ALLIANCE FOR WATER EFFICIENCY

WATER EFFICIENCY & CONSERVATION SYMPOSIUM 2025

AUGUST 6-8, 2025 | CHICAGO, IL

From Root to Rise: The Growth of Residential Landscape Programs

Room 621 2:15-3:15pm

Jenna Battson

Colorado Water Conservation Board

Toby Bickmore

Southern Nevada Water Authority

Justin Burks

Santa Clara Valley Water District

Jack Karlin

Turfgrass Water Conservation Alliance

Whitney Ray

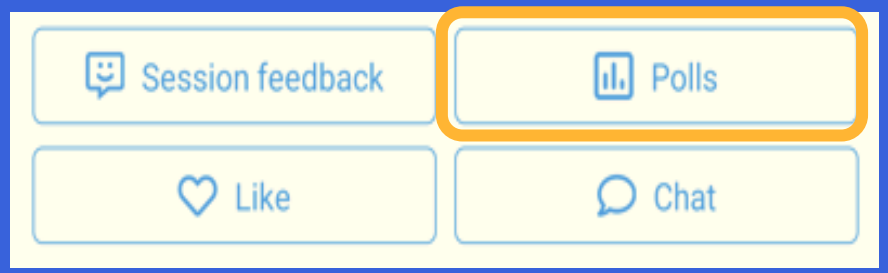
East Bay Municipal Utility District

WATER EFFICIENCY & CONSERVATION SYMPOSIUM

Panel Interactive Polling

Open your Whova apps to participate in polls throughout the panel discussion!

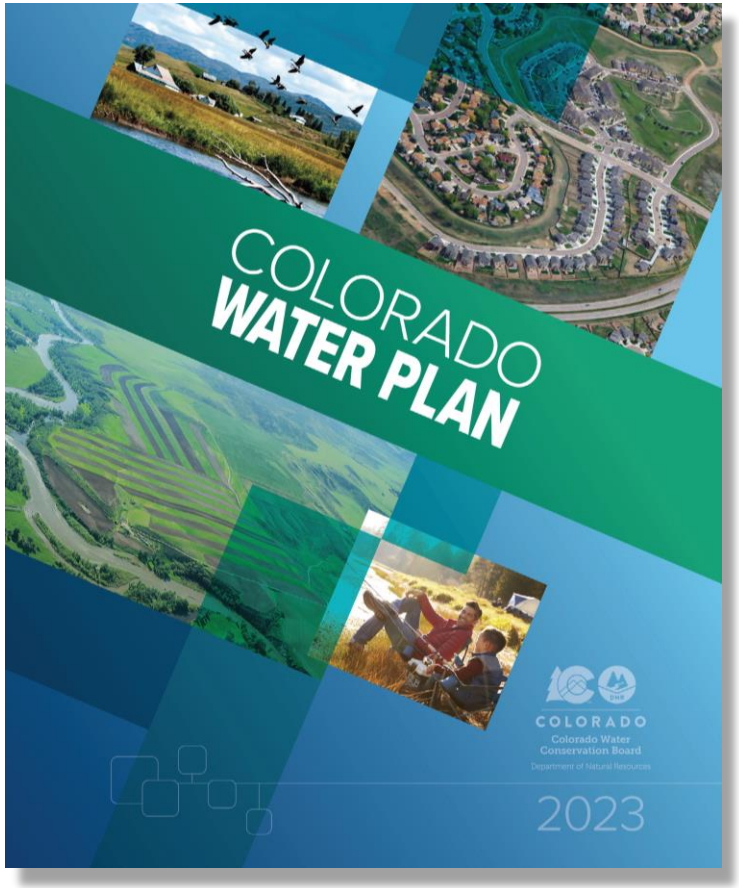
Navigate to the Whova app → Go to this session → Click on “Polls” → Select and respond to the question you see displayed on the screen



Whova

Colorado Water Conservation CWCB

- Policy direction on water issues
- Water information resource
- Technical Assistance
- Funding Opportunities
- Colorado Water Plan



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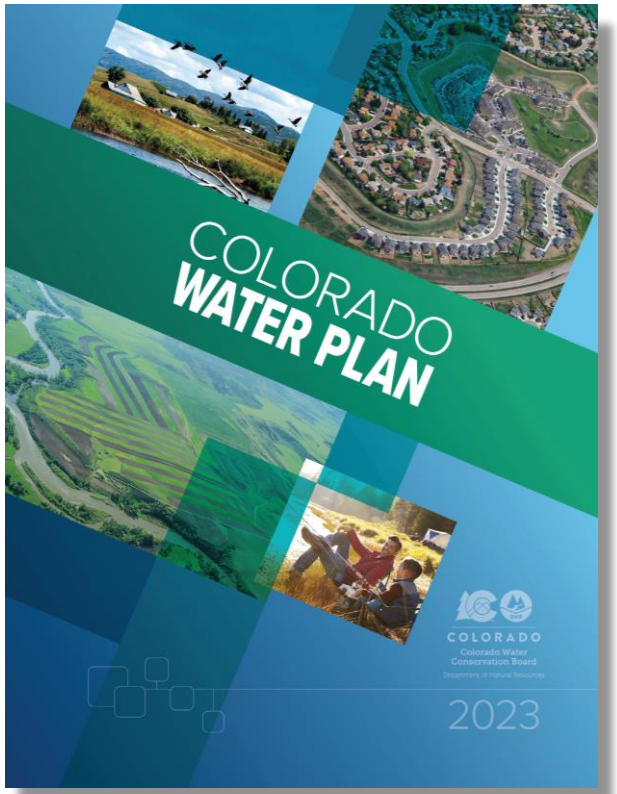
STATE-OF-THE-SCIENCE REPORT



AGENCY ACTIONS
VIBRANT COMMUNITIES

1.7 Identify turf replacement options that support transformative landscape change

Lead Agency: CWCB ***Collaborating Agencies:*** DOLA ***Related Action Area:*** Resilient Planning

Traditional landscaping in the United States often includes large expanses of turf grass, historically originating from wetter climates such as the eastern United States and Europe. In Colorado's semi-arid climate, however, many turf grasses require a large amount of supplemental irrigation to survive and thrive. Vast swaths of non-functional turf grass with high irrigation water requirements are unsustainable in Colorado's increasingly arid climate.

