

This presentation premiered at WaterSmart Innovations

watersmartinnovations.com



Random Control Trials; The Future of Testing New Conservation Ideas?

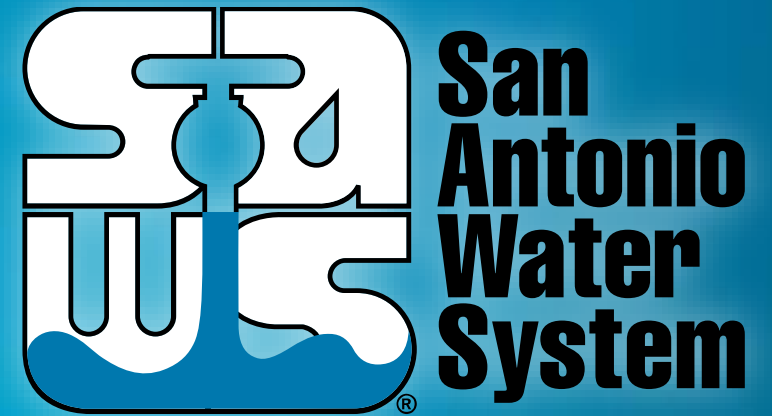
Karen Guz

Conservation Director

San Antonio Water System

WaterSmart Innovations Conