%	100%	0%	0%
City of Milpitas	2	0%	100%	0%	0%
City of Morgan Hill	3	0%	100%	0%	0%
City of Mountain View	4	25%	75%	0%	0%
City of Palo Alto	3	0%	100%	0%	0%
City of Santa Clara	11	9%	73%	18%	0%
City of Sunnyvale	12	50%	25%	25%	0%
Great Oaks Water Company	1	0%	100%	0%	0%
Purissima Hills Water District	3	0%	0%	67%	33%
San José Municipal Water System	3	0%	100%	0%	0%
San Jose Water Company	61	16%	54%	30%	0%
Stanford University	1	100%	0%	0%	0%
No Retail Agency	9	11%	56%	33%	0%



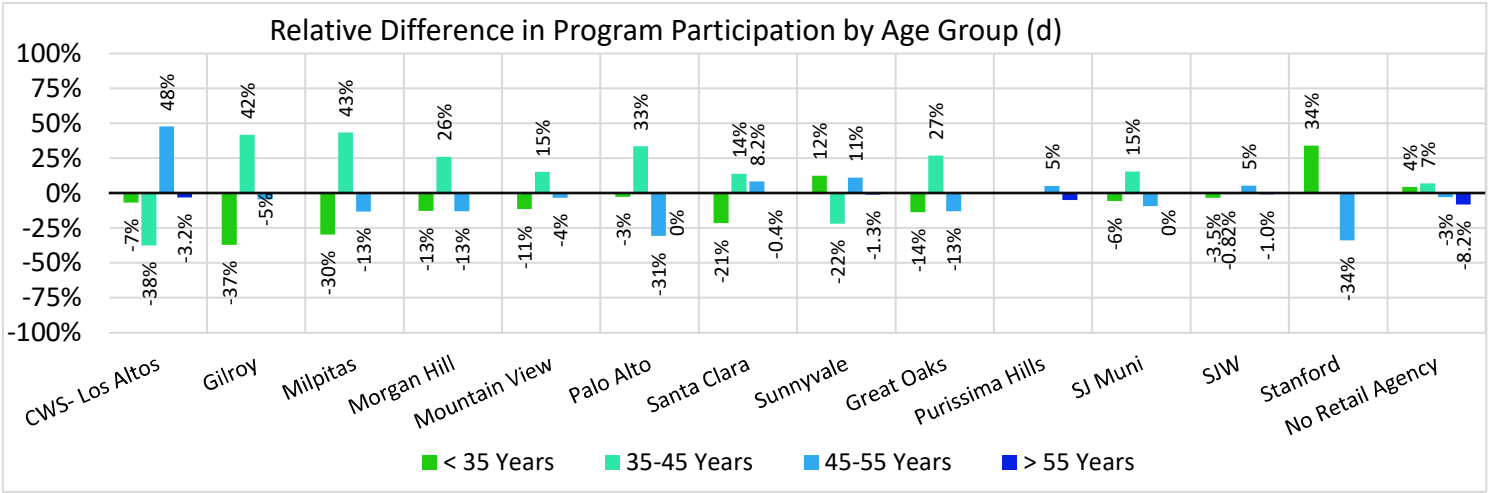


Table C-14
Graywater Programs Participation by Median Household Age
Valley Water, Water Conservation Strategic Plan

Abbreviations:

CWS = California Water Service
MFD = multi-family dwelling
SJ Muni = San José Municipal Water System
SJW = San Jose Water

Notes:

(a) Median household age is based on the estimated median age of household members by Census Block Group, per Census (2020).
(b) Residential customers include both single-family and multi-family customers. Participants included in this analysis are limited to those for which location data are available.
(c) Several programs have had limited participation. The small sample size should be considered when evaluating these results.
(d) Relative difference is calculated as the percentage of program participation by age group minus the overall percentage of residential customers by age group within the retail agency boundary.

References:

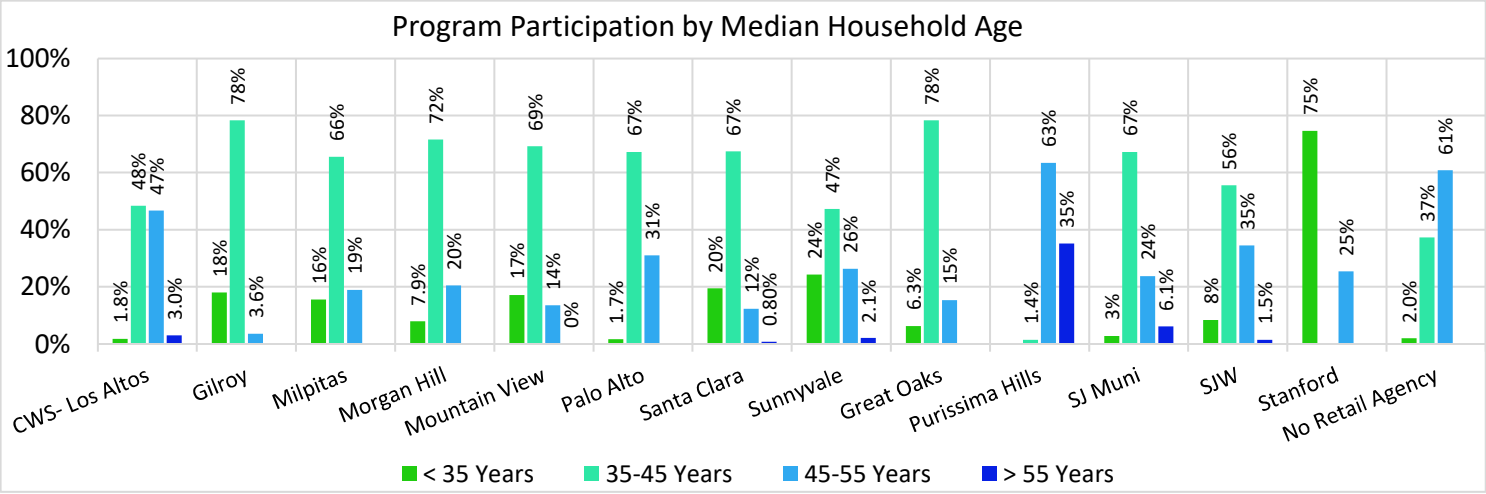
1. Census, 2020. 2014-2018 American Community Survey (ACS) 5-year estimates. TIGER/Line Shapefiles by Block Group, https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-data.html, United States Census Bureau, downloaded July 2020.

Table C-15

LRP Landscape Conversion and WBIC Rebates Program Participation by Median Household Age

Valley Water, Water Conservation Strategic Plan

Percentage of Participating Residential Customers by Retail Agency (b)	Number of Participants	Median Household Age (a)			
		< 35 Years	35-45 Years	45-55 Years	> 55 Years
CWS - Los Altos	601	1.8%	48%	47%	3.0%
City of Gilroy	194	18%	78%	3.6%	0%
City of Milpitas	206	16%	66%	19%	0%
City of Morgan Hill	405	7.9%	72%	20%	0%
City of Mountain View	449	17%	69%	14%	0%
City of Palo Alto	1,047	1.7%	67%	31%	0%
City of Santa Clara	497	20%	67%	12%	0.80%
City of Sunnyvale	840	24%	47%	26%	2.1%
Great Oaks Water Company	332	6.3%	78%	15%	0%
Purissima Hills Water District	71	0%	1.4%	63%	35%
San José Municipal Water System	458	3%	67%	24%	6.1%
San Jose Water Company	5,362	8%	56%	35%	1.5%
Stanford University	67	75%	0%	25%	0%
No Retail Agency	102	2.0%	37%	61%	0%



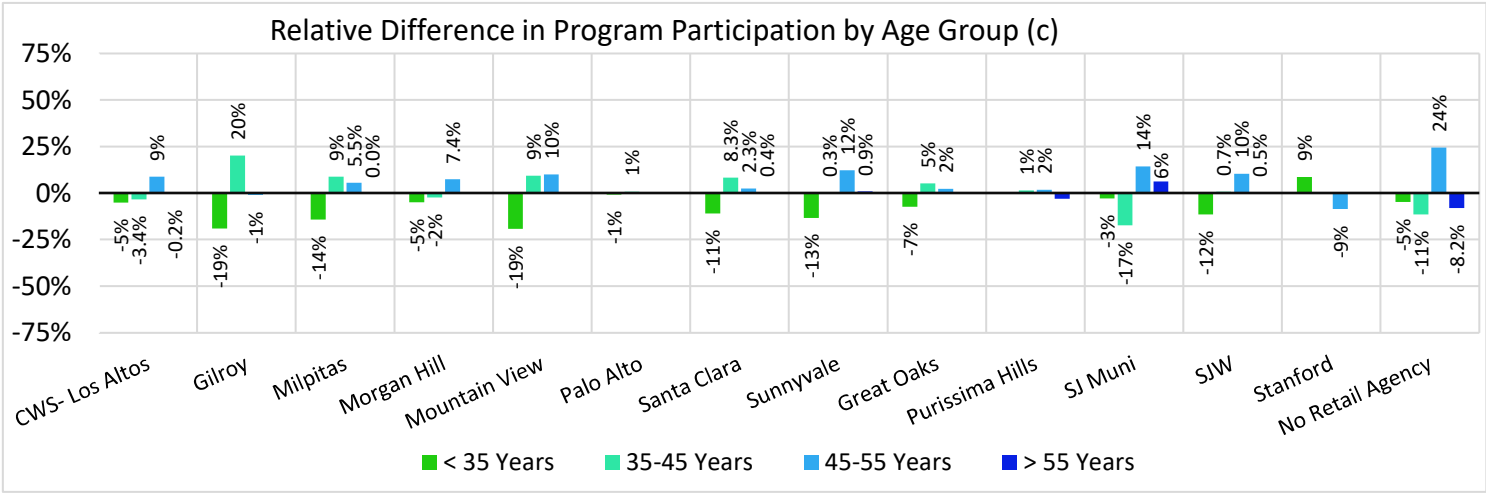


Table C-15

LRP Landscape Conversion and WBIC Rebates Program Participation by Median Household Age

Valley Water, Water Conservation Strategic Plan

Abbreviations:

CWS = California Water Service
LRP = Landscape Rebate Program
MFD = multi-family dwelling
SJ Muni = San José Municipal Water System
SJW = San Jose Water
WBIC = Weather-based irrigation controller

Notes:

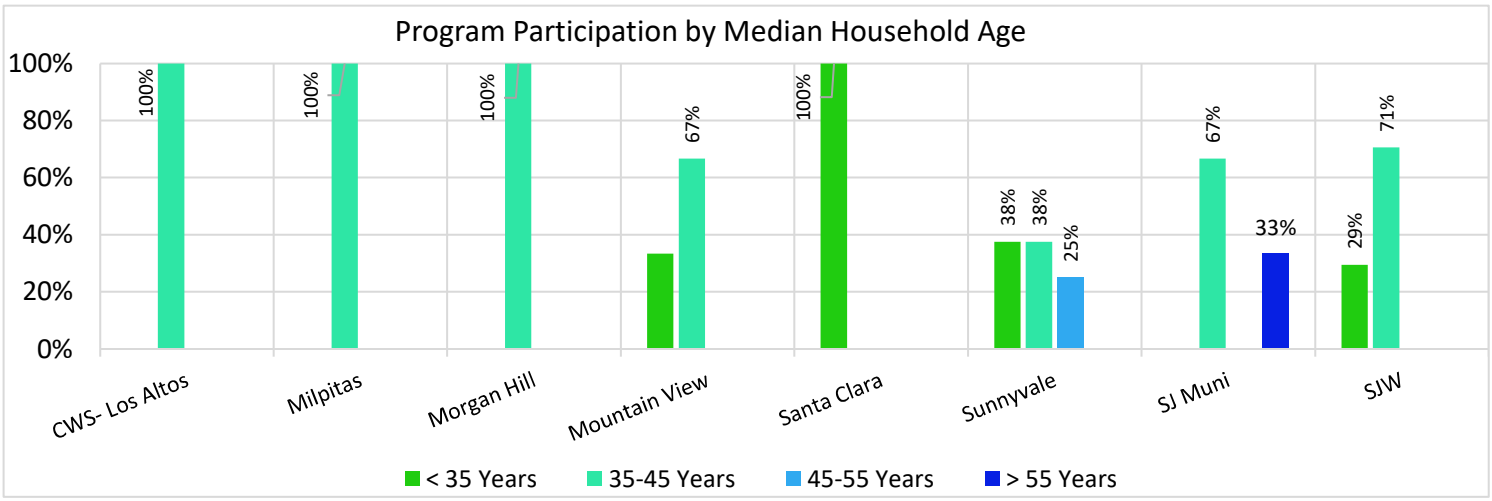
(a) Median household age is based on the estimated median age of household members by Census Block Group, per Census (2020).
(b) Residential customers include both single-family and multi-family customers. Participants included in this analysis are limited to those for which location data are available.
(c) Relative difference is calculated as the percentage of program participation by age group minus the overall percentage of residential customers by age group within the retail agency boundary.

References:

1. Census, 2020. 2014-2018 American Community Survey (ACS) 5-year estimates. TIGER/Line Shapefiles by Block Group, https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-data.html, United States Census Bureau, downloaded July 2020.