Understanding the best strategies for transformative landscape change to reduce water use while maintaining resilient, livable, and aesthetically pleasing outdoor environments will require the creation of a Colorado standard for landscapes. This will include removing nonfunctional turf, identifying turf replacement plant material options, and evaluating how to sustain long-term water savings.

Replacing nonfunctional irrigated turf with water-wise landscaping is an ongoing topic of interest as supported by Colorado's General Assembly in HB22-1151. Pursuant to that statute, CWCB will develop and administer a turf replacement program by July of 2023.

Beyond the requirements in statute, CWCB will actively conduct and support research on turf replacement best practices, alternative tools for driving turf replacement, addressing underlying irrigation concerns, and identifying the optimal low-water replacement materials that could be sustained on as little as one day of efficient irrigation per week.

CWCB will use information and data it collects through its turf replacement program to create a handbook that explores study findings and compares the potential for municipal tools like water rate structures, water budgets, incentives, and land use codes to aid this transformation. The CWCB will coordinate with key partners to find pathways for achieving effective outcomes that explore both retrofit and new construction standards. This will include evaluating the role and capacity of landscapers as well as contractors, developers, municipalities, and other groups to support this transformation.

CWCB will also engage experts to evaluate alternative landscape plant material options that include medium to low-water-using native species and/or well-adapted plant species and analyze ways that a range of other landscape challenges such as stormwater management, heat impacts, defensible space from fire, and pollinator support might be addressed through a Colorado-specific landscape standard.

TOOLS used for this action

- Water efficiency and conservation programs
- Collaboration groups
- Public outreach and education
- Equity
- Policy and regulatory changes

WHAT IS NON-FUNCTIONAL TURF?

Part of developing a Colorado standard for landscape would include defining what is and is not functional turf grass. Generally, the term "turf" is often associated with water-intensive grasses, however, not all turf is technically high water-using. The intent of turf removal is really aimed at trying to target removal of high-water using grasses (e.g., Kentucky Bluegrass)—especially where they are providing little value. But defining "low-value" can also be challenging. In the context of this discussion, the focus is on removing high-water-using turf on slopes, in medians, or other locations where alternatives like low-water vegetation, mulch or hard-scapes may reduce water use. At the same time, turf can serve an important function (functional turf), such as high-traffic areas that are used for recreation (e.g., sports fields), municipal operations (e.g., parks, stormwater swales), or for other critical operations.

WHY CREATE A COLORADO STANDARD?

States like Nevada or California have made important strides in low-water landscapes; however, the standards and programs used in those states cannot always be easily replicated in Colorado due to important differences in our climates. Nevada or Southern California's evaporation and transpiration rates (evaporative loss from plants) are significantly higher than Colorado's. Much of Colorado's native vegetation surrounding metropolitan areas is grassland, not desert shrubland. Colorado also experiences meaningful seasonal variation in temperature and precipitation. Additionally, Colorado has many native and well-adapted plant materials that provide ecological benefits, societal value, and cooling effects. Often turf removal in other states uses rock, gravel, or other materials that inevitably make landscapes hotter and may not support irrigation that sustains trees—exacerbating warming through the heat island effect.

*The Urban Landscape Transformation Task Force and DIY Landscape Transformation Guide are also part of Agency Action 1.7

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REPORT INPUTS

REPORT SCOPE

The CWCB's work to complete Agency Action 1.7 included parallel and complementary efforts. Some core components were:

- Convening the 21-member Urban Landscape Conservation Task Force (ULCTF), whose recommendations and suggestions for research partially inform the work in this report.
- Collaborating with Denver Water, Resource Central, and other stakeholders to develop a Do-It-Yourself (DIY) Landscape Transformation Guide that empowers homeowners to adopt water-wise landscaping practices.
- Advancing research questions and recommendations that emerged from the ULCTF and the state's Turf Replacement Grant Program.

This report builds on a growing body of previous work. It identifies insights and takeaways to inform the best practices for creating and sustaining healthy urban environments that reduce overall water use. It highlights key findings, identifies best practices, and provides data-driven insights for creating resilient urban environments that reduce water use. Policymakers can use these insights to make informed decisions about conservation tools that support sustainable landscapes.

This report draws on almost two years of piloting voluntary nonfunctional turf replacement programs and extensive analyses to evaluate standardized water savings metrics and the broader impacts of landscape change, including urban heat reduction, cooling capacity, and chemical use. **It consolidates diverse findings and emphasizes the need for more verified water savings instead of estimates while acknowledging the data limitations, legal complexities, and variability across landscapes.** Outdoor water conservation efforts are complex due to irregular irrigation patterns, weather and climate, and human behavior. Optimizing demand reduction results will require careful planning, monitoring, and evaluation to understand their efficacy.

Transformative landscape changes—replacing nonfunctional turf with drought-tolerant plants, xeriscaping, and other water-efficient techniques—can reduce water use while enhancing ecological value. However, challenges such as human behavior, aesthetic change acceptance, urban heat island effects, and ecosystem impacts must be considered. This report underscores the importance of thoughtful implementation to maximize benefits and mitigate undesirable impacts.

In addition to turf replacement, the report explores complementary strategies, including smart irrigation systems, native plants, and other alternative conservation tools. When combined with turf replacement efforts, these approaches can offer a multi-pronged approach to reducing outdoor water use in Colorado, recognizing that water savings will ultimately need to come through a combination of efforts beyond turf replacement to include a portfolio of other conservation tools. The report equips local decision-makers with actionable insights for sustainable landscape transformation programs by consolidating data on water and environmental impacts.

