

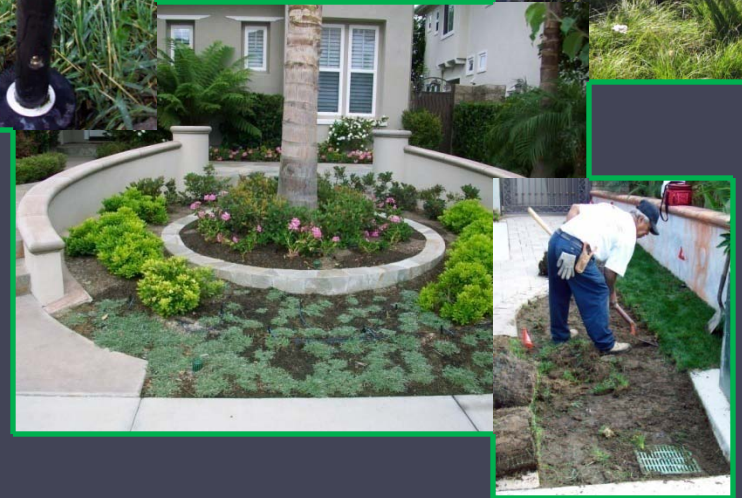
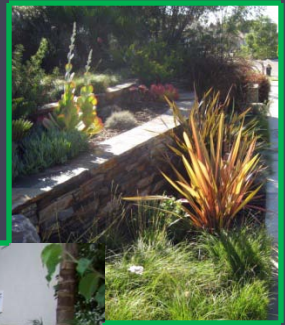
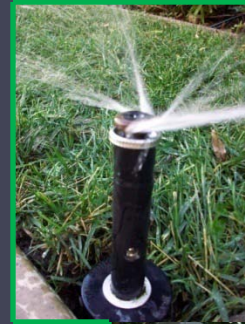
This presentation premiered at WaterSmart Innovations

watersmartinnovations.com



Sustainability:

1 Part Landscape,
1 Part Irrigation,
1 Part Perception



A Comprehensive
Irrigation & Landscape
Improvement Study

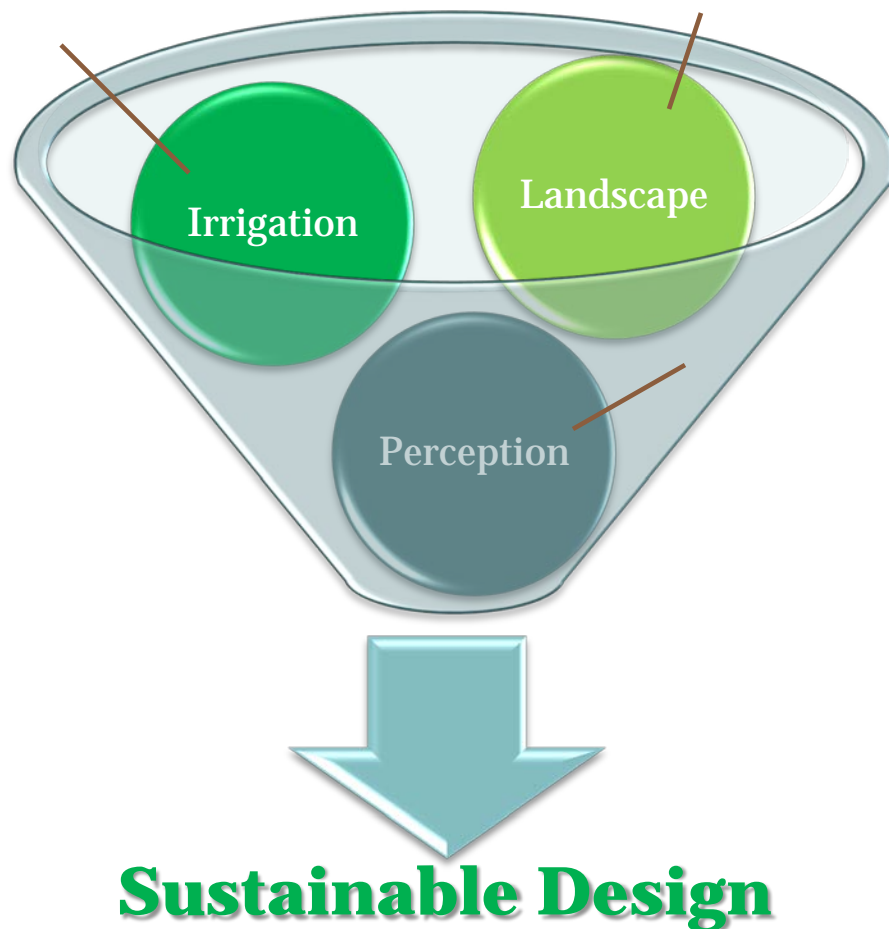
Partnership between:



Sustainable Design?