Table C-16
Submeter Rebate Program Participation by Median Household Age
Valley Water, Water Conservation Strategic Plan

Percentage of Participating Residential Customers by Retail Agency (b, c)	Number of Participants	Median Household Age (a)			
		< 35 Years	35-45 Years	45-55 Years	> 55 Years
CWS - Los Altos	2	0%	100%	0%	0%
City of Gilroy	--	--	--	--	--
City of Milpitas	1	0%	100%	0%	0%
City of Morgan Hill	2	0%	100%	0%	0%
City of Mountain View	3	33%	67%	0%	0%
City of Palo Alto	--	--	--	--	--
City of Santa Clara	1	100%	0%	0%	0%
City of Sunnyvale	8	38%	38%	25%	0%
Great Oaks Water Company	--	--	--	--	--
Purissima Hills Water District	--	--	--	--	--
San José Municipal Water System	3	0%	67%	0%	33%
San Jose Water Company	17	29%	71%	0%	0%
Stanford University	--	--	--	--	--
No Retail Agency	--	--	--	--	--



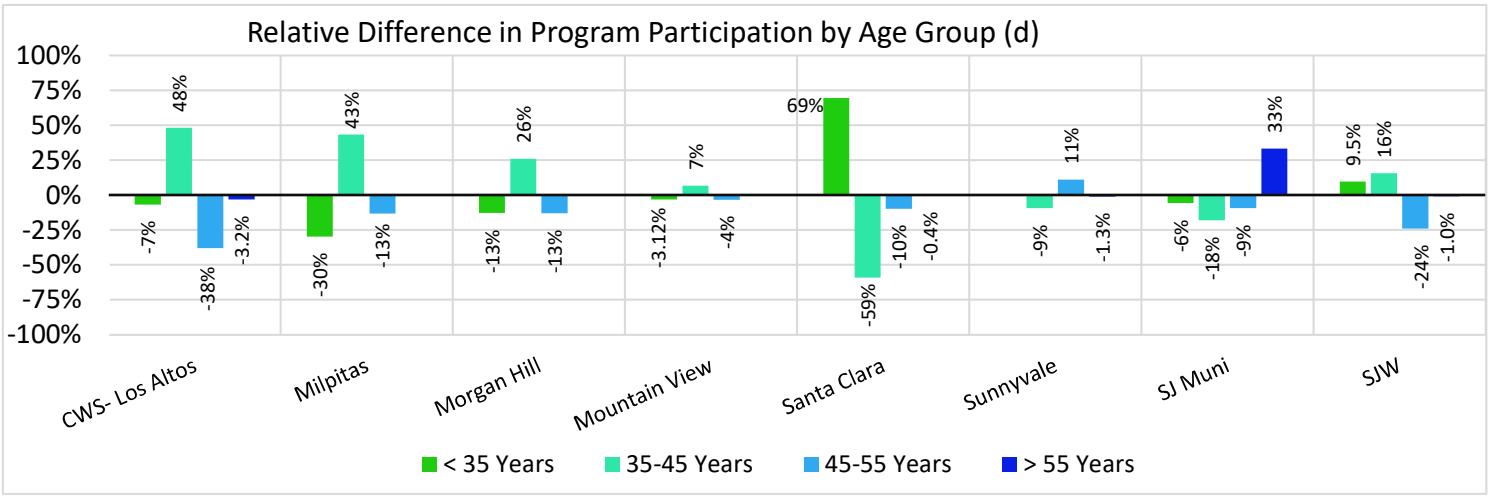


Table C-16
Submeter Rebate Program Participation by Median Household Age
Valley Water, Water Conservation Strategic Plan

Abbreviations:

CWS = California Water Service
MFD = multi-family dwelling
SJ Muni = San José Municipal Water System
SJW = San Jose Water

Notes:

(a) Median household age is based on the estimated median age of household members by Census Block Group, per Census (2020).
(b) Residential customers include both single-family and multi-family customers. Participants included in this analysis are limited to those for which location data are available.
(c) Several programs have had limited participation. The small sample size should be considered when evaluating these results. For this program, only San Jose Water Company had more than 10 participants with available location data.

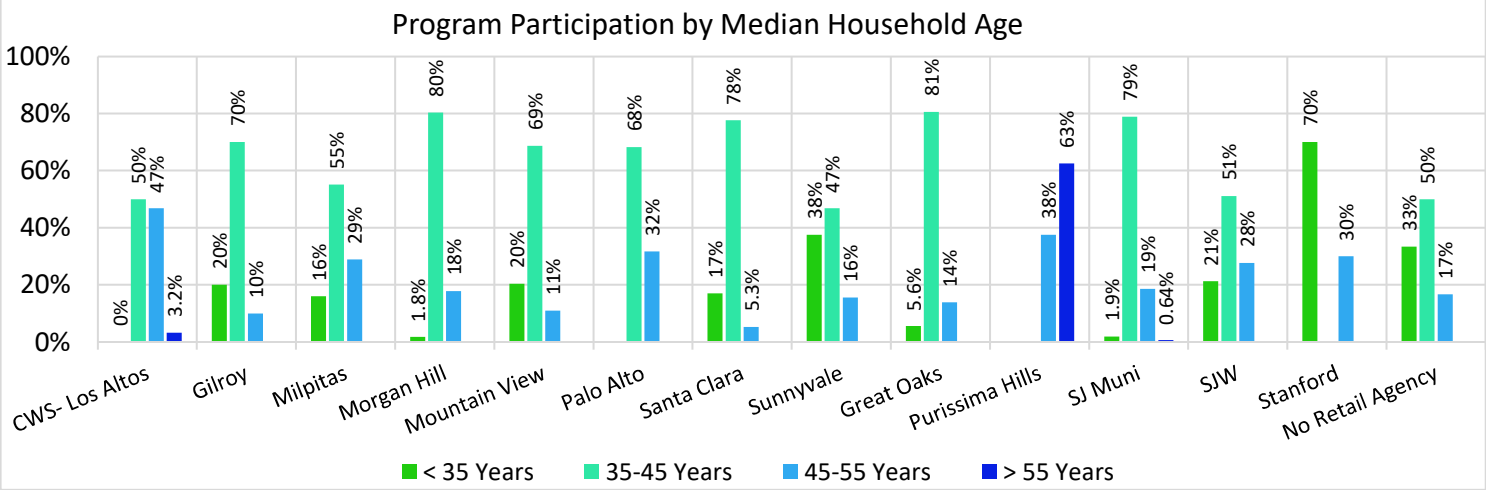
(d) Relative difference is calculated as the percentage of program participation by age group minus the overall percentage of residential customers by age group within the retail agency boundary.

References:

1. Census, 2020. 2014-2018 American Community Survey (ACS) 5-year estimates. TIGER/Line Shapefiles by Block Group, https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-data.html, United States Census Bureau, downloaded July 2020.

Table C-17
Water Wise Survey Program Participation by Median Household Age
Valley Water, Water Conservation Strategic Plan

Percentage of Participating Residential Customers by Retail Agency (b, c)	Number of Participants	Median Household Age (a)			
		< 35 Years	35-45 Years	45-55 Years	> 55 Years
CWS - Los Altos	62	0%	50%	47%	3.2%
City of Gilroy	20	20%	70%	10%	0%
City of Milpitas	156	16%	55%	29%	0%
City of Morgan Hill	56	1.8%	80%	18%	0%
City of Mountain View	265	20%	69%	11%	0%
City of Palo Alto	211	0%	68%	32%	0%
City of Santa Clara	94	17%	78%	5.3%	0%
City of Sunnyvale	64	38%	47%	16%	0%
Great Oaks Water Company	36	5.6%	81%	14%	0%
Purissima Hills Water District	8	0%	0%	38%	63%
San José Municipal Water System	156	1.9%	79%	19%	0.64%
San Jose Water Company	141	21%	51%	28%	0%
Stanford University	10	70%	0%	30%	0%
No Retail Agency	6	33%	50%	17%	0%



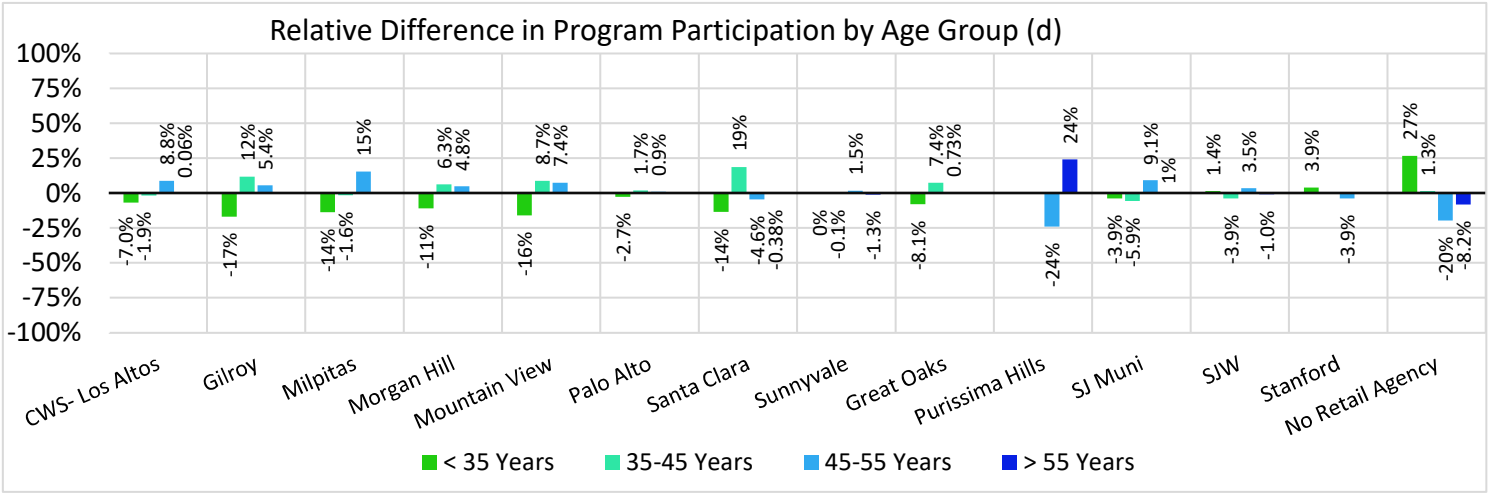


Table C-17
Water Wise Survey Program Participation by Median Household Age
Valley Water, Water Conservation Strategic Plan

Abbreviations:

CWS = California Water Service
MFD = multi-family dwelling
SJ Muni = San José Municipal Water System
SJW = San Jose Water

Notes:

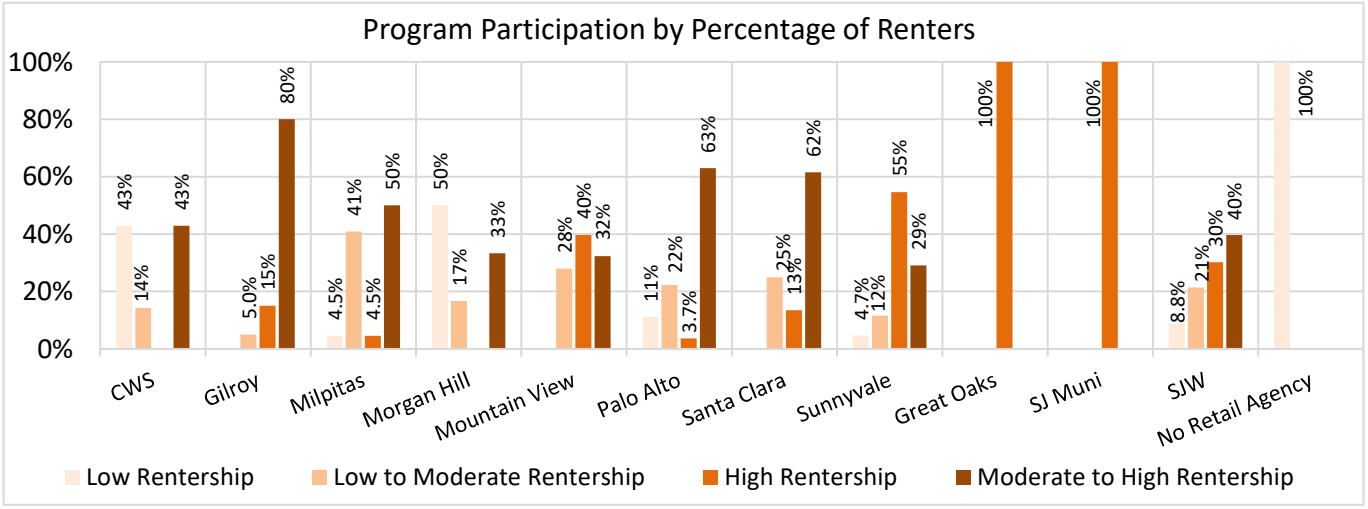
(a) Median household age is based on the estimated median age of household members by Census Block Group, per Census (2020).
(b) Residential customers include both single-family and multi-family customers. Participants included in this analysis are limited to those for which location data are available.
(c) Several programs have had limited participation. The small sample size should be considered when evaluating these results. For this program, Stanford University and Purissima Hills Water District had no more than 10 participants with available location data.
(d) Relative difference is calculated as the percentage of program participation by age group minus the overall percentage of residential customers by age group within the retail agency boundary.

References:

1. Census, 2020. 2014-2018 American Community Survey (ACS) 5-year estimates. TIGER/Line Shapefiles by Block Group, https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-data.html, United States Census Bureau, downloaded July 2020.