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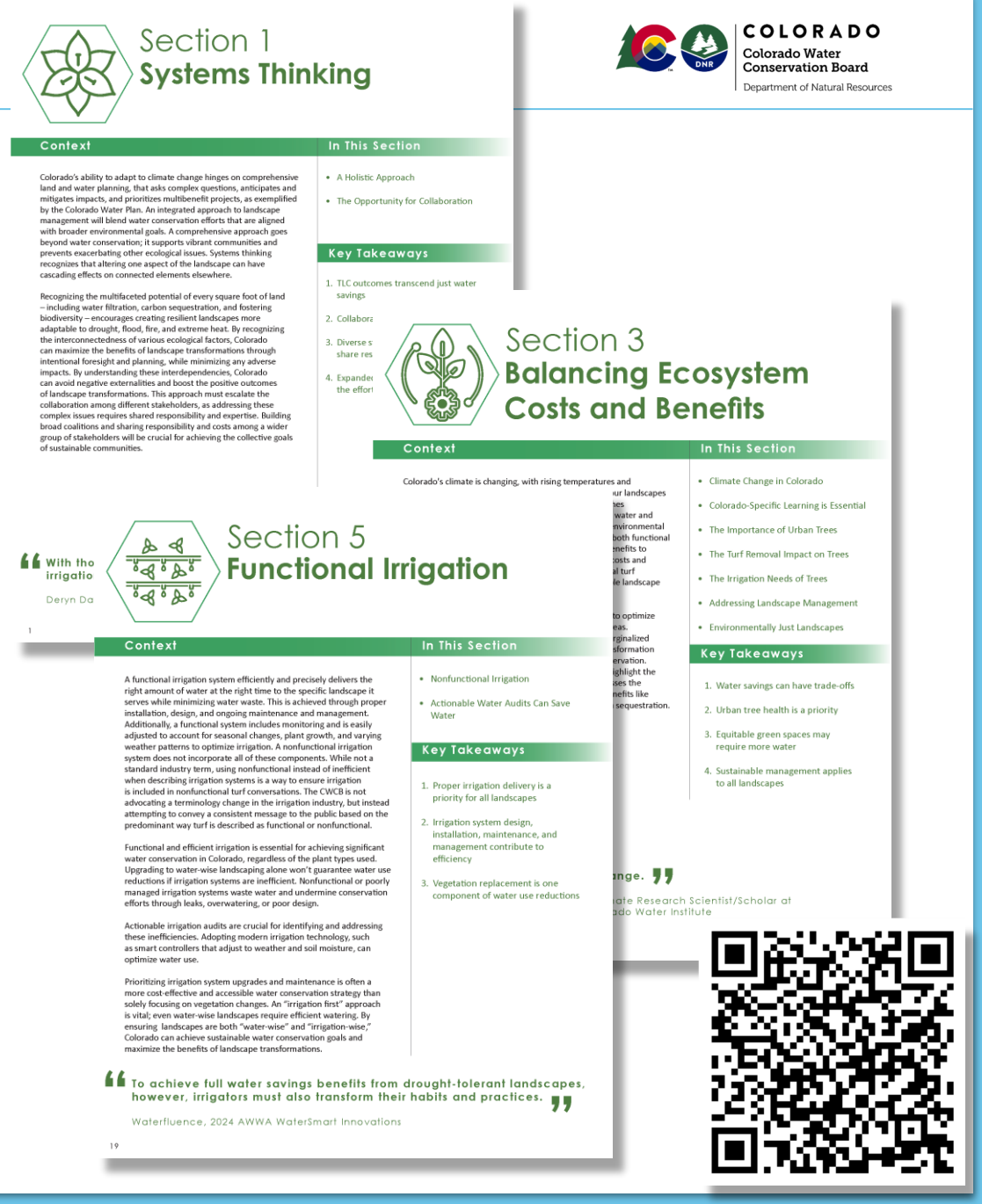
- 2023 Urban Landscape Conservation Task Force Final Report and Recommendations
- Contractor collaborations (BBC Research & Consulting, Brown & Caldwell, ELEMENT Water Consulting, PlanetScape AI, WaterDM, Wilson Water Group, and Wright Water Engineer)
- Turf Replacement Grant Program
- CWCB Board questions and CWCB staff research and analysis

SECTIONS

- Systems Thinking
- Collaborative Land Use Planning
- Balancing Ecosystem and Cost Benefits
- Understanding the Metrics
- Functional Irrigation
- Managing Expectations
- Targeting the Highest Users
- Learning from Existing Programs
- Shifting the Status Quo



THANK YOU!

engageCWCB.org

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Conservation Board
Department of Natural Resources