Sustainability..... 3 parts



SUSTAINABLE DESIGN :

- **Landscape:** Is this an environmentally intelligent plant palette & design layout?
- **Irrigation:** Does the appropriate application rate and frequency of irrigation occur?
- **Perception:** Does this design define a community & enrich it in the long-term?



Project Goals

- Study the water savings & water runoff reduction for a comprehensive irrigation and landscape retrofit in a community:
 - “Smart” Irrigation Controllers
 - Irrigation System Improvements
 - Turf Removal for Water-Smart Plants





Project Funding Partners

- A Proposition 50 Grant from
 - **State Water Resources Control Board**
- **Municipal Water District of Orange County (MWDOC)**
- **Metropolitan Water District of Southern California (MWD)**
- **Natural Resources Conservation Service**
 - **Resource Conservation District Staff**
- **United States Bureau of Reclamation**
- **City of San Clemente**

Location & Watershed



- Prima Descheca Watershed, San Clemente, Orange County CA

Reserve HOA Characteristics

- Distinct storm drainage systems
- Similar housing stock (2003)
- The Reserve **“Test Group”**
 - 239 lots
 - 5.9 lots per acre
 - 7,403 sq.ft. = avg. lot size
- The Reserve **“Control Group”**
 - 180 lots
 - 7.3 lots per acre
 - 5,943 sq.ft. = avg. lot size





Timeline

2007

2008

2009

2010

**2007:
Prop 50
Grant
funding
awarded**

**Summer '08:
Dry-Season
runoff flows
measured pre-
retrofit**

**Nov '08:
Test Group
received
marketing
material &
contracts with
landscape
contractors
finalized.**

**Nov '08 –
Apr '09:
Retrofits occur
during “wet”
season. Up to
\$3,000/home
available for
comprehensive
retrofits.**

**2009 – 2010:
Post-retrofit
water use,
water runoff
and water
quality
monitoring &
statistical
evaluation.**



Direct Marketing Effort

The Reserve Outdoor Sustainability Project

In partnership with The Reserve Maintenance Corporation

MUNICIPAL WATER DISTRICT OF ORANGE COUNTY

CA Friendly and Native Plants

Smart Irrigation Controller

Synthetic Turf and Edgescape

Rotating Nozzle Retrofit

Project Description | Improvement Options | Participation Process | Project Application | Terms and Conditions


The screenshot shows a website for "The Reserve Outdoor Sustainability Project". At the top left are the logos for the City of San Clemente and the Municipal Water District of Orange County. Below these is the text "In partnership with The Reserve Maintenance Corporation". The main title "The Reserve Outdoor Sustainability Project" is centered. Below the title are four columns, each with a green header and a corresponding image: "CA Friendly and Native Plants" (a garden with native plants), "Smart Irrigation Controller" (a white and blue controller mounted on a wall), "Synthetic Turf and Edgescape" (a house with a green lawn and synthetic turf), and "Rotating Nozzle Retrofit" (a black nozzle spraying water). At the bottom of the website is a navigation bar with five links: "Project Description", "Improvement Options", "Participation Process", "Project Application", and "Terms and Conditions".

- Dedicated website, flyers left on doors, direct mailings, HOA Board endorsement, kick-off meeting @ HOA clubhouse, word of mouth



Retrofit Process

- Resident to fill out applic.
 - \$50 deposit → “bait”
- A pre-retrofit audit performed
 - Performed by Resource Conservation Dist. staff
- Proceed letter to eligible residents
 - Resident to choose between 2 landscape contractors
- Contractor completes Indscp./irrig. improvements
- A post-retrofit audit performed
 - \$50 deposit returned
- Fine-tuning & callbacks



**Project
Application
Form**

OFFICE USE ONLY

PLEASE NOTE: Forms are processed in the order in which they are received. *This offer will be distributed on a first-come, first-served basis while funding lasts.* To receive this offer you must follow and satisfy all Application Form Instructions and Terms and Conditions listed on the reverse side. Please sign, date, and include a copy of your most recent water bill and a refundable check for \$50 – along with this completed form – to the City of San Clemente at the address provided.