Table C-18
HET Program Participation by Percentage of Renters
Valley Water, Water Conservation Strategic Plan

Percentage of Participating Residential Customers by Retail Agency (b, c)	Number of Participants	Percentage of Renters (a)			
		Low Rentership ≤25%	Low to Moderate Rentership 25.1%-50%	Moderate to High Rentership 50.1%-75%	High Rentership ≥75%
CWS - Los Altos	7	43%	14%	43%	0%
City of Gilroy	20	0%	5.0%	80%	15%
City of Milpitas	22	4.5%	41%	50%	4.5%
City of Morgan Hill	6	50%	17%	33%	0%
City of Mountain View	68	0%	28%	32%	40%
City of Palo Alto	54	11%	22%	63%	3.7%
City of Santa Clara	52	0%	25%	62%	13%
City of Sunnyvale	86	4.7%	12%	29%	55%
Great Oaks Water Company	1	0%	0%	0%	100%
Purissima Hills Water District	--	--	--	--	--
San José Municipal Water System	2	0%	0%	0%	100%
San Jose Water Company	159	8.8%	21%	40%	30%
Stanford University	--	--	--	--	--
No Retail Agency	1	100%	0%	0%	0%



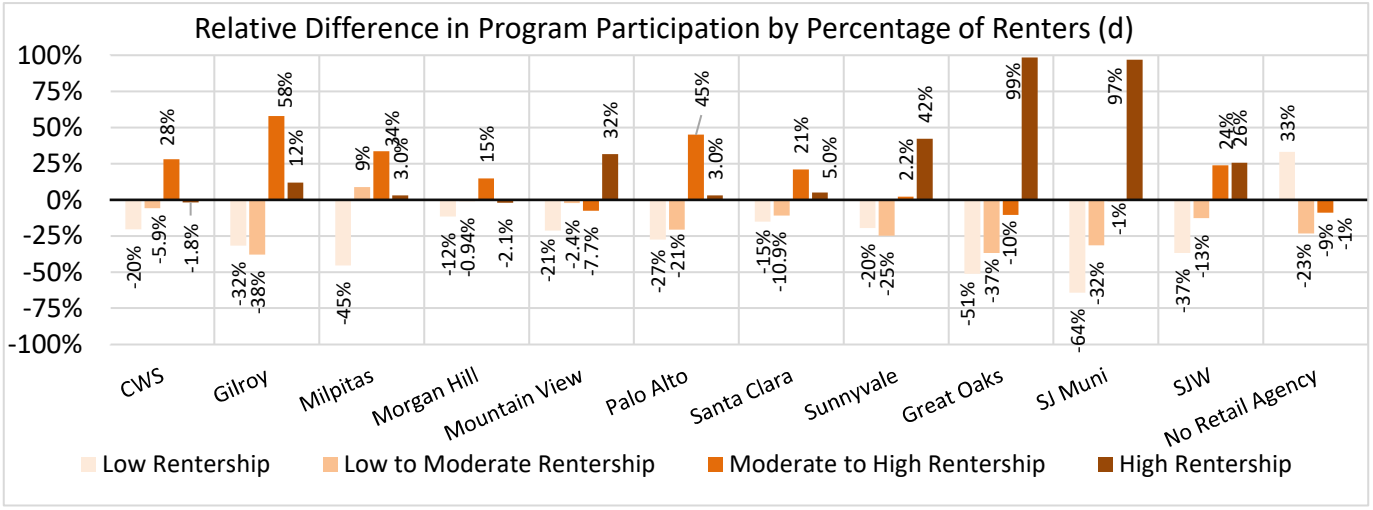


Table C-18
HET Program Participation by Percentage of Renters
Valley Water, Water Conservation Strategic Plan

Abbreviations:

CWS = California Water Service
CII = commercial, industrial, and institutional
HET = high efficiency toilets
MFD = multi-family dwelling
SJ Muni = San José Municipal Water System
SJW = San Jose Water

Notes:

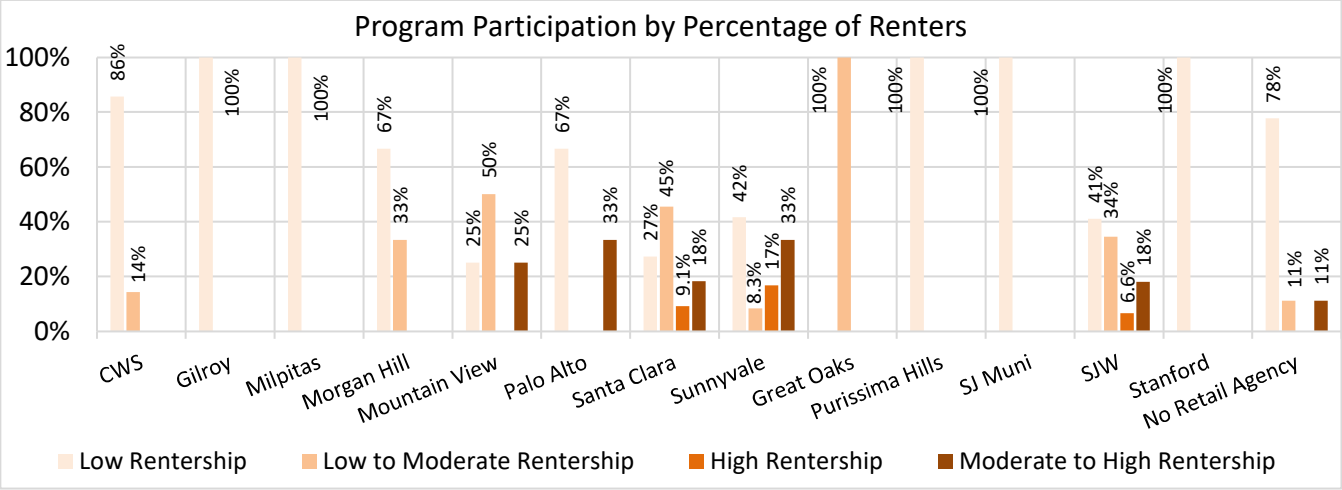
(a) Percentage of renters reflects the proportion of population within a given Census Block Group that lives in renter-occupied homes. A low percentage of renters indicates an area that consists predominantly of owner-occupied homes; high percentage of renters indicates an area that consists predominantly of renter-occupied homes. Percentage of renter-occupied housing units is based on the estimated 2018 number of renter-occupied housing units by Census Block Group, per Census (2020).
(b) Residential customers include both single-family and multi-family customers. Participants included in this analysis are limited to those for which location data are available.
(c) Several programs have had limited participation. The small sample size should be considered when evaluating these results. For this program, Stanford University and Purissima Hills Water District had no participants with available location data.
(d) Relative difference is calculated as the percentage of program participation by rentership group minus the overall percentage of residential customers by rentership group within the retail agency boundary.

References:

1. Census, 2020. 2014-2018 American Community Survey (ACS) 5-year estimates. TIGER/Line Shapefiles by Block Group, https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-data.html, United States Census Bureau, downloaded July 2020.

Table C-19
Graywater Programs Participation by Percentage of Renters
Valley Water, Water Conservation Strategic Plan

Percentage of Participating Residential Customers by Retail Agency (b, c)	Number of Participants	Percentage of Renters (a)			
		Low Rentership ≤25%	Low to Moderate Rentership 25.1%-50%	Moderate to High Rentership 50.1%-75%	High Rentership ≥75%
CWS - Los Altos	7	86%	14%	0%	0%
City of Gilroy	1	100%	0%	0%	0%
City of Milpitas	2	100%	0%	0%	0%
City of Morgan Hill	3	67%	33%	0%	0%
City of Mountain View	4	25%	50%	25%	0%
City of Palo Alto	3	67%	0%	33%	0%
City of Santa Clara	11	27%	45%	18%	9.1%
City of Sunnyvale	12	42%	8.3%	33%	17%
Great Oaks Water Company	1	0%	100%	0%	0%
Purissima Hills Water District	3	100%	0%	0%	0%
San José Municipal Water System	3	100%	0%	0%	0%
San Jose Water Company	61	41%	34%	18%	6.6%
Stanford University	1	100%	0%	0%	0%
No Retail Agency	9	78%	11%	11%	0%



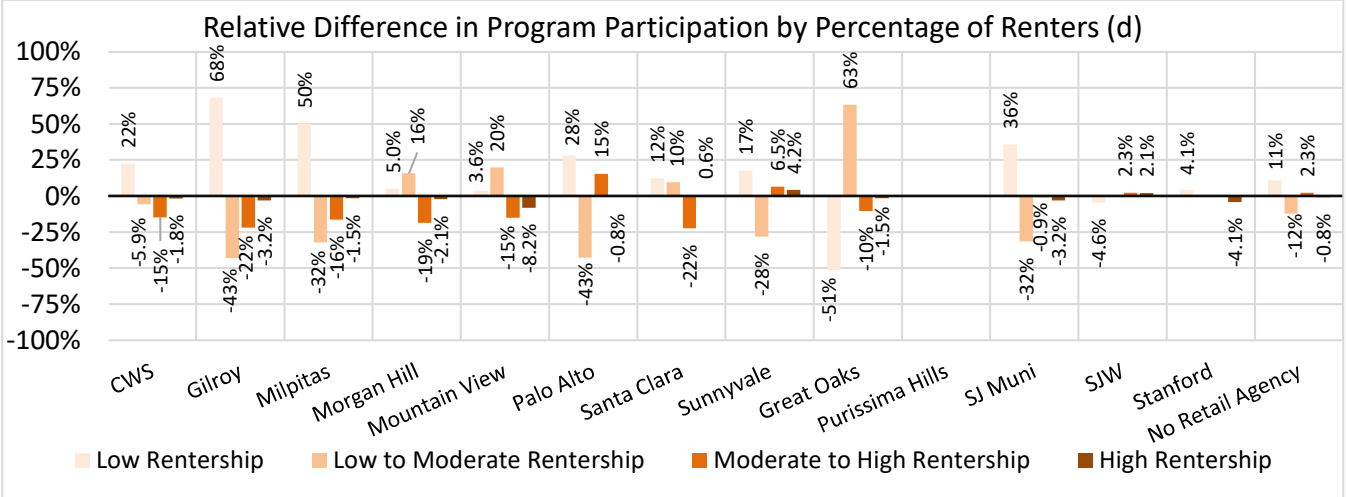


Table C-19
Graywater Programs Participation by Percentage of Renters
Valley Water, Water Conservation Strategic Plan

Abbreviations:

CWS = California Water Service
CII = commercial, industrial, and institutional
HET = high efficiency toilets
MFD = multi-family dwelling
SJ Muni = San José Municipal Water System
SJW = San Jose Water

Notes:

(a) Percentage of renters reflects the proportion of population within a given Census Block Group that lives in renter-occupied homes. A low percentage of renters indicates an area that consists predominantly of owner-occupied homes; high percentage of renters indicates an area that consists predominantly of renter-occupied homes. Percentage of renter-occupied housing units is based on the estimated 2018 number of renter-occupied housing units by Census Block Group, per Census (2020).
(b) Residential customers include both single-family and multi-family customers. Participants included in this analysis are limited to those for which location data are available.
(c) Several programs have had limited participation. The small sample size should be considered when evaluating these results.
(d) Relative difference is calculated as the percentage of program participation by rentership group minus the overall percentage of residential customers by rentership group within the retail agency boundary.

References:

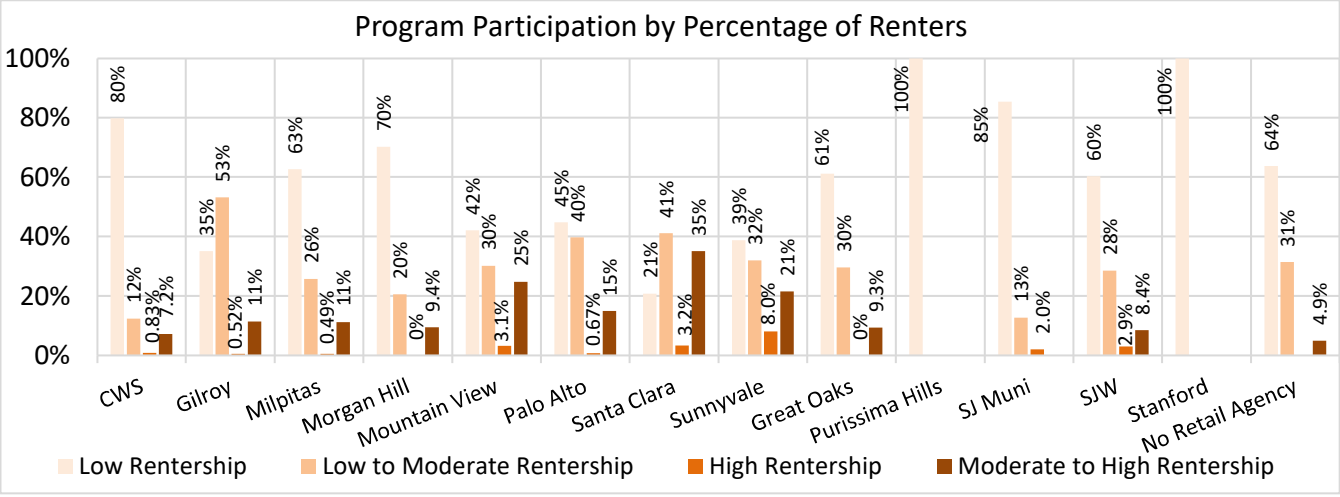
1. Census, 2020. 2014-2018 American Community Survey (ACS) 5-year estimates. TIGER/Line Shapefiles by Block Group, https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-data.html, United States Census Bureau, downloaded July 2020.

Table C-20

LRP Landscape Conversion and WBIC Rebates Program Participation by Percentage of Renters

Valley Water, Water Conservation Strategic Plan

Percentage of Participating Residential Customers by Retail Agency (b)	Number of Participants	Percentage of Renters (a)			
		Low Rentership ≤25%	Low to Moderate Rentership 25.1%-50%	Moderate to High Rentership 50.1%-75%	High Rentership ≥75%
CWS - Los Altos	601	80%	12%	7.2%	0.83%
City of Gilroy	194	35%	53%	11%	0.52%
City of Milpitas	206	63%	26%	11%	0.49%
City of Morgan Hill	405	70%	20%	9.4%	0%
City of Mountain View	449	42%	30%	25%	3.1%
City of Palo Alto	1,047	45%	40%	15%	0.67%
City of Santa Clara	497	21%	41%	35%	3.2%
City of Sunnyvale	840	39%	32%	21%	8.0%
Great Oaks Water Company	332	61%	30%	9.3%	0%
Purissima Hills Water District	71	100%	0%	0%	0%
San José Municipal Water System	458	85%	13%	0%	2.0%
San Jose Water Company	5,362	60%	28%	8.4%	2.9%
Stanford University	67	100%	0%	0%	0%
No Retail Agency	102	64%	31%	4.9%	0%



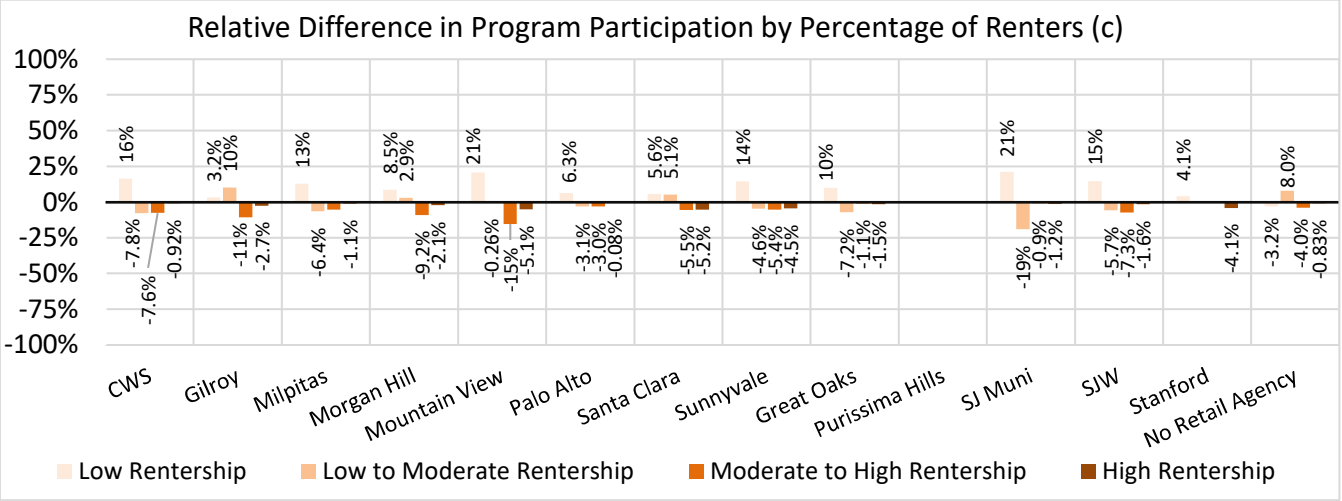


Table C-20

LRP Landscape Conversion and WBIC Rebates Program Participation by Percentage of Renters

Valley Water, Water Conservation Strategic Plan

Abbreviations:

CWS = California Water Service
CII = commercial, industrial, and institutional
HET = high efficiency toilets
HCD = California Department of Housing and Community Development
LRP = Landscape Rebate Program
MFD = multi-family dwelling
SJ Muni = San José Municipal Water System
SJW = San Jose Water

Notes:

(a) Percentage of renters reflects the proportion of population within a given Census Block Group that lives in renter-occupied homes. A low percentage of renters indicates an area that consists predominantly of owner-occupied homes; high percentage of renters indicates an area that consists predominantly of renter-occupied homes. Percentage of renter-occupied housing units is based on the estimated 2018 number of renter-occupied housing units by Census Block Group, per Census (2020).