COLORADO
WATER PLAN

SNWA Water Smart Landscape Program History/Lessons Learned

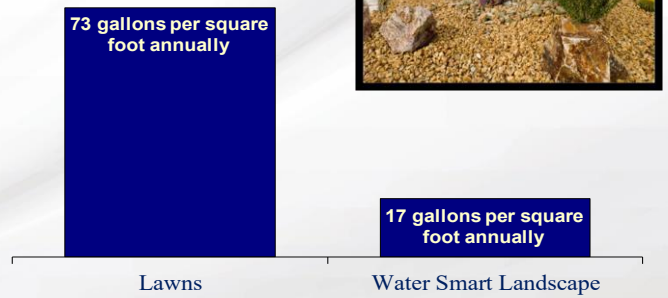
Toby Bickmore

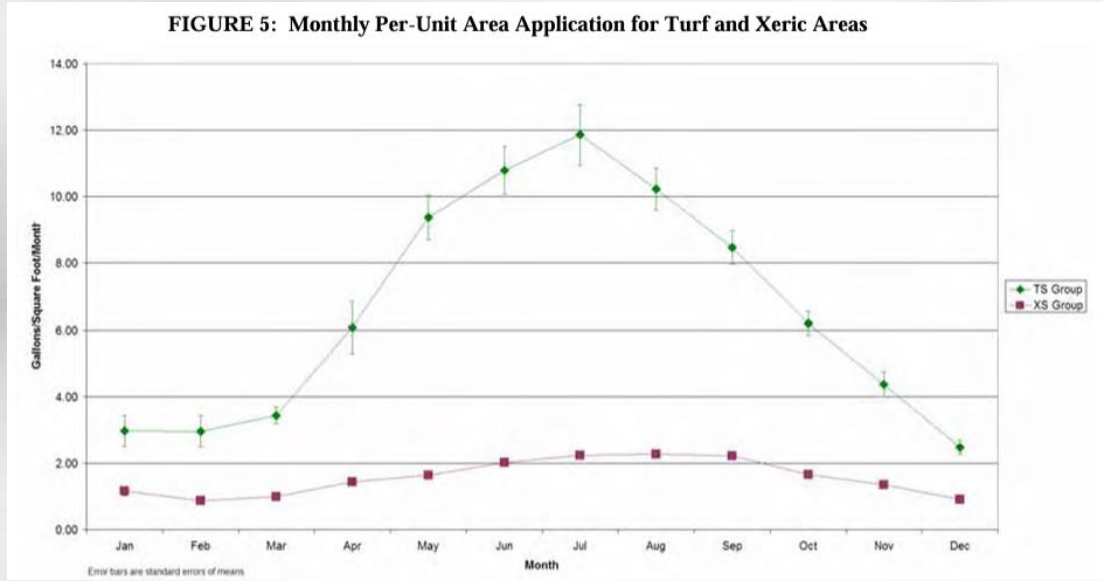
Conservation Services Administrator

SOUTHERN NEVADA WATER AUTHORITY™

Do Grass Conversions Save Water

- Late 1990's/early 2000's looked at roughly 500 properties – avg properties with grass/properties that converted and control group. Via submetering landscape areas – derived savings of 55 g/sf per year. 73 for grass vs 17 for xeric.
- 2010 timeframe, utilizing meter consumption analysis of several thousand conversion properties, validated 55 g savings.
- Roughly 14% of conversions do not save water – only common theme is smaller lot size with smaller conversions





How Much to Rebate and Budget

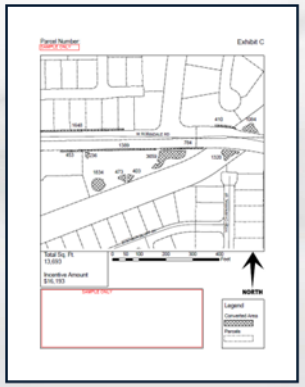
How much to Rebate

- Cost of Water (price to buy acre ft of water in the market dictates conservatio rebates for similar acre ft of savings)
- Customer Surveys

Summation of Cost per Square Foot	N Responses	561
	Average	$10.47
	Minimum	$0.51
	Maximum	$93.99
	% Artifical Turf	61%
	Average	$11.75
	Minimum	$0.51
	Maximum	$93.99
	% Non-Artifical Turf	39%
	Average	$8.45
	Minimum	$0.91
	Maximum	$68.49

Funding

- Bond/Easement
  - To utilize bond funding for the rebate, bond council determined that a conservation easement had to be recorded against the property – to assure conversions were permanent like capital projects
- Grants
  - More recently, BOR grant funding - $24 million grant in 2023 – SNWA equal match required



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Identify Where Grass Should be Planted

- **2003**, all SNWA member agencies passed ordinances that prohibited the installation of living grass in newly constructed homes.

- **2021**, Nevada Assembly Bill 356 – requiring all non-sf residential nonfunctional grass to be removed by 2027
- - Detailed process with community reps to identify ‘non-functional’ turf
- - Utilization of aerial imagery (flown quarterly) and infrared to identify turf areas

- **2023**, NV Assembly Bill 220 – no sf res grass beyond 2023

Misc. Lessons Learned and Challenges Going Forward

- Program design – prescriptive or not
  - Historically – no
    - allowing any type of trees, mulches, hardscapes, artificial grass etc = mass program participation – **over 93k projects and almost 250 million sq ft converted**

- Impacts of Conversions
  - Weather/Climate – conducted studies of plants succeeding in the future
  - Tree health
    - Bad conversion/design/irrigation

- How to reach remaining turf properties
  - Affluent who buy their way out – EUC
  - People's inability to front costs for conversions as well as discretionary spending

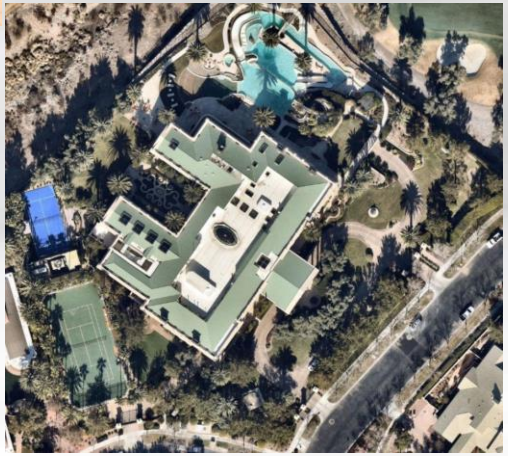
Scientific Name	Common Name	Plant Type	Still Within Tolerance Range in 2025?	Still Within Tolerance Range in 2055?
Aptenia cordifolia	Hearts and Flowers / Red Apple Ice Plant	GC, Succulent	Y	N
Buxus microphylla Japonica'	Japanese Boxwood	Shrub	Y	N
Dietes bicolor, Dietes iridioides, Moraea iridioides	Fortnight Lily (African Iris)	Perennial	Y	N
Drosanthemum cooperi	Purple Iceplant	GC, Succulent	Y	N
Echinocactus grusonii	Golden Barrel Cactus	Cactus	Y	N
Fraxinus velutina	Ash (Arizona)	Tree	Y	N
Fraxinus velutina glabra	Ash (Modesto)	Tree	Y	N
Fraxinus velutina 'Rio Grande' or 'Fan-tex'	Ash (Fan-Tex)	Tree	Y	N
Ligustrum japonicum	Waxleaf/Japanese Privet	Tree, Shrub	Y	N
Ligustrum lucidum	Glossy Privet	Tree, Shrub	Y	N
Liriope muscari	Lily Turf	Perennial	Y	N
Olea europaea	Olive Tree	Tree	Y	N
Pinus eldarica	Pine (Mondell/Afghan)	Tree	Y	N
Pinus halepensis	Pine (Aleppo)	Tree	Y	N
Pittosporum tobira	Mock Orange (Japanese)	Shrub	Y	N
Pyracantha koidzumii 'Santa Cruz'	Santa Cruz Pyracantha/Firethorn	GC	Y	N
Rhus lancea	African Sumac	Tree	Y	N
Rosa species	Rose*	Shrub, Vine	Y	N*
Salvia greggii	Sage (Autumn)*	Shrub	Y	N*
Vitex agnus-castus	Chaste Tree	Tree	Y	N
Xylosma congestum	Xylosma [shrub]	Tree, Shrub	Y	N
Yucca recurvifolia	Weeping/Pendulous Yucca	Succulent	Y	N