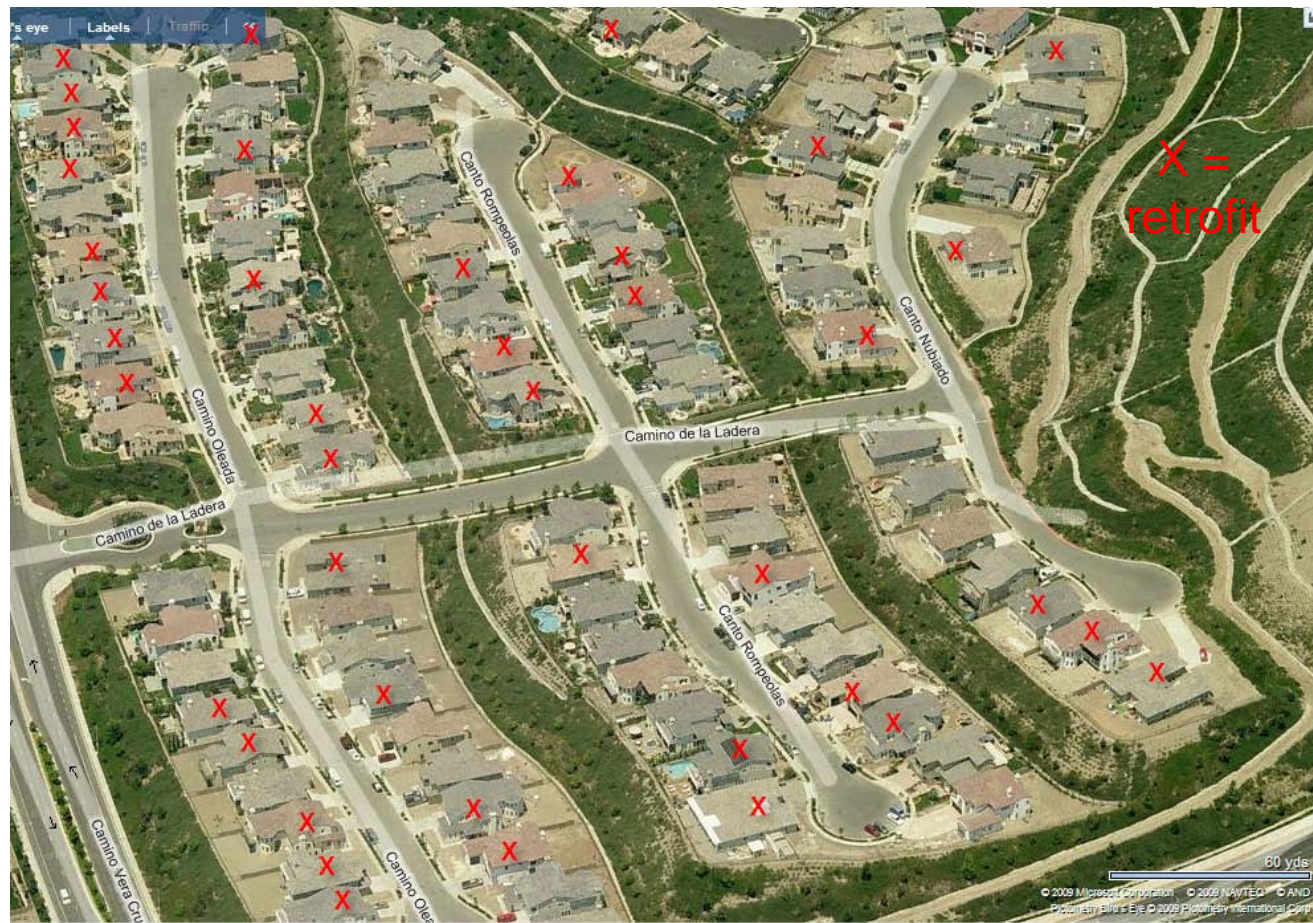
| 1. ACCOUNT INFORMATION | |
|-------------------------------------|---------------------------------|
| Name on Water Account (Water Bill): | Water Account Number: |
| 2. INSTALLATION ADDRESS | |
| First Name: | Last Name: |
| Address: | Unit Number: |
| City: | Zip: |
| Phone Number: () - - | Assessor's Parcel Number (APN): |