(b) Residential customers include both single-family and multi-family customers. Participants included in this analysis are limited to those for which location data are available.

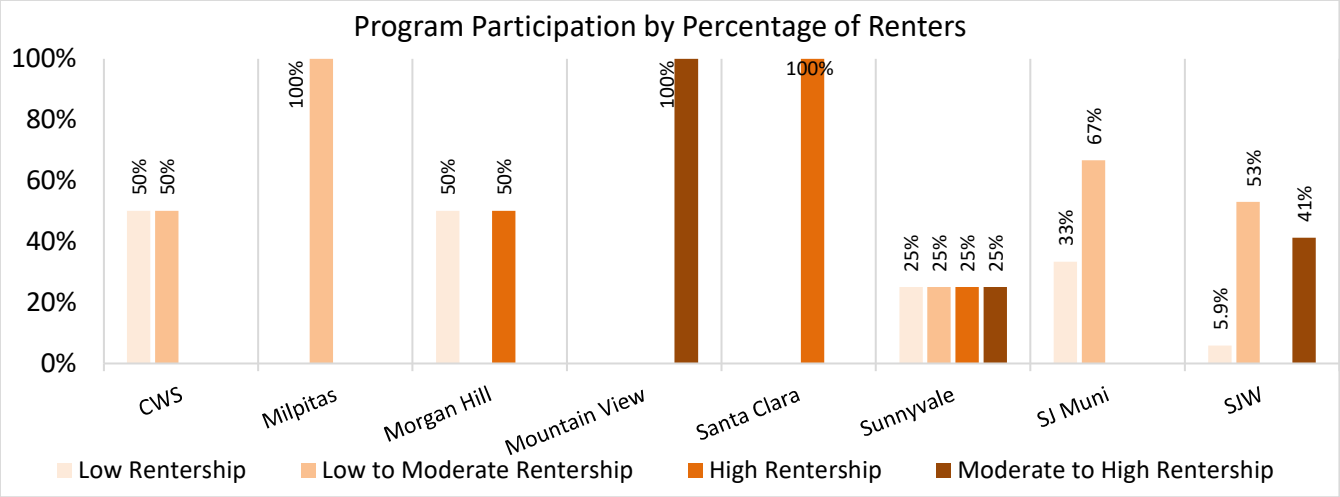
(c) Relative difference is calculated as the percentage of program participation by rentership group minus the overall percentage of residential customers by rentership group within the retail agency boundary.

References:

1. Census, 2020. 2014-2018 American Community Survey (ACS) 5-year estimates. TIGER/Line Shapefiles by Block Group, https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-data.html, United States Census Bureau, downloaded July 2020.

Table C-21
Submeter Rebate Program Participation by Percentage of Renters
Valley Water, Water Conservation Strategic Plan

Percentage of Participating Residential Customers by Retail Agency (b, c)	Number of Participants	Percentage of Renters (a)			
		Low Rentership ≤25%	Low to Moderate Rentership 25.1%-50%	Moderate to High Rentership 50.1%-75%	High Rentership ≥75%
CWS - Los Altos	2	50%	50%	0%	0%
City of Gilroy	--	--	--	--	--
City of Milpitas	1	0%	100%	0%	0%
City of Morgan Hill	2	50%	0%	0%	50%
City of Mountain View	3	0%	0%	100%	0%
City of Palo Alto	--	--	--	--	--
City of Santa Clara	1	0%	0%	0%	100%
City of Sunnyvale	8	25%	25%	25%	25%
Great Oaks Water Company	--	--	--	--	--
Purissima Hills Water District	--	--	--	--	--
San José Municipal Water System	3	33%	67%	0%	0%
San Jose Water Company	17	5.9%	53%	41%	0%
Stanford University	--	--	--	--	--
No Retail Agency	--	--	--	--	--



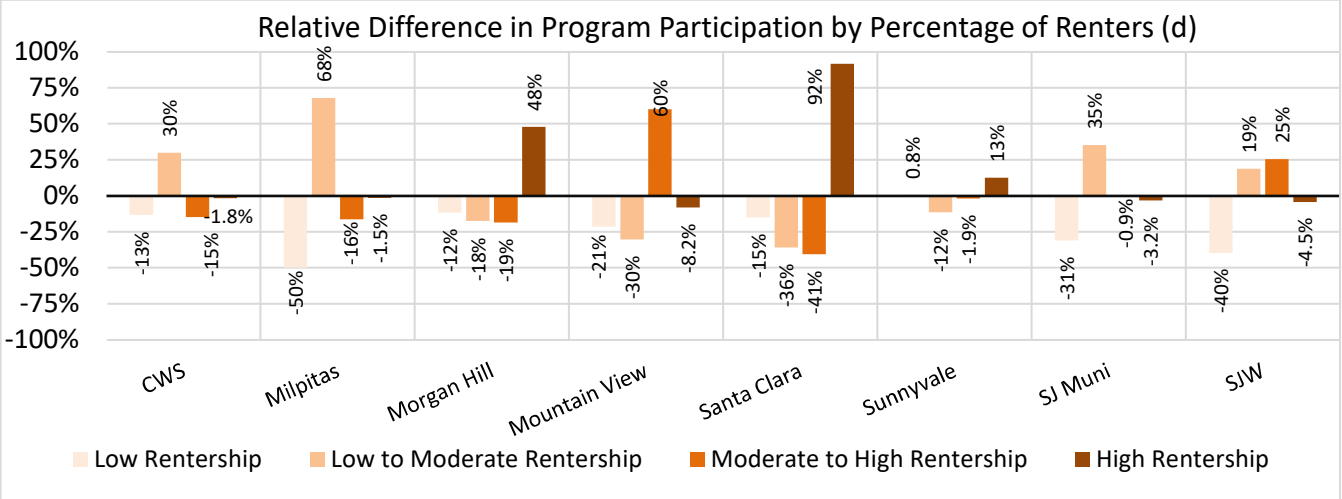


Table C-21
Submeter Rebate Program Participation by Percentage of Renters
Valley Water, Water Conservation Strategic Plan

Abbreviations:

CWS = California Water Service
CII = commercial, industrial, and institutional
HET = high efficiency toilets
HCD = California Department of Housing and Community Development
MFD = multi-family dwelling
SJ Muni = San José Municipal Water System
SJW = San Jose Water

Notes:

(a) Percentage of renters reflects the proportion of population within a given Census Block Group that lives in renter-occupied homes. A low percentage of renters indicates an area that consists predominantly of owner-occupied homes; high percentage of renters indicates an area that consists predominantly of renter-occupied homes. Percentage of renter-occupied housing units is based on the estimated 2018 number of renter-occupied housing units by Census Block Group, per Census (2020).

(b) Residential customers include both single-family and multi-family customers. Participants included in this analysis are limited to those for which location data are available.

(c) Several programs have had limited participation. The small sample size should be considered when evaluating these results. For this program, only San Jose Water Company had more than 10 participants with available location data.

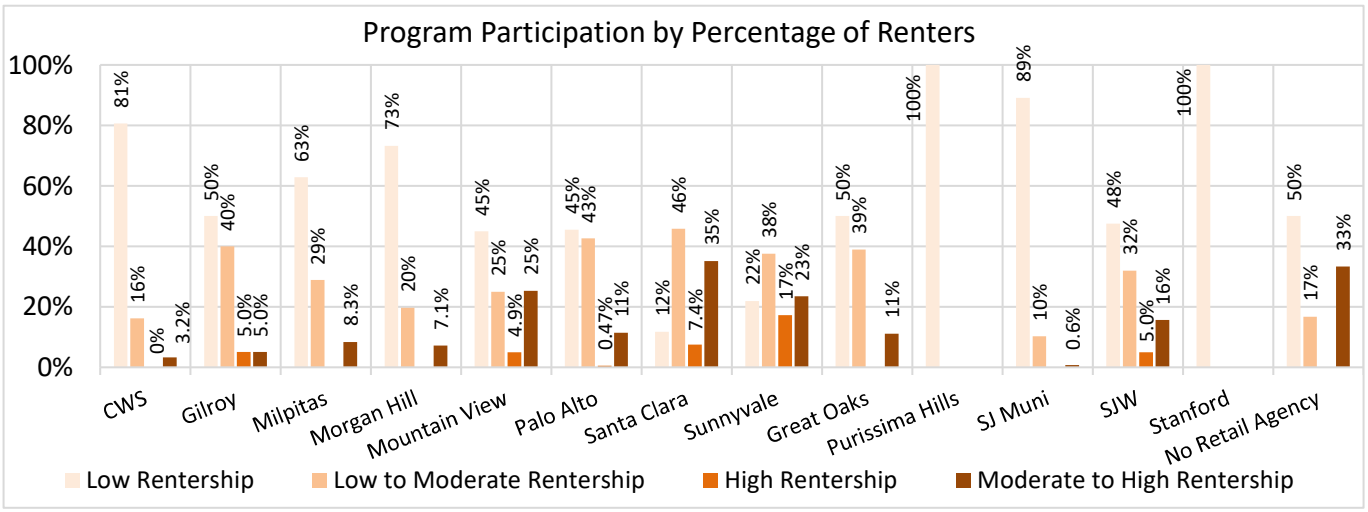
(d) Relative difference is calculated as the percentage of program participation by rentership group minus the overall percentage of residential customers by rentership group within the retail agency boundary.

References:

1. Census, 2020. 2014-2018 American Community Survey (ACS) 5-year estimates. TIGER/Line Shapefiles by Block Group, https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-data.html, United States Census Bureau, downloaded July 2020.

Table C-22
Water Wise Survey Program Participation by Percentage of Renters
Valley Water, Water Conservation Strategic Plan

Percentage of Participating Residential Customers by Retail Agency (b, c)	Number of Participants	Percentage of Renters (a)			
		Low Rentership ≤25%	Low to Moderate Rentership 25.1%-50%	Moderate to High Rentership 50.1%-75%	High Rentership ≥75%
CWS - Los Altos	62	81%	16%	3.2%	0%
City of Gilroy	20	50%	40%	5.0%	5.0%
City of Milpitas	156	63%	29%	8.3%	0%
City of Morgan Hill	56	73%	20%	7.1%	0%
City of Mountain View	265	45%	25%	25%	4.9%
City of Palo Alto	211	45%	43%	11%	0.47%
City of Santa Clara	94	12%	46%	35%	7.4%
City of Sunnyvale	64	22%	38%	23%	17%
Great Oaks Water Company	36	50%	39%	11%	0%
Purissima Hills Water District	8	100%	0%	0%	0%
San José Municipal Water System	156	89%	10%	0.6%	0%
San Jose Water Company	141	48%	32%	16%	5.0%
Stanford University	10	100%	0%	0%	0%
No Retail Agency	6	50%	17%	33%	0%



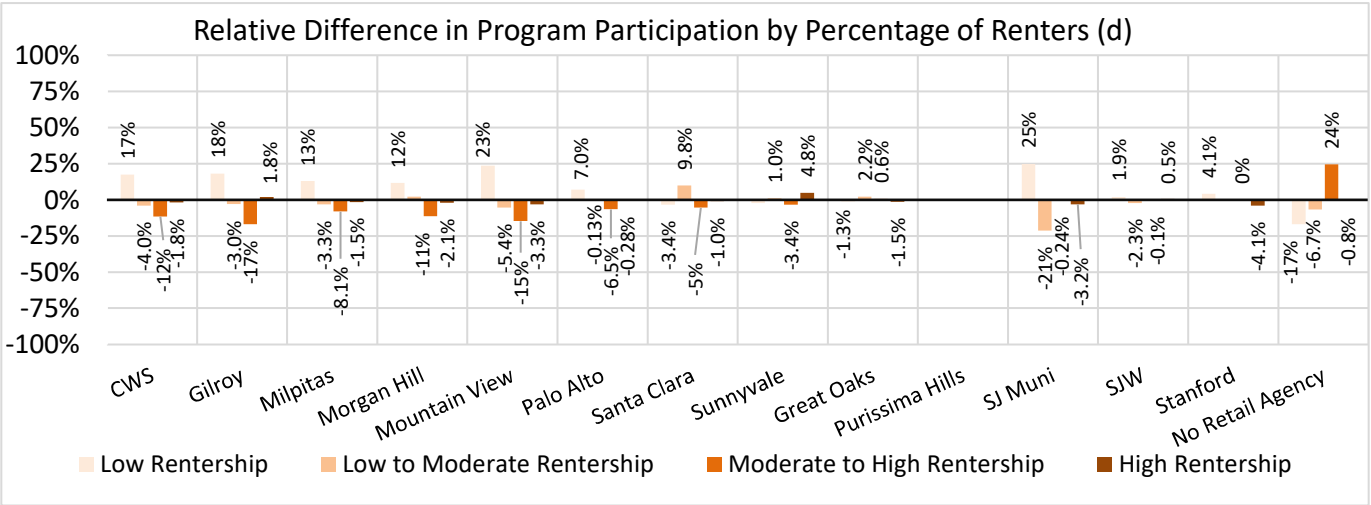


Table C-22
Water Wise Survey Program Participation by Percentage of Renters
Valley Water, Water Conservation Strategic Plan

Abbreviations:

CWS = California Water Service
CII = commercial, industrial, and institutional
HET = high efficiency toilets
HCD = California Department of Housing and Community Development
MFD = multi-family dwelling
SJ Muni = San José Municipal Water System
SJW = San Jose Water

Notes:

(a) Percentage of renters reflects the proportion of population within a given Census Block Group that lives in renter-occupied homes. A low percentage of renters indicates an area that consists predominantly of owner-occupied homes; high percentage of renters indicates an area that consists predominantly of renter-occupied homes. Percentage of renter-occupied housing units is based on the estimated 2018 number of renter-occupied housing units by Census Block Group, per Census (2020).
(b) Residential customers include both single-family and multi-family customers. Participants included in this analysis are limited to those for which location data are available.
(c) Several programs have had limited participation. The small sample size should be considered when evaluating these results. For this program, Stanford University and Purissima Hills Water District had no more than 10 participants with available location data.
(d) Relative difference is calculated as the percentage of program participation by rentership group minus the overall percentage of residential customers by rentership group within the retail agency boundary.

References:

1. Census, 2020. 2014-2018 American Community Survey (ACS) 5-year estimates. TIGER/Line Shapefiles by Block Group, https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-data.html, United States Census Bureau, downloaded July 2020.

Appendix D

Valley Water Conservation Master Plan Chapter 6 Scenario Modeling Results

POLICY ANALYSIS
FOR THE
PUBLIC AND PRIVATE
SECTORS
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Technical Memorandum

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Subject: **Updated** Valley Water Conservation Master Plan Chapter 6 Scenario Modeling Results

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Introduction

This memorandum describes the method used to construct alternative long-range conservation program scenarios for the Santa Clara Valley Water District Water Conservation Master Plan and summarizes the results of this analysis. These results may be used to inform the discussion and recommendations presented in chapter 6 of the Santa Clara Valley Water District Conservation Master Plan. The conservation program scenarios presented herein were analyzed using the Santa Clara Valley Water District Conservation Tracking Model with the water savings base year set to 1991.[1]

Long-Range Conservation Targets

The Santa Clara Valley Water District Water Supply Master Plan 2040 reaffirms long-range targets for water conservation. These targets are for the combined water savings from plumbing fixture efficiency codes and standards, new development ordinances and requirements, and water conservation programs operated by the Santa Clara Valley Water District and its program partners. The base year for calculating water savings is 1991 and the targets are 99,000 AFY by 2030 and 109,000 AFY by 2040.[2] The conservation program scenarios presented herein are constructed to satisfy the 2030 and 2040 targets.

The District's Conservation Tracking Model estimates that water savings were 74,198 AFY in 2020. Therefore, to meet the targets, an additional 24,802 AFY and 34,802 AFY will be needed by 2030 and 2040, respectively. Most of the water savings are expected to come from plumbing codes and appliance standards. The Conservation Tracking Model estimates that plumbing codes and appliance standards will generate water savings of 76,228 AFY and 93,578 AFY in 2030 and 2040, respectively. As shown in Table 1, this means District conservation programs and initiatives will need to generate at least 22,772 AFY and 15,422 AFY in 2030 and 2040, respectively, to meet the targets. Some of this will come from the residual water savings of historical program implementation. The Conservation Tracking Model estimates that residual water savings from past program implementation (1992-2020) will be 7,705 AFY in 2030 and 4,612 AFY in 2040. This leaves a net savings requirement for new conservation programming of 15,067 AFY in 2030 and 10,810 AFY in 2040.

Table 1. District Conservation Targets and Water Savings Requirements

Year	Water Savings Target (AFY)	Savings from Plumbing Codes and Appliance Standards (AFY)	Residual Savings from District Programs thru 2020 (AFY)	Additional Savings Needed from District Programs and Initiatives (AFY)
2020	NA	54,293		
2030	99,000	76,228	7,705	15,067
2040	109,000	93,578	4,612	10,810

[1] Water savings in the base year are zero by definition. Therefore, the first year of positive water savings is 1992, which corresponds to Valley Water's internal accounting rules for tabulating water savings of historical and projected conservation program implementation.

[2] Santa Clara Valley Water District Water Supply Master Plan 2040, page 20.

Model Water Efficiency New Development Ordinance

One of the conservation initiatives being pursued by the District is the Model Water Efficiency New Development Ordinance (MWENDO), which was finalized in 2019.[3] The ordinance has the following main requirements on new development:

- Require hot water recirculation for single-family development
- Pre-plumb single-family development for graywater collection, treatment, and redistribution
- Pre-plumb multi-family development for alternative water sources
- Require multi-family development to submeter indoor water uses
- Require multi-family development to have locks on outdoor hose bibs
- Require reuse water connections for common areas in HOA development
- Prohibit the sale of non-compliant fixtures

The District has begun working with the county's local jurisdictions to secure MWENDO adoption. The District's role will be to promote ordinance adoption and implementation and provide technical assistance.[4]

Both the timing and volume of the water savings that may be generated by MWENDO are uncertain. There has been limited adoption by municipalities in the county so far, but this may change if the next several years continue dry. For water savings modeling purposes, the following has been assumed.

- Adoption will occur gradually over time. Coverage will be 25% of the county by 2025 and will increase by 5% annually thereafter. Full coverage will not occur until 2040.
- The number of single- and multi-family housing units subject to the ordinance is based on the projections of new single- and multi-family occupied housing units in the District's Conservation Tracking Model. These projections, in turn, are based on the California Department of Finance's P-1 County Population Projections for Santa Clara County.
- Single-family water savings are based on two development requirements: Water Waste Reduction when Heating Water and Residential Gray Water Ready Collection and Distribution System requirements.
- Estimates of annual water savings per single-family housing unit for MWENDO's water heating and gray water requirements are drawn from Energy Solutions (2018).[5] This study assumes most households will not choose to install gray water treatment systems and therefore bases the gray water savings on laundry-to-landscape systems that do not require treatment. In the case of the water heating requirement, there are two compliance options, labeled A and B in the source document. For purposes of modeling water savings, it is assumed that 75% of new households meet the requirement with compliance option A and 25% meet it with option B.

[3] Ibid, pages 33-34.
[4] Ibid, page 34.
[5] Energy Solutions (2018). Energy and Water Efficiency Cost-Effectiveness Study for Residential and Nonresidential New Construct: Local Energy and Water Efficiency Ordinances. Report prepared for Kelly Cunningham, Codes and Standards Program, Pacific Gas and Electric Company. December 14, 2018.

- Multi-family water savings are based on three development requirements: Exterior Faucet Locks, Water Meters to Measure Indoor Water Use (i.e., submetering), and Use of Alternate Water Sources for Multi-Family Buildings.
- Estimates of annual water savings for the faucet lock and alternative water source requirements are drawn from Energy Solutions (2018). It was necessary to convert the savings estimate for the alternative water source requirement from savings per building to savings per housing unit by dividing the estimate by the average number of multi-family housing units per building in Santa Clara County, as determined from American Community Survey 2019 1-Year Estimate data.[6] The savings estimate for faucet locks was already expressed in terms of savings per housing unit, so conversion was not necessary. Additionally, the water savings estimate for the alternative water source requirement was reduced by 20% to account for the effects of submetering on multi-family water use.
- The estimate of annual water savings per multi-family housing unit for the submetering requirement is based on Mayer, et al. (2004), which estimated mean savings of 21.8 gpd per multi-family household.[7]
- Potential water savings for the non-residential submetering and alternative water source requirements are not modeled because data needed to estimate these savings is lacking.

Given these planning assumptions, estimated MWENDO water savings are summarized in Table 2.

Table 2. MWENDO Planning-Level Water Savings Estimates

Year	Single-Family (AFY)	Multi-Family (AFY)	Total (AFY)
2025	11	80	91
2030	99	753	852
2035	244	1,940	2,185
2040	448	3,725	4,173

The effect of MWENDO is to reduce the amount of water savings that will be needed from District conservation programs to meet the 2030 and 2040 conservation targets. Because the timing and volume of MWENDO water savings is so uncertain, two variants of each conservation scenario are provided below: one that assumes MWENDO is universally adopted by 2040 and achieves the savings in Table 2 and one that assumes MWENDO is not universally adopted and fails to generate significant water savings.

[6] Accessed from: https://data.census.gov/cedsci/table?q=santa%20clara%20county%20units%20in%20structure&tid=ACSDT1Y2019.B25024&hidePreview=false

[7] Mayer, Peter W., Erin Towler, William B. DeOreo, et al. (2004). National Multiple Family Submetering and Allocation Billing Program Study. Report prepared for: United States Environmental Protection Agency, National Apartment Association, National Multi Housing Council, City of Austin, City of Phoenix, City of Portland, City of Tucson, Denver Water Department, East Bay Municipal Utility District, San Antonio Water System, San Diego County Water Authority, Seattle Public Utilities, and Southern Nevada Water Authority

Conservation Program Scenarios

Three conservation program scenarios were considered for this analysis.

Business as Usual Scenario – This scenario is based on the District's existing mix of conservation programs. These programs target indoor and outdoor residential water uses, CII indoor water uses (e.g., sanitation, process, washing, cooling, and food preparation water uses), and non-residential landscape water uses. In this scenario, program implementation is assumed to continue at recent average rates of implementation. Program implementation levels for this scenario are not adjusted to ensure the conservation targets in Table 1 are achieved.

Existing Program Mix Scenario – This scenario includes the same programs as the Business as Usual Scenario. However, unlike that scenario program implementation in this scenario is scaled up to ensure that the conservation targets in Table 1 are achieved.

State Water Use Objective Scenario – This scenario is based on the subset of programs that contribute to meeting the pending state water use objectives, colloquially termed Making Conservation a California Way of Life.[8] The state is developing water use objectives for indoor and outdoor residential water use and irrigation of non-residential landscape served by dedicated irrigation meters. The state is not developing objectives for CII water use.[9] Therefore, the State Water Use Objective Mix Scenario excludes CII programs that do not contribute to meeting the residential and landscape water use objectives. The programs in this scenario are heavily weighted toward programs that reduce landscape water use.

Two variants of each scenario are analyzed: with MWENDO and without MWENDO. Table 3 summarizes the scenarios that were analyzed.

[8] See California Department of Water Resources and State Water Resources Control Board (2018). Making Water Conservation a California Way of Life: Primer of 2018 Legislation on Water Conservation and Drought Planning Senate Bill 606 (Hertzberg) and Assembly Bill 1668 (Friedman). Accessed from: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Water-Use-And-Efficiency/Make-Water-Conservation-A-California-Way-of-Life/Files/PDFs/Final-WCL-Primer.pdf

[9] The state is developing CII performance standards, akin to BMPs. The nature and extent of these BMPs is still unknown but the state's primary focus is on the residential and landscape water use objectives.

Table 3. Modeled Conservation Program Scenarios

Conservation Program Scenario	Description
Business as Usual, without MWENDO	District's existing mix of conservation programs at recent average rates of implementation. No savings from MWENDO assumed.
Business as Usual, with MWENDO	District's existing mix of conservation programs at recent average rates of implementation. MWENDO savings in Table 2 assumed.
Existing Program Mix, without MWENDO	District's existing mix of conservation programs, scaled to meet the 2030 and 2040 conservation targets of 99,000 AFY and 109,000 AFY, respectively. No savings from MWENDO assumed.
Existing Program Mix, with MWENDO	District's existing mix of conservation programs, scaled to meet the 2030 and 2040 conservation targets of 99,000 AFY and 109,000 AFY, respectively. MWENDO savings in Table 2 assumed.
State Water Use Objective Mix, without MWENDO	Subset of District's existing conservation programs that contribute to meeting the state water use objectives, scaled to meet the 2030 and 2040 conservation targets of 99,000 AFY and 109,000 AFY, respectively. No savings from MWENDO assumed.
State Water Use Objective Mix, with MWENDO	Subset of District's existing conservation programs that contribute to meeting the state water use objectives, scaled to meet the 2030 and 2040 conservation targets of 99,000 AFY and 109,000 AFY, respectively. MWENDO savings in Table 2 assumed.

Conservation Program Implementation Assumptions and Constraints

The analysis incorporates the following program implementation assumptions and constraints when calculating expected program water savings and expenditures.

- AMI cost-sharing is capped at one million dollars annually through 2030, per the District's current budget projections.[10] After 2030, AMI cost-sharing is scaled back and implemented at a level needed to meet the 2040 conservation target. In the case of the Business as Usual scenario, implementation is set to the recent average level of participation.
- District retailers receiving AMI cost-sharing will be required to provide both leak alerts and electronic home water use reports to customers with AMI meters.[11]
- Stand-alone home water use reports (i.e., independent of AMI) are held constant at current levels. Future expansion of home water use reports will only be through the District's AMI cost-sharing program.[12]

[10] Personal communication with Karen Koppett and Justin Burks, March 3, 2021.
[11] Ibid.
[12] Ibid.

- 2021-2025 implementation of multi-family and CII bathroom direct installation programs are set to levels provided by District staff.[13] The direct installation programs are assumed to be renewed for another five years (2026-2030) and implementation is scaled by up to double the 2021-2025 level as necessary to meet the 2030 and 2040 conservation targets. The direct install programs are assumed to be discontinued after 2030 due to high saturation rates of efficient plumbing fixtures.
- The CII ULF Toilet Prison Direct Install program is assumed to end in 2025, by which time it would have replaced 1,750 toilets. The JFA Institute (2017) projects a total jail population in Santa Clara County of about 3,500 and a bed requirement of about 3,800.[14] If an average of two beds per toilet is assumed, then the number of retrofittable toilets may be on the order of 1,900. Under these assumptions, the program would achieve 92% coverage by 2025.
- Showerhead distribution programs, other than via the multi-family and CII bathroom direct installation programs, are discontinued after 2022 due to high saturation rates in the county (estimated saturation is 95% for single-family and 97% for multi-family by 2022).
- The number of non-residential landscape sites with irrigation budgets is increased by 250/year until 4,000 sites is reached (a 33% increase over the current level) and then held at that level through the remainder of the forecast.
- The District's mobile irrigation lab agricultural conservation program is assumed to save 2,000 AFY.[15] This assumption is carried through the entire forecast period.

Table 4 summarizes average annual program implementation levels for the last ten years (2011-2020) and the first five years of the forecast (2021-2025). The program implementation levels for the first five years of the forecast were informed by discussions with District staff.[16] MWENDO is not assumed to generate significant water savings during this period (see Table 2) and therefore does not impact program implementation levels.

Tables 5 and 6 summarize program implementation levels in 2026-2030 for the Existing Program Mix and State Water Use Objective scenarios. Table 7 does the same for the 2031-2040 period. For the period 2031-2040, implementation only for the Landscape Water Budget and Agricultural Mobile Lab programs is shown. These two programs are assumed to operate in all years. Additional program implementation is not needed to meet the 2040 savings target. The residual water savings from 2021-2030 program implementation plus plumbing codes savings are sufficient to meet the 2040 target. This is true with or without MWENDO.

[13] Email from Justin Burks dated February 24, 2021.
[14] The JFA Institute (2017). Santa Clara County, California Baseline and Alternative Jail Population Projections Report. Accessed from: https://sccgov.iqm2.com/Citizens/FileOpen.aspx?Type=4&ID=168799
[15] A description of the District's mobile lab program is here: https://www.valleywater.org/saving-water/agriculture/mobile-lab-improve-farm-irrigation-efficiency
[16] February 23, 2021 meeting between EKI, M.Cubed, and District staff.

Table 4. District Conservation Program Activity for 2011-2020 and 2021-2025 by Scenario (Units/yr)

					2021-2025 Avg Activity		
ID	Class	Program Name	Activity Unit	2011-2020 Average Activity	Business As Usual	Existing Program Scenario	Water Use Objective Scenario
23	SFR	Aerators	Aerator	4,570	336	1,000	1,000
39	SFR	AMI Leak Alert	Home	500	0	0	0
38	SFR	AMI Leak Alert & Home Water Report	Home	0	600	14,290	14,290
34	SFR	Home Water Use Reports	Home	66,596	50,132	25,710	25,710
1	SFR	Residential Surveys, SFR	Survey	852	0	0	0
41	SFR	Water Wise Indoor DIY Kits	Survey	360	139	360	360
42	SFR	Water Wise Outdoor Survey	Survey	165	233	165	165
7	SFR	Residential LF Showerhead, SFR	Showerhead	2,716	0	120	120
5	SFR	Residential HE Toilets, SFR	Toilet	1,759	0	0	0
26	SFR	Residential Low WF HEW	Washer	6,818	0	0	0
22	SFR	Water Softener Upgrade Rebate	Rebate	50	0	0	0
25	OTH	Agriculture	AF	1,550	2,000	2,000	2,000
2	MFR	Residential Surveys, MFR	Survey	410	0	0	0
8	MFR	Residential LF Showerhead, MF	Showerhead	852	0	0	0
50	MFR	MF Bathroom Retrofit Direct Install	Toilet	0	900	900	900
6	MFR	Residential HE Toilets, MFR	Toilet	1,313	0	0	0
35	IRR	Graywater - L2L	Rebate	12	24	24	24
33	IRR	High efficiency nozzles for pop ups	Nozzle	19,930	4487	5,000	5,000
18	IRR	Large Land. Irrigation Controller	Controller	96	34	35	35
17	IRR	Large Landscape Surveys	Survey	46	36	30	30
29	IRR	Large Landscape Water Budgets	Site	1,207	2,647	3,700	3,700
36	IRR	Rain Barrel Rebate (40-199 gal)	Rain Barrel	55	55	75	75
37	IRR	Rain Cistern Rebate (200+ gal)	Gallons	16,373	2,647	20,000	20,000
27	IRR	Rain Sensors	Sensor	365	625	300	300
10	IRR	Residential Irrigation Controller, SFR	Controller	469	661	700	700
28	IRR	Rotor Sprinklers or Spray Bodies	Nozzle	15,877	4,398	5,000	5,000
24	IRR	Small commercial landscape surveys	Survey	7	0	0	0
11	IRR	Turf Replacement	Square Foot	1,195,272	384,854	400,000	400,000
32	IRR	Flow Sensor/Dedicated Irrigation Meter	Meter	34	36	60	60
31	CII	CII Aerators 1/2 gallon per minute	Aerator	1,881	240	200	0
45	CII	CII Aerators Direct Install	Aerator	0	100	100	0
21	CII	CII Surveys	Survey	7	0	0	0
16	CII	CII Spray Rinse Valve	Valve	59	0	0	0
46	CII	CII Spray Rinse Valve Direct Install	Valve	0	20	20	0
14	CII	CII HE Toilet	Toilet	677	0	0	0
44	CII	CII Ultra HE Toilet Direct Install	Toilet	0	300	300	0
48	CII	CII 0.125 Gallon Urinal Direct Install	Urinal	0	100	100	0
12	CII	CII 1/2 Gallon Urinal	Urinal	237	0	0	0
15	CII	CII Laundromat	Washer	156	0	0	0
19	CII	Residential Meter Installation	Meter	250	236	200	200
47	CII	CII ULF Toilet Prison Direct Install	Toilet	0	350	350	0
20	CII	WET	CCF	6,707	10,446	7,500	0

Table 5. District Conservation Program Activity for 2026-2030: Existing Program Mix Scenario (Units/yr)

					2026-2030 Avg Activity	
ID	Class	Program Name	Activity Unit	2021-2025 Avg Activity	Without MWENDO	With MWENDO
23	SFR	Aerators	Aerator	1,000	791	213
39	SFR	AMI Leak Alert	Home	0	0	0
38	SFR	AMI Leak Alert & Home Water Report	Home	14,290	14,290	14,290
34	SFR	Home Water Use Reports	Home	25,710	25,710	25,710
1	SFR	Residential Surveys, SFR	Survey	0	0	0
41	SFR	Water Wise Indoor DIY Kits	Survey	360	285	77
42	SFR	Water Wise Outdoor Survey	Survey	165	130	35
7	SFR	Residential LF Showerhead, SFR	Showerhead	120	0	0
5	SFR	Residential HE Toilets, SFR	Toilet	0	0	0
26	SFR	Residential Low WF HEW	Washer	0	0	0
22	SFR	Water Softener Upgrade Rebate	Rebate	0	0	0
25	OTH	Agriculture	AF	2,000	2,000	2,000
2	MFR	Residential Surveys, MFR	Survey	0	0	0
8	MFR	Residential LF Showerhead, MF	Showerhead	0	0	0
50	MFR	MF Bathroom Retrofit Direct Install	Toilet	900	712	192
6	MFR	Residential HE Toilets, MFR	Toilet	0	0	0
35	IRR	Graywater - L2L	Rebate	24	19	5
33	IRR	High efficiency nozzles for pop ups	Nozzle	5,000	3,953	1,066
18	IRR	Large Land. Irrigation Controller	Controller	35	28	7
17	IRR	Large Landscape Surveys	Survey	30	24	6
29	IRR	Large Landscape Water Budgets	Site	3,700	4,000	4,000
36	IRR	Rain Barrel Rebate (40-199 gal)	Rain Barrel	75	59	16
37	IRR	Rain Cistern Rebate (200+ gal)	Gallons	20,000	15,813	4,263
27	IRR	Rain Sensors	Sensor	300	237	64
10	IRR	Residential Irrigation Controller, SFR	Controller	700	553	149
28	IRR	Rotor Sprinklers or Spray Bodies	Nozzle	5,000	3,953	1,066
24	IRR	Small commercial landscape surveys	Survey	0	0	0
11	IRR	Turf Replacement	Square Foot	400,000	316,270	85,258
32	IRR	Flow Sensor/Dedicated Irrigation Meter	Meter	60	47	13
31	CII	CII Aerators 1/2 gallon per minute	Aerator	200	158	43
45	CII	CII Aerators Direct Install	Aerator	100	79	21
21	CII	CII Surveys	Survey	0	0	0
16	CII	CII Spray Rinse Valve	Valve	0	0	0
46	CII	CII Spray Rinse Valve Direct Install	Valve	20	16	4
14	CII	CII HE Toilet	Toilet	0	0	0
44	CII	CII Ultra HE Toilet Direct Install	Toilet	300	237	64
48	CII	CII 0.125 Gallon Urinal Direct Install	Urinal	100	79	21
12	CII	CII 1/2 Gallon Urinal	Urinal	0	0	0
15	CII	CII Laundromat	Washer	0	0	0
19	CII	Residential Meter Installation	Meter	200	158	43
47	CII	CII ULF Toilet Prison Direct Install	Toilet	350	0	0
20	CII	WET	CCF	7,500	5,930	1,599

Table 6. District Conservation Program Activity for 2026-2030: Water Use Objective Mix Scenario (Units/yr)

					2026-2030	
ID	Class	Program Name	Activity Unit	2021-2025 Activity	Without MWENDO	With MWENDO
23	SFR	Aerators	Aerator	1,000	1,074	418
39	SFR	AMI Leak Alert	Home	0	0	0
38	SFR	AMI Leak Alert & Home Water Report	Home	14,290	14,290	14,290
34	SFR	Home Water Use Reports	Home	25,710	25,710	25,710
1	SFR	Residential Surveys, SFR	Survey	0	0	0
41	SFR	Water Wise Indoor DIY Kits	Survey	360	387	151
42	SFR	Water Wise Outdoor Survey	Survey	165	177	69
7	SFR	Residential LF Showerhead, SFR	Showerhead	120	0	0
5	SFR	Residential HE Toilets, SFR	Toilet	0	0	0
26	SFR	Residential Low WF HEW	Washer	0	0	0
22	SFR	Water Softener Upgrade Rebate	Rebate	0	0	0
25	OTH	Agriculture	AF	2,000	2,000	2,000
2	MFR	Residential Surveys, MFR	Survey	0	0	0
8	MFR	Residential LF Showerhead, MF	Showerhead	0	0	0
50	MFR	MF Bathroom Retrofit Direct Install	Toilet	900	966	376
6	MFR	Residential HE Toilets, MFR	Toilet	0	0	0
35	IRR	Graywater - L2L	Rebate	24	26	10
33	IRR	High efficiency nozzles for pop ups	Nozzle	5,000	5,368	2,092
18	IRR	Large Land. Irrigation Controller	Controller	35	38	15
17	IRR	Large Landscape Surveys	Survey	30	32	13
29	IRR	Large Landscape Water Budgets	Site	3,700	4,000	4,000
36	IRR	Rain Barrel Rebate (40-199 gal)	Rain Barrel	75	81	31
37	IRR	Rain Cistern Rebate (200+ gal)	Gallons	20,000	21,474	8,366
27	IRR	Rain Sensors	Sensor	300	322	125
10	IRR	Residential Irrigation Controller, SFR	Controller	700	752	293
28	IRR	Rotor Sprinklers or Spray Bodies	Nozzle	5,000	5,368	2,092
24	IRR	Small commercial landscape surveys	Survey	0	0	0
11	IRR	Turf Replacement	Square Foot	400,000	429,474	167,323
32	IRR	Flow Sensor/Dedicated Irrigation Meter	Meter	60	64	25
31	CII	CII Aerators 1/2 gallon per minute	Aerator	0	0	0
45	CII	CII Aerators Direct Install	Aerator	0	0	0
21	CII	CII Surveys	Survey	0	0	0
16	CII	CII Spray Rinse Valve	Valve	0	0	0
46	CII	CII Spray Rinse Valve Direct Install	Valve	0	0	0
14	CII	CII HE Toilet	Toilet	0	0	0
44	CII	CII Ultra HE Toilet Direct Install	Toilet	0	0	0
48	CII	CII 0.125 Gallon Urinal Direct Install	Urinal	0	0	0
12	CII	CII 1/2 Gallon Urinal	Urinal	0	0	0
15	CII	CII Laundromat	Washer	0	0	0
19	CII	Residential Meter Installation	Meter	200	215	84
47	CII	CII ULF Toilet Prison Direct Install	Toilet	0	0	0
20	CII	WET	CCF	0	0	0

Table 7. District Conservation Program Activity for 2031-2040 (Units/yr)