N 1 zone above tolerance range

NN 2 zones above tolerance range

NNN 3+ zones above tolerance range

* some specific cultivars/varieties may still be within tolerance level



SOUTHERN NEVADA WATER AUTHORITY™

Turf Trade

Trade up. Dry out. Stay Green.

Jack Karlin

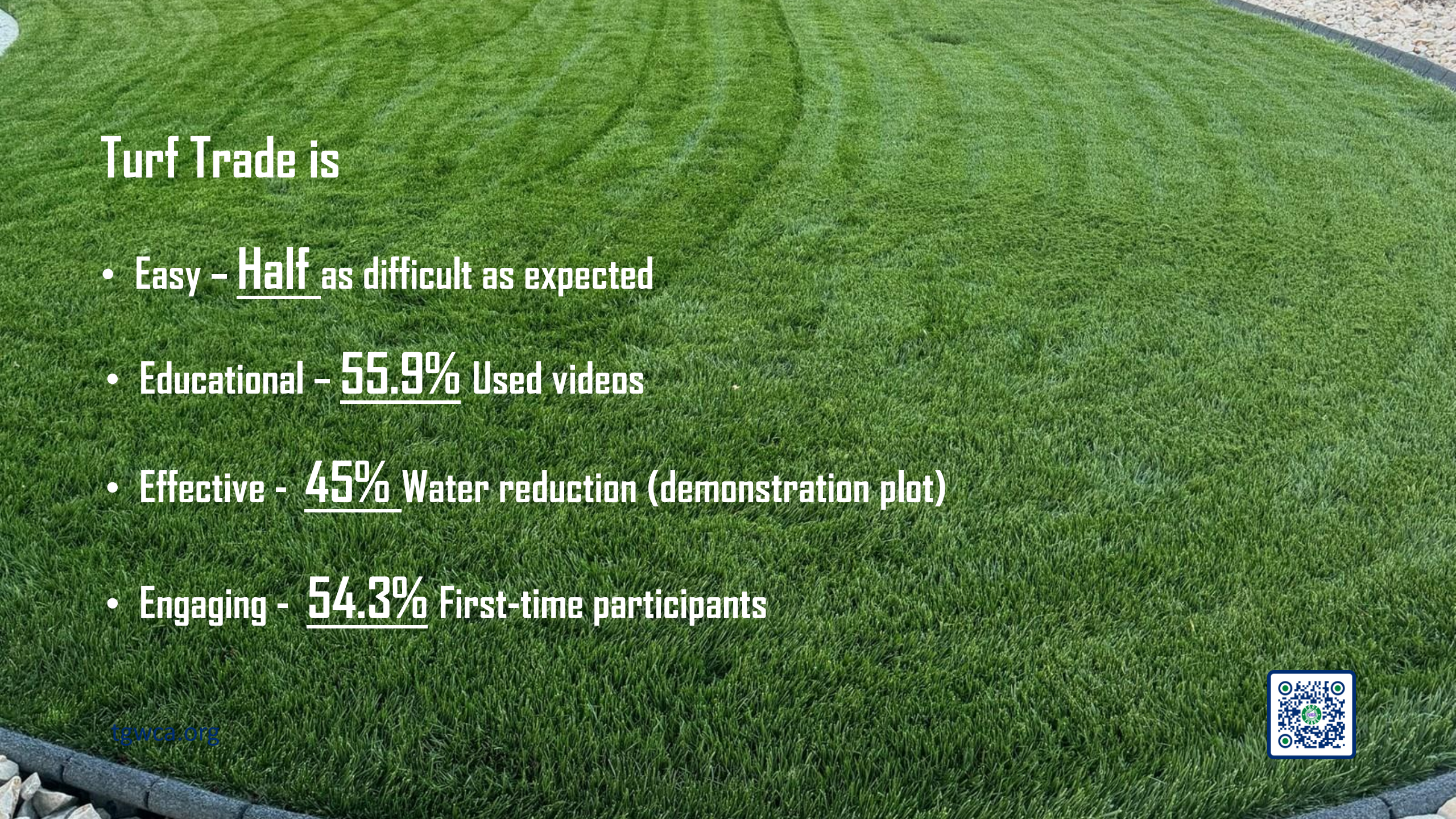
jack.karlin@tgwca.org

@_tgwca.org

tgwca

TWCA is

- Independent
- Data Driven
- Objective data



Turf Trade is

- Easy – Half as difficult as expected
- Educational – 55.9% Used videos
- Effective - 45% Water reduction (demonstration plot)
- Engaging - 54.3% First-time participants