Site Inspections & Retrofits in Action



Homes Retrofitted

- **Control Group**
 - 239 eligible homes
 - 72 homes retrofitted
 - 30% retrofit rate





Widgets & Stats

- 72 homes retrofitted
- 178,340 ft² of landscaping (4 acres) or 2,475ft²/home
 - 35% grass / 65% shrubs
- 8 homes had turf areas removed
 - 820 ft² total or 102 ft²/home
- \$206,570 or \$1.53/ft²
- 70 smart controllers installed
- 4,880 spray heads removed (avg. 68/home)
- 1,550 Rotating Nozzles installed (avg. 22/home)
- 7,370 Drip Emitters (avg. 112/home)
 - 13,570 linear feet of drip tube installed (2.5 miles)





Post-Retrofit Audit Analysis*

| | Linear Feet Overspray/ Runoff | Distribution Uniformity | Precipitation Rate ("/hr) | Nozzle Pressure (p.s.i.) |
|----------------------|--|------------------------------------|--|---|
| PRE-Retrofit | 44 | 47% | 2.28 | 52 |
| POST-Retrofit | 16 | 58% | 0.84 | 48 |
| Difference | 28 foot decrease | 11% increase | 1.44 "/hr decrease | 4 p.s.i. decrease |

* Averages of retrofit homes

Case Study #1



DU: 60%
Precip. Rate = 3.63 "/hr
Pressure = 95 p.s.i.
Overspray/Runoff = 41 ft.



DU: 65%
Precip. Rate = 0.44 "/hr
Pressure = 40 p.s.i.
Overspray/Runoff = 20 ft.

Case Study #2

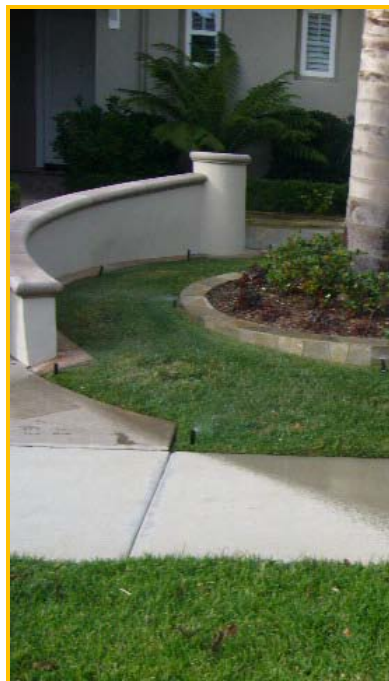


Photo: Monday 10/5/09

PRE



POST

DU: 18%
Pressure = 85 p.s.i.
Overspray/Runoff = 30 ft.

DU: -% (drip)
Pressure = 25 p.s.i.
Overspray/Runoff = 0 ft.
149 ft² of turf removed

Case Study #3



DU: 44%
Precip. Rate = 2.4 "/hr
Overspray/Runoff = 40 ft.

DU: 65%
Precip. Rate = 0.63 "/hr
Overspray/Runoff = 12 ft.
100 ft² of turf removed

Case Study #4



PRE



POST

DU: 38%
Precip. Rate = 1.3 "/hr
Pressure = 22 p.s.i.
Overspray/Runoff = 45 ft.

DU: -% (drip)
Precip. Rate = 1.8 "/hr
Pressure = 30 p.s.i.
Overspray/Runoff = 0 ft.
262 ft² of turf removed