ID	Class	Program Name	Activity Unit	2021-2025 Activity	Without MWENDO	With MWENDO
23	SFR	Aerators	Aerator	1,000	0	0
39	SFR	AMI Leak Alert	Home	0	0	0
38	SFR	AMI Leak Alert & Home Water Report	Home	14,290	0	0
34	SFR	Home Water Use Reports	Home	25,710	0	0
1	SFR	Residential Surveys, SFR	Survey	0	0	0
41	SFR	Water Wise Indoor DIY Kits	Survey	360	0	0
42	SFR	Water Wise Outdoor Survey	Survey	165	0	0
7	SFR	Residential LF Showerhead, SFR	Showerhead	120	0	0
5	SFR	Residential HE Toilets, SFR	Toilet	0	0	0
26	SFR	Residential Low WF HEW	Washer	0	0	0
22	SFR	Water Softener Upgrade Rebate	Rebate	0	0	0
25	OTH	Agriculture	AF	2,000	2,000	2,000
2	MFR	Residential Surveys, MFR	Survey	0	0	0
8	MFR	Residential LF Showerhead, MF	Showerhead	0	0	0
50	MFR	MF Bathroom Retrofit Direct Install	Toilet	900	0	0
6	MFR	Residential HE Toilets, MFR	Toilet	0	0	0
35	IRR	Graywater - L2L	Rebate	24	0	0
33	IRR	High efficiency nozzles for pop ups	Nozzle	5,000	0	0
18	IRR	Large Land. Irrigation Controller	Controller	35	0	0
17	IRR	Large Landscape Surveys	Survey	30	0	0
29	IRR	Large Landscape Water Budgets	Site	3,700	4,000	4,000
36	IRR	Rain Barrel Rebate (40-199 gal)	Rain Barrel	75	0	0
37	IRR	Rain Cistern Rebate (200+ gal)	Gallons	20,000	0	0
27	IRR	Rain Sensors	Sensor	300	0	0
10	IRR	Residential Irrigation Controller, SFR	Controller	700	0	0
28	IRR	Rotor Sprinklers or Spray Bodies	Nozzle	5,000	0	0
24	IRR	Small commercial landscape surveys	Survey	0	0	0
11	IRR	Turf Replacement	Square Foot	400,000	0	0
32	IRR	Flow Sensor/Dedicated Irrigation Meter	Meter	60	0	0
31	CII	CII Aerators 1/2 gallon per minute	Aerator	200	0	0
45	CII	CII Aerators Direct Install	Aerator	100	0	0
21	CII	CII Surveys	Survey	0	0	0
16	CII	CII Spray Rinse Valve	Valve	0	0	0
46	CII	CII Spray Rinse Valve Direct Install	Valve	20	0	0
14	CII	CII HE Toilet	Toilet	0	0	0
44	CII	CII Ultra HE Toilet Direct Install	Toilet	300	0	0
48	CII	CII 0.125 Gallon Urinal Direct Install	Urinal	100	0	0
12	CII	CII 1/2 Gallon Urinal	Urinal	0	0	0
15	CII	CII Laundromat	Washer	0	0	0
19	CII	Residential Meter Installation	Meter	200	0	0
47	CII	CII ULF Toilet Prison Direct Install	Toilet	350	0	0
20	CII	WET	CCF	7,500	0	0

Projected Water Savings by Scenario

Projected water savings, rounded to the nearest thousand AFY, for each scenario are summarized in Table 9. The following is noted:

- The Business as Usual scenario is not able to meet the 2030 conservation target with or without MWENDO. It does, however, meet the 2040 target.
- The two other scenarios meet the 2030 and 2040 targets by construction. When MWENDO is included, 2040 water savings exceed the target by several thousand AFY. This results from the ramp-up of MWENDO savings over the forecast plus the residual water savings from 2021-2030 program implementation.

Table 8. Projected Water Savings by Scenario (AFY)

Scenario	MWENDO Savings	2020	2025	2030	2035	2040
Business As Usual	Without	74,000	84,000	94,000	102,000	109,000
	With	74,000	84,000	95,000	104,000	113,000
Existing Program Mix	Without	74,000	88,000	99,000	105,000	111,000
	With	74,000	88,000	99,000	107,000	115,000
Water Use Objective Mix	Without	74,000	88,000	99,000	105,000	111,000
	With	74,000	88,000	99,000	107,000	115,000
*Savings rounded to nearest thousand AFY						

Program Costs by Scenario

Table 10 summarizes the 10-year cost projection by scenario. Costs include District labor, benefits, and overhead, plus expenditures for outside services, materials, and financial incentives and rebates. All costs are in 2019 constant dollars. Labor, benefits, and overhead costs are based on the District's water conservation program operations cost forecast.[17] The Business as Usual scenario assumes the same staffing level that is in this forecast. The other two scenarios assume that staffing is increased from 4 to 10 FTE over a three-year period.[18]

Without MWENDO, relative to the Business as Usual scenario, annual cost is, on average, 53% greater under the Existing Program Mix scenario and 47% greater under the State Water Objective scenario. With MWENDO, relative to the Business as Usual scenario, annual cost is, on average, 41% greater under the Existing Program Mix scenario and 36% greater under the State Water Objective scenario. The effect of MWENDO is to reduce needed program expenditure by roughly one million dollars per year between 2026 and 2030.

[17] The District provided this forecast to M.Cubed in the spreadsheet "91151001_Water Conservation Program_v2.0.xlsm."
[18] Per April 21, 2021 email from Karen Koppett.

Table 9. Projected Program Materials and Services Expenditure by Scenario (Mil. 2019 $)

Scenario	MWENDO Assumption	2021-2025	2026-2030
Business as Usual	Without	$4.7	$4.5
	With	$4.7	$4.5
Existing Program Mix	Without	$6.2	$7.9
	With	$6.2	$6.8
State Water Use Objective	Without	$5.5	$8.0
	With	$5.5	$7.0

Unit Cost of Savings

Table 11 summarizes the unit cost of water savings ($/AF) under each scenario. The unit costs in Table 11 are based on a 3% real discount rate. Unit cost for the Business as Usual scenario is, on average, 11% lower than under the Existing Program Mix Scenario, and 9% lower than under the State Water Use Objective scenario. However, the District is not able to meet its 2030 savings goal under the Business as Usual scenario. In order to meet the 2030 goal, the District must expand its conservation program, essentially moving up the conservation supply curve. The State Water Use Objective scenario generates water savings at lower unit cost than the Existing Program Mix scenario, but the difference is not consequential, about 2%, on average.

Table 10. Unit Cost of Savings ($/AF)

Scenario	MWENDO Assumption	Unit Cost ($/AF)
Business as Usual	Without	$412
	With	$412
Existing Program Mix	Without	$465
	With	$461
State Water Use Objective	Without	$456
	With	$453

Conclusions and Recommendations

This analysis considered three alternative conservation program scenarios for meeting the District's long-range conservation target. The Business as Usual scenario continues the District's current programs at historical average implementation levels. The Existing Program Mix scenario also continues the District's current programs but increases the level of implementation in order to meet the District's 2030 and 2040 conservation goals. The State Water Use Objective scenario is based on the subset of existing programs that directly contribute to meeting the pending state water use objectives. This scenario is heavily weighted toward reducing landscape water use. Implementation levels are scaled up to ensure the District achieves its 2030 and 2040 conservation goals.

The scenarios were evaluated with and without water savings from MWENDO. Thus, a total of six cases were evaluated. Based on this evaluation, the following is noted:

- The District cannot meet its 2030 conservation goal under the Business as Usual scenario. There is a 5,000 AF shortfall if MWENDO savings are not assumed, and a 4,000 AF shortfall if they are.
- To meet the 2030 conservation goal, the District will need to increase program implementation between 2021 and 2030. If MWENDO savings are not assumed, program costs would need to increase, on average, by 53% under the Existing Program Mix scenario and by 47% under the State Water Use Objective scenario. If MWENDO savings are assumed, the program cost increases for the two scenario would be 41% and 36%, respectively.
- While the District meets its 2030 target at lower cost under the State Water Use Objective scenario, which refocuses the District programs on landscape water savings, there are several downsides to this approach:
    - First, the difference in the unit cost of savings is only about 2%, which is within the model's margin of error. Cost savings are negligible.
    - Second, the approach may be viewed as inequitable. All county water users contribute to the District's water conservation budget and reasonably expect to benefit from District conservation programs.
    - Third, while the state is currently not setting CII water use objectives, this may change in the future. Keeping in place the District's current CII programs provides a reasonable hedge for this possibility.
- Broad MWENDO adoption would allow the District to reduce annual program expenditure by roughly one million dollars between 2021 and 2030. However, the timing and volume of MWENDO savings is uncertain. A prudent planning stance would be for the District to initially base its conservation planning on the Without MWENDO modelling results, and then adjust program implementation levels over time as more information on MWENDO adoption and performance becomes available.

Appendix E

Estimation of Per Capita Water Use

Appendix E
Estimation of Per Capita Water Use

Per Valley Water's request, a per capita water use analysis was conducted to understand how water use patterns have changed and are projected to change throughout the Valley Water service area over time and through 2025. Section 1 describes the data sources and the methodology, Section 2 presents the results of the analysis, and Section 3 presents the potential application of these findings to Valley Water's potential drought response.

1. Data Sources and Methodology

1.1 Data Sources

The data used to estimate per capita water use for the Valley Water service area and for each retail agency and the independent private pumpers includes:

- Potable water production and consumption billing data by retail agencies provided by Hazen & Sawyer on 11 August 2020. Data generally cover the period from 2000-2018.
- Population data for the retail agencies and private well owners provided by Hazen & Sawyer on 2 September 2020. Data generally cover the period from 2000-2018.
- Draft 2020 Urban Water Management Plans (UWMPs) for the retail agencies, as available. These data cover the years 2020 and 2025.
- Valley Water's 2010 and 2015 UWMPs and its Draft 2020 UWMP. These data cover the years 2010, 2015, 2020 and 2025.

1.2 Methodology

Per capita water use is calculated by dividing the total volume of *potable* water produced in a year by the number of people being served and converted to units of "gallons per person per day" or GPCD.

Residential per capita water use (R-GPCD) is calculated by dividing the total volume of residential *potable* water consumption by the number of people being served.

The per capita water use includes non-revenue water while the residential per capita water use does not include non-revenue water.

2. Per Capita Water Use Analysis and Results

The per capita water use analysis was conducted several different ways to capture different perspectives on water use within the Valley Water service area:

1. Total per capita water use by the Valley Water Retail Agencies.
2. Residential per capita water use by the Valley Water Retail Agencies.
3. Total per capita water use by the "Independent Pumper" sector.
4. Total per capita water use for the Valley Water service area as a whole.

2.1 Per Capita Water Use by Retail Agencies

Table E-1 and the associated chart shows the total GPCD for Valley Water's 13 retail agencies, including California Water Service Los Altos District, City of Gilroy, City of Milpitas, City of Morgan Hill, City of Mountain View, City of Palo Alto, City of Santa Clara, City of Sunnyvale, Great Oaks Water Company, Purissima Hills Water District, San Jose Municipal Water, San Jose Water Company, and Stanford University, as well as the weighted average per capita water use (i.e., weighted by each retail agencies' population). **Table E-2** and the associated chart shows the R-GPCD for Valley Water's 13 retail agencies, and the weighted average R-GPCD.

As shown on the two tables and their associated charts below, the per capita water use in Valley Water's service area varies significantly between agencies, but the overall trends are similar as indicated by each agency's GPCD values and the weighted average values. Both the total GPCD and R-GPCD have generally decreased since the 2000s, reaching their lowest values in 2015 and 2016 (i.e., during the recent, historic drought). Both the total GPCD and R-GPCD showed generally increasing trends again following 2016, indicative of a rebound in water use following the drought.

Table E-1 Total Per Capita Water Use by Retail Agencies (GPCD)

Year	California Water Service Los Altos District	City of Gilroy	City of Milpitas	City of Morgan Hill	City of Mountain View	City of Palo Alto	City of Santa Clara	City of Sunnyvale	Great Oaks Water Company	Purissima Hills Water District	San Jose Municipal Water	San Jose Water Company	Stanford University	Weighted Average
2000	246	191	184	224	192	235	239	183	142	416	175	161	--	**--**
2001	246	191	182	230	188	225	223	179	143	438	179	164	--	**--**
2002	243	189	175	233	189	223	213	178	143	438	182	164	--	**--**
2003	242	182	168	227	181	213	203	170	138	409	184	156	102	**170**
2004	260	190	174	235	189	222	206	169	142	447	194	160	109	**175**
2005	239	189	162	226	181	201	197	165	137	400	182	151	87	**165**
2006	239	195	166	225	174	198	197	158	135	408	185	152	80	**165**
2007	254	198	169	235	184	210	194	164	140	455	193	155	106	**170**
2008	243	196	161	231	178	200	186	164	142	432	187	155	102	**168**
2009	217	179	149	208	162	182	169	146	127	382	169	141	86	**152**
2010	178	168	137	194	142	172	160	135	111	335	155	133	89	**141**
2011	177	169	137	194	142	171	156	128	115	335	158	131	79	**139**
2012	195	173	137	205	142	167	158	136	121	368	162	134	83	**143**
2013	221	183	140	221	153	178	159	139	123	393	168	137	93	**148**
2014	191	158	123	181	132	152	145	122	105	336	148	121	115	**130**
2015	147	130	107	141	108	126	129	101	85	259	121	96	74	**105**
2016	145	130	104	146	105	128	124	104	83	258	118	94	58	**103**
2017	166	143	106	157	110	142	135	117	93	296	125	100	63	**112**
2018	178	143	103	152	106	134	128	110	95	287	123	102	52	**111**
2020	166	--	--	--	112	142	--	109	--	--	--	--	--	**--**
2025	165	--	--	--	117	141	--	104	--	--	--	--	--	**--**

Notes:

(a) The GPCD estimates are based on the retail agencies' potable water production data, which includes non-revenue water. It is noted that the Stanford water production amounts were lower than the consumption amounts (30% lower compared to consumption in 2018), which is due to the fact that the production data does not include water sources such as Stanford's own surface water diversions from local foothills creeks.

(b) The weighted GPCD values are weighted by the population of each retail agency.