tgwca.org

Turf Trade is

Introduction

Site Description

Seeding

Light Irrigation

Mulching

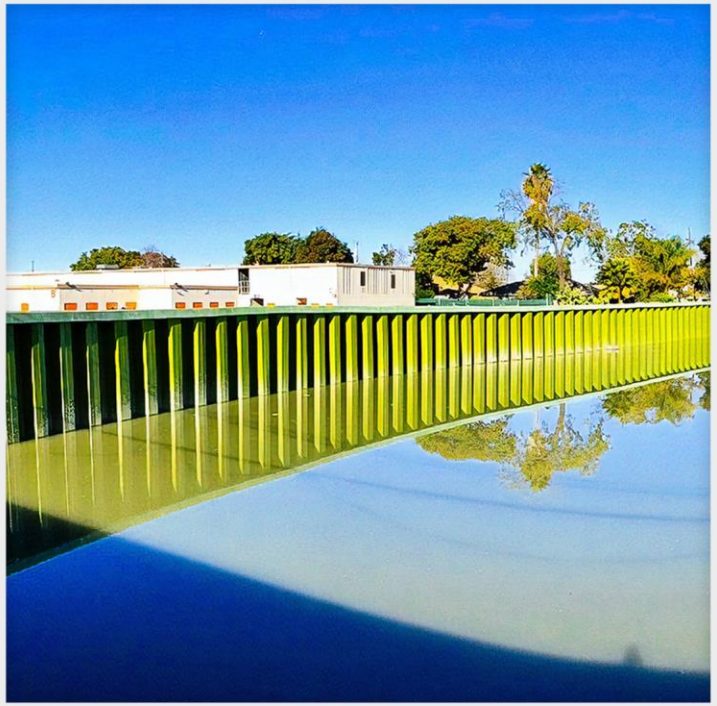
Seasonal Irrigation

Turf Trade by the Numbers

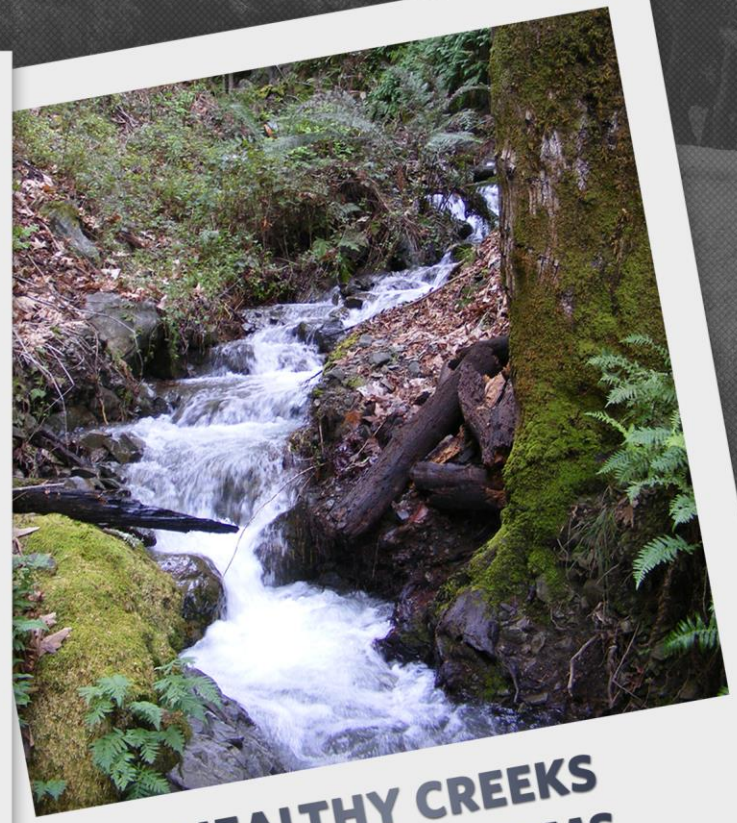
- 2200+ Households statewide
- 142 Acres (6.1million square ft)
- 141 A-ft savings potential annually
- 75% Satisfaction
- 28 Units/household savings
- 8 programs statewide
- 6 videos
- 4years
- 2 Cooperating cities

Valley Water provides:

CLEAN, RELIABLE WATER



FLOOD PROTECTION



HEALTHY CREEKS AND ECOSYSTEMS

Valley Water

15 Cities

2,000,000 People

13 Local water providers

4,700 Direct well owners

Santa Clara Valley
Water District

0 4 8
Miles

Graywater Animation

Graywater Rebate and Resources

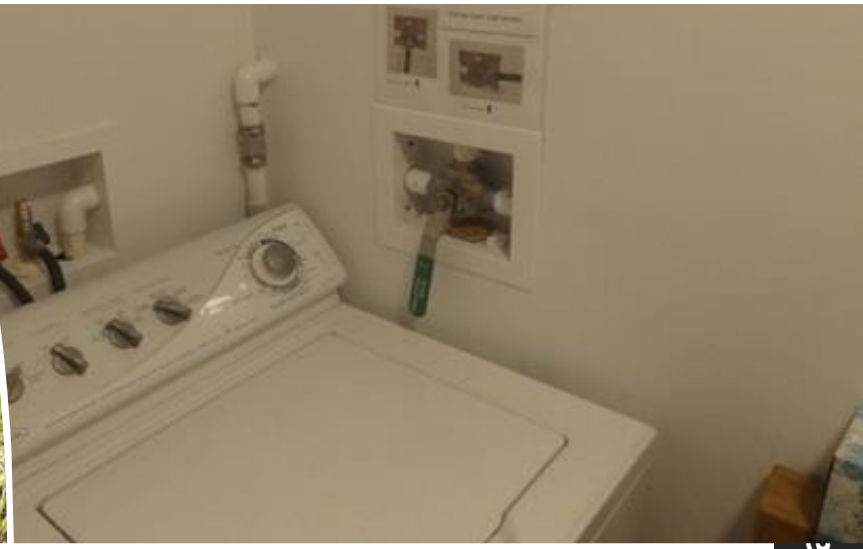
Launched in 2014

$200 or $400 rebate

Pre-approval required

164 completed projects

Virtual post-inspection



Valley Water

A Study of L2L Systems in Santa Clara County

- University-led analysis of 30 households.
- Most systems were within acceptable water quality parameters tested
- 85% of systems are compatible with CA plumbing codes
- 59% of vegetation irrigated by Graywater was drought tolerant
- Outdoor vegetation diverse and healthy

Water Conservation Poll

- 72% of residents are interested in installing a graywater system
- 87% of residents stated that I actively work to use less water, even if there are no restrictions on water use
- **Outcome:** Cross-promote the Graywater Rebate through the Landscape Rebate Program