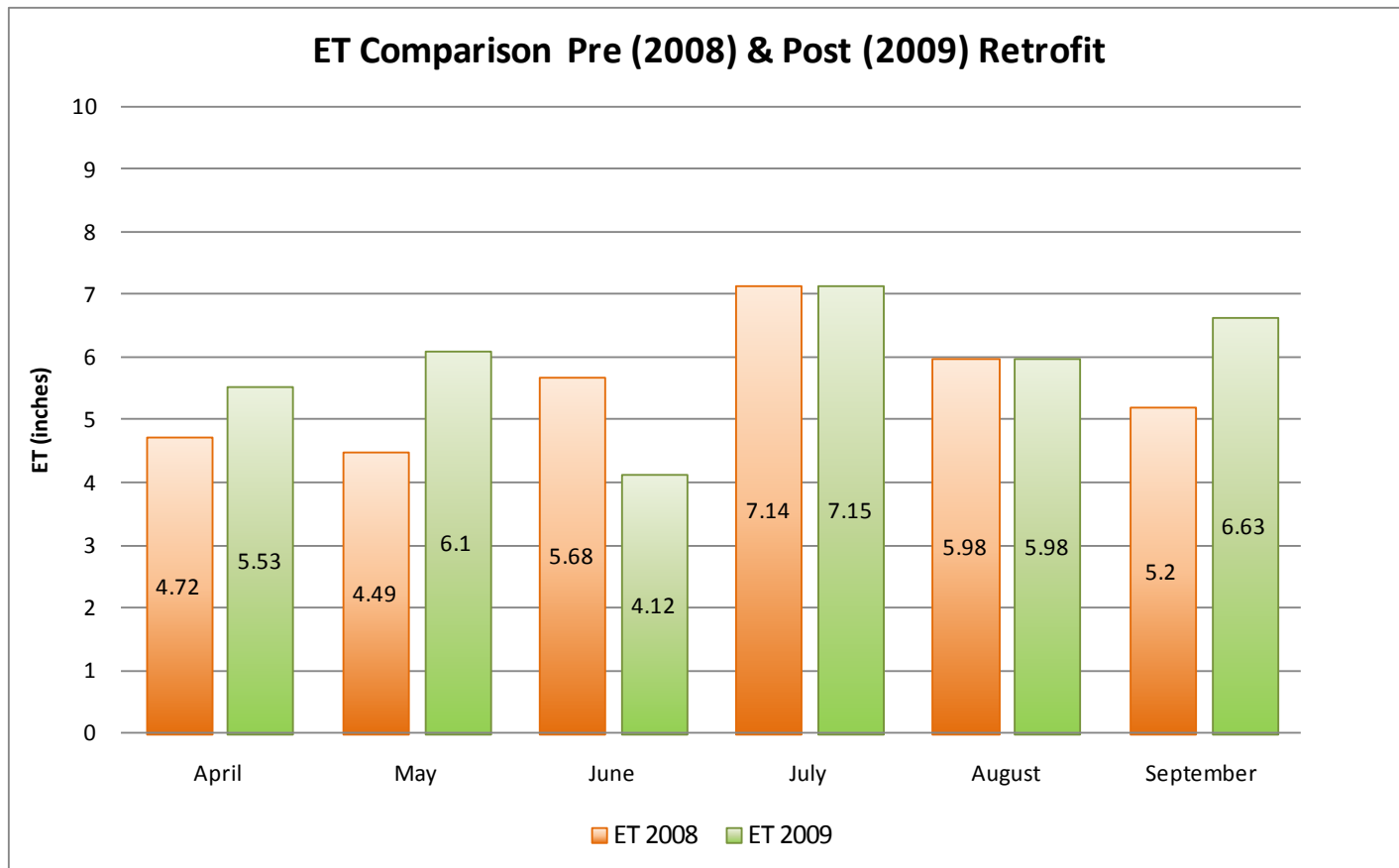
Initial Water Savings Results

- **Must wait for more water use data... & statistical evaluation. . .**



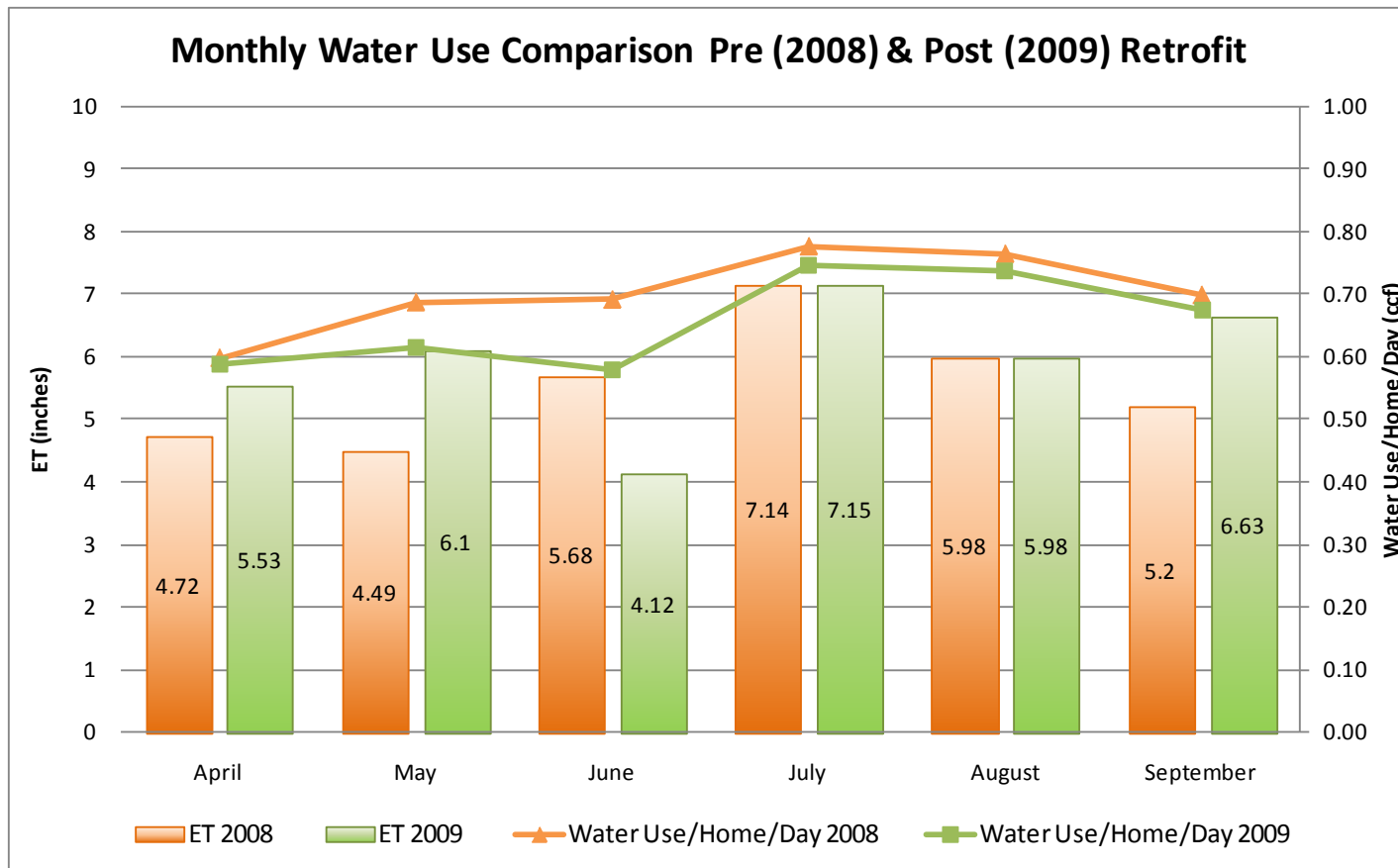


Initial Water Savings Results





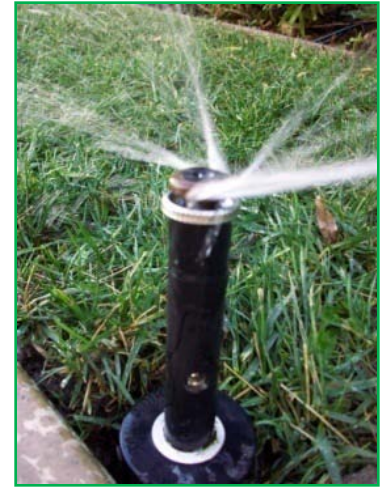
Initial Water Savings Results





Lessons & Challenges

- **Technology & DU: Don't mix Little Valves & MP Rotators**
- **Challenges of Managing Expectations & Perceptions**
 - **Green Lawns or Lower Water Bills?**
 - While grass is not deeply rooted in the soil, it is in our souls. . .
 - **"Smart" irrigation can be counter-intuitive**
 - Runtimes & Cycle/Soak vs. Water Used
 - **Causation vs. Correlation . . . (bunnies & water rates!)**



More To Come:

- Tracking post-retrofit water consumption
- Conduct a statistical analysis to determine project's effectiveness in reducing water consumption and water runoff.

• **QUESTIONS?**
(or Happy Hour?)