Chart E-1 Total Per Capita Water Use (GPCD)

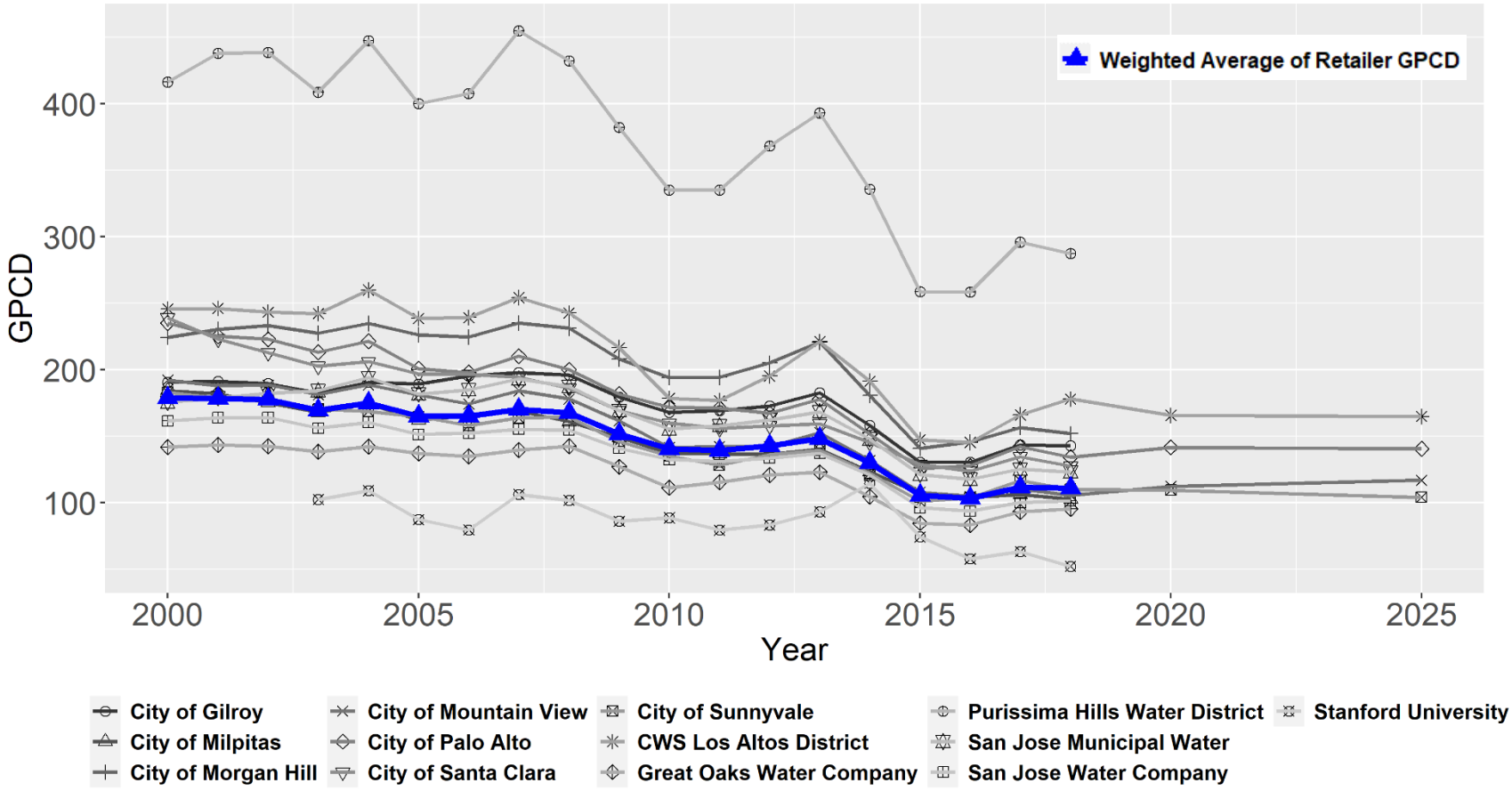


Table E-2 Residential Per Capita Water Use by Retail Agencies (R-GPCD)

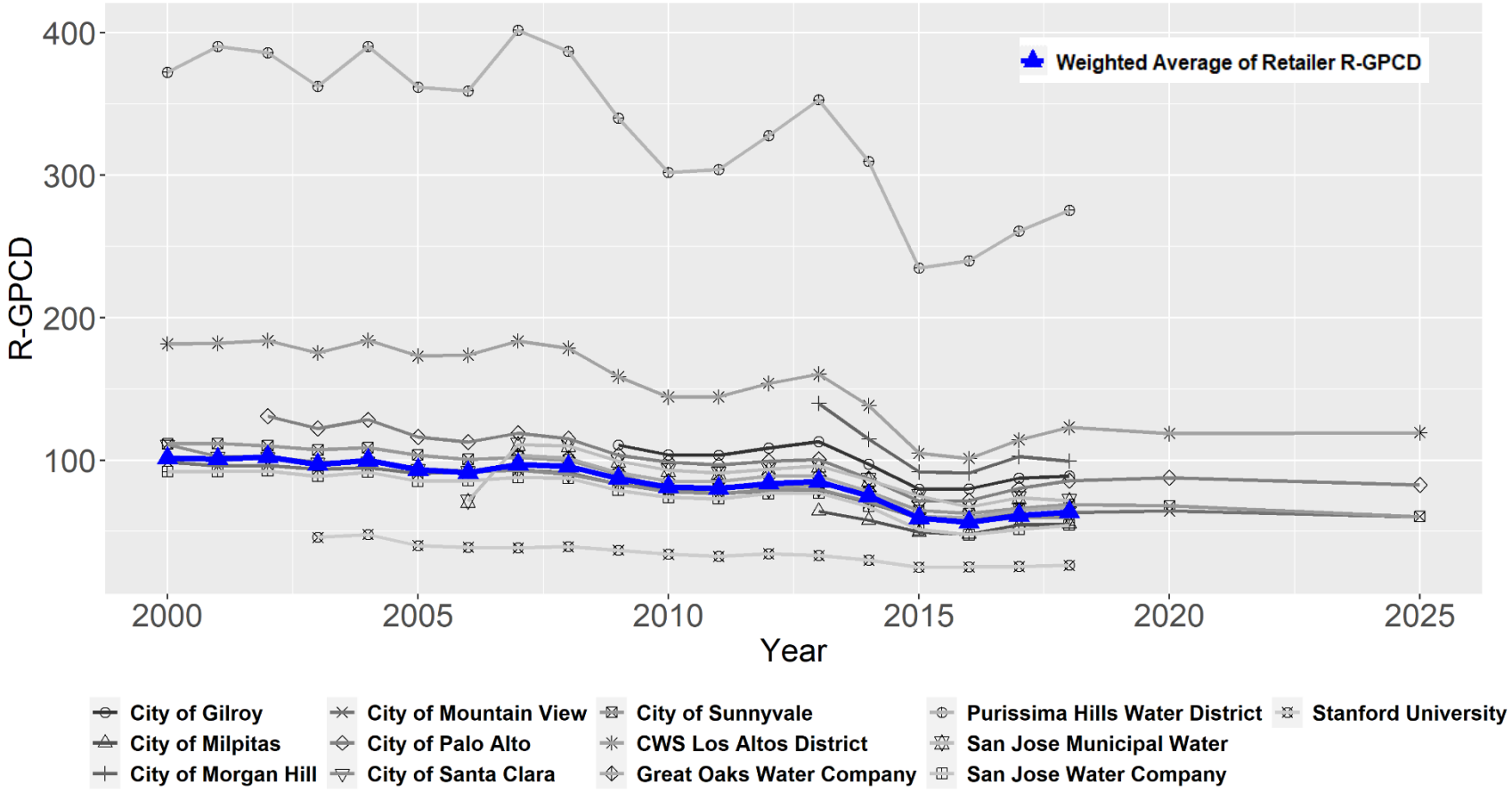
Year	California Water Service Los Altos District	City of Gilroy	City of Milpitas	City of Morgan Hill	City of Mountain View	City of Palo Alto	City of Santa Clara	City of Sunnyvale	Great Oaks Water Company	Purissima Hills Water District	San Jose Municipal Water	San Jose Water Company	Stanford University	Weighted Average
2000	182	--	--	--	99	--	111	111	--	372	--	92	--	**--**
2001	182	--	--	--	96	--	103	112	--	390	--	92	--	**--**
2002	184	--	--	--	96	131	102	110	--	386	--	93	--	**--**
2003	175	--	--	--	94	122	99	107	--	362	--	89	46	**97**
2004	184	--	--	--	95	128	99	109	--	390	--	92	48	**100**
2005	173	--	--	--	91	116	94	104	--	362	--	85	40	**93**
2006	174	--	--	--	92	113	92	101	--	359	71	86	39	**91**
2007	184	--	--	--	93	119	93	102	103	402	111	88	38	**97**
2008	179	--	--	--	91	115	90	100	101	387	110	87	39	**96**
2009	159	111	--	--	83	103	83	90	91	340	99	79	37	**87**
2010	144	104	--	--	79	99	78	80	85	302	93	74	34	**81**
2011	144	104	--	--	77	97	77	80	85	304	91	73	32	**80**
2012	154	109	--	--	78	99	79	80	89	328	94	77	34	**84**
2013	160	113	64	140	79	101	80	83	89	353	96	77	33	**85**
2014	138	97	58	115	70	87	71	78	78	310	86	68	30	**75**
2015	105	80	49	92	59	71	60	65	61	235	75	51	25	**59**
2016	101	80	48	91	60	72	56	63	60	240	67	48	25	**56**
2017	114	87	55	102	62	80	60	66	65	261	74	51	25	**61**
2018	123	89	55	99	63	86	60	69	67	275	72	54	26	**63**
2020	119	--	--	--	64	88	--	68	--	--	--	--	--	**--**
2025	119	--	--	--	60	83	--	60	--	--	--	--	--	**--**

Notes:

(a) The R-GPCD estimates are based on the retail agencies' consumption data for the residential sector. The 2020 and 2025 R-GPCD estimates are only available for retail agencies whose Draft 2020 UWMPs are available as of 27 May 2021.

(b) The weighted R-GPCD values are weighted by the population of each retail agency.

Chart E-2 Residential Per Capita Water Use (R-GPCD)



2.2 Per Capita Water Use by Independent Pumpers

Table E-3 shows the private well owner (i.e., "Independent Pumper") population, the groundwater production volumes in acre-feet per year (AFY), and the resultant estimated GPCD. It is noted that the private well owner GPCD is about five times higher than the weighted average of the Valley Water retail agencies' GPCD.

Table E-3 Private Well Owner GPCD Estimates

Year	Independent Groundwater Pumping (AFY) (b)	Private well owner Population	GPCD
2015	16,900	22,116	682
2020	13,000	23,101	502
2025 (a)	14,000	24,086	519

Notes:

(a) The historical population data (2015 and 2020) were provided by Hazen & Sawyer. The 2025 private well owner population is estimated based on a linear extrapolation of the 2015 and 2020 populations.

(b) The groundwater pumping volumes were sourced from Valley Water's 2015 UWMP and Draft 2020 UWMP.

2.3 Per Capita Water Use Within the Valley Water Service Area

Table E-4 shows the GPCD estimates for Valley Water's service area as a whole. As shown therein, similar to the GPCD estimates for Valley Water's 13 retail agencies and their weighted average, the total GPCD (excluding recycled water) for Valley Water showed relatively lower water consumption in 2015 with a rebound in 2020 and a projected increase through 2025.

Table E-4 Valley Water GPCD Estimates

	2010	2015	2020	2025
Population	1,822,000	1,877,700	1,986,340	2,098,695
Water Production				
Treated Water and Groundwater	--	170,700	246,000	288,000
Agricultural Irrigation	--	26,700	25,000	25,000
Independent Groundwater Pumping	--	16,900	13,000	14,000
Untreated Surface Water	--	1,500	2,000	2,000
Losses	--	2,400	3,000	3,000
Total Production (exclude recycled water) (a)	318,430	218,200	289,000	330,000
GPCD Estimates				
GPCD (excluding agricultural irrigation and untreated surface water)	--	89	116	128
Total GPCD (excluding recycled water)	149	104	122	140

Notes:

(a) The 2010 UWMP stated "[t]otal water usage in Santa Clara County is estimated to be 332,900 AF in calendar year 2010". Although it was not specifically specified, it appears that the total water use included recycled water use based on the Chart – Historic Water Use and Population in Section 4.1 of the 2020 Draft UWMP. Thus, the total production presented herein was adjusted to remove the recycled water use.

(b) Water production and population data were obtained from the Valley Water 2010, 2015, and Draft 2020 UWMPs. Production by source was not available in the 2010 UWMP.

3. Implications of Changes in Per Capita Water Use on Valley Water's Potential Drought Response

As shown in **Table E-5**, Valley Water's retail agencies reduced their water use by approximately 30% during the historic statewide 2012-2016 drought, and through 2018 water use has not fully rebounded to pre-drought conditions. In fact, retail agency water use in 2018 was only about 7% greater than water use in 2016.

Water savings during the drought would likely have resulted from a combination of behavioral changes (such as irrigating less) and more permanent fixture/device changes (such as replacing old fixtures and removing turf). The observed increase in per capita water use (i.e., the 7%) is likely the result of behavioral changes and may represent the potential for short-term savings opportunities in a future shortage. Customers whose water use has not rebounded are assumed to be "demand-hardened", which will make future drought cutbacks more difficult to achieve.

Depending on the water savings needed in the current or future droughts or water shortages, Valley Water will likely need to increase outreach and other efforts to achieve the same savings results as were achieved during the 2012-2016 drought period. Even so, due to demand hardening, the same level of savings may not be feasible. For example, if Valley Water wants to achieve a 30% water use reduction target, the effective GPCD for its retail agencies would have to be approximately 78 GPCD on average, which is significantly lower than any of the retail agencies' historical GPCD values (see **Table E-1**)[1].

Table E-5 Drought Response and Rebound GPCD Assessment for Valley Water Retail Agencies

Period/Year	Weighted Average by Retail Agencies' GPCD	% Change Relative to the Previous Period	Note
2013	148	--	Highest Water Use from 2011-2018
2016	103	-30%	Lowest Water Use from 2011-2018
2018	111	7%	Most Recent Water Use
Next Drought	78	-30%	GPCD needed to achieve a 30% reduction

4. References

California Water Service - Los Altos Suburban District, 2021. Draft 2020 Urban Water Management Plan, dated May 2021.

City of Mountain View, 2021. 2020 Urban Water Management Plan Public Draft, dated May 18, 2021.

City of Palo Alto, 2021. Draft 2020 Urban Water Management Plan and Water Shortage Contingency Plan, dated June 2021.

City of Sunnyvale, 2021. Draft 2020 Urban Water Management Plan, dated May 2021.

Valley Water, 2010. 2010 Urban Water Management Plan, Santa Clara Valley Water District.

Valley Water, 2016b. 2015 Urban Water Management Plan, Santa Clara Valley Water District, dated May 2016.

Valley Water, 2021g. 2020 Urban Water Management Plan, Santa Clara Valley Water District, dated June 2021.

[1] Stanford University's GPCD presented in **Table E-1** is underestimating their actual GPCD due to incomplete data related to all of their supply sources.