East Bay Municipal Utility District Water Conservation

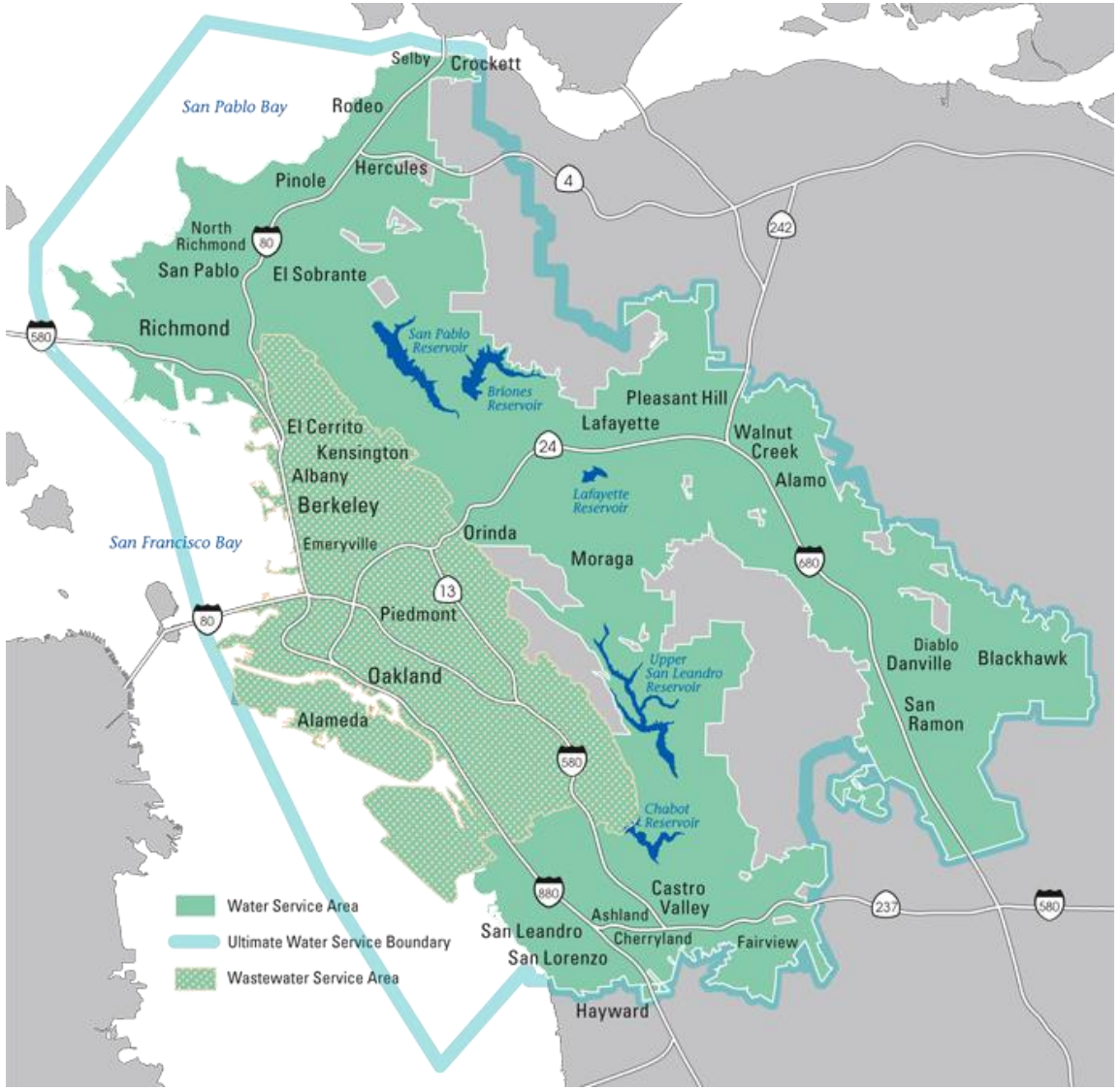
Whitney Ray

August 8, 2025

EBMUD

EBMUD Water & Wastewater Service Areas

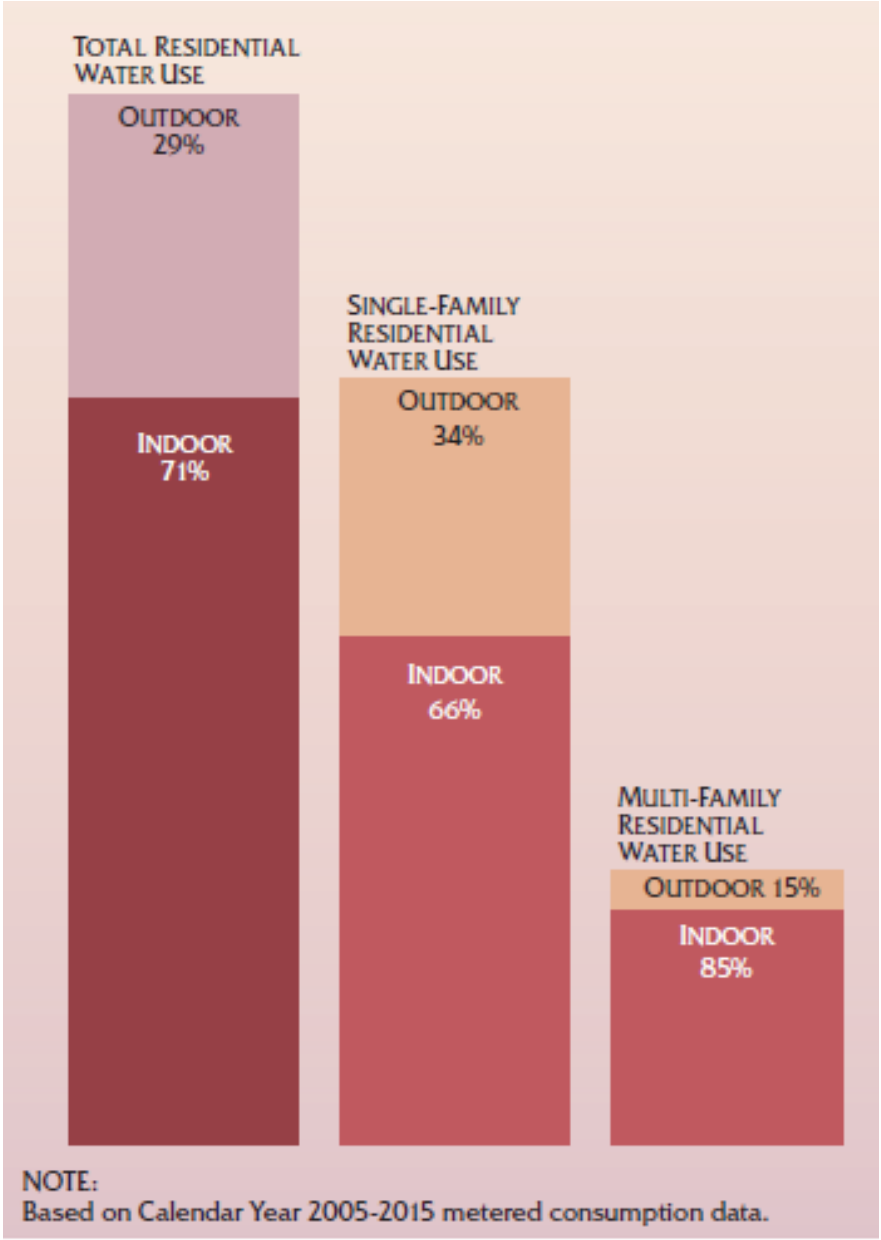
- Alameda & Contra Costa Counties
- 1.4 million water customers
  - ~400,000 connections
- 685,000 wastewater customers
- > 4,200 miles of pipe



Average EBMUD Household Use

Single & Multi-Family

- Outdoor water use: 34%
- Indoor water use: 66%



Graywater Rebate

- Began in 2010
- $100 Rebate
  - Brass three-way diverter
  - Air admittance or anti-siphon valve
  - PVC conveyance line
- Review L2L video and submit receipts within 90 days of purchase
- 120+ projects completed to date
- Do not require an inspection or images of system. Only require receipt of parts

Outdoor Urban Water Use in California

EBMUD emailed to 86 customers - 43 responses (50%)

Satisfaction

- Respondents are “satisfied” to “very satisfied” with their system

Installation and Maintenance

- Systems require minimum maintenance

Water savings data analysis

- EBMUD (2024) Preliminary analysis shows on average, modest water savings with a wide range.

Customer Feedback

- Increase rebate amount

Water Conservation Culture

- Positive attitudes towards their system and moderate level of showcasing system to friends/family
- Many indicate the installation of the graywater system inspired other water conservation changes in the household

Water Conservation Culture

making water conservation part of our daily habits

- In Australia, Fieldings et al. (2012) found **households who reported a stronger culture of water conservation used less water**. Singha et al. (2022) also found **awareness of water issues was highly related to attitude, responsibility, and culture**.

- **Psychological, social, and behavioral factors** such as attitudes, beliefs, values, norms, behavior control, emotion, personal involvement, and awareness **are important determinants of water conservation behavior** (Singha et al. 2022)

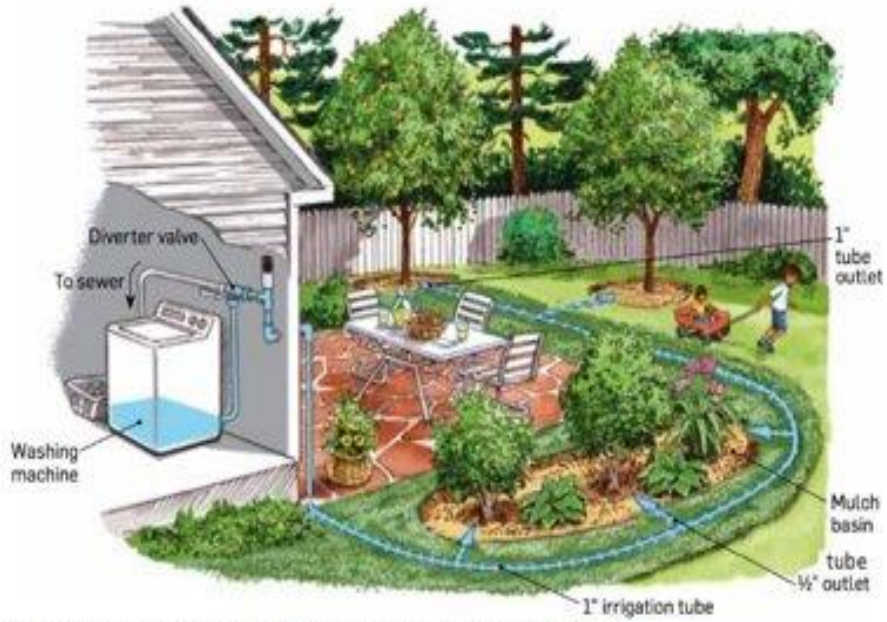
Summary

- **Many customer who install Laundry-to-Landscape systems report satisfaction with the system**, low maintenance requirements, are likely to recommend to a friend, and talk about the systems with friends and family.

- With longer and more frequent droughts, the **adoption of a water conservation culture, is essential to meet local and state conservation goals**.

- **Shifting how we reach our customers**

Creating a Conservation Culture



© Steve Sanford in Greywater, Greenlandscape by Laura Allen

Reminders & What's Next

Thank you all for participating in this session!

- **CEUs:** AWWA CA-NV Water Use Efficiency Practitioner and Irrigation Association

American Water Works Association California-Nevada Section

IRRIGATION ASSOCIATION CEU APPROVED SELECT CERTIFIED

- **Next:** Closing Plenary (3:15 – 3:30 pm) in Room 621
- **If you are joining the Lincoln Park Nature Boardwalk & Zoo Field Trip, meet in the lobby at 3:00 pm for a 3:30 pm *sharp* bus departure!**

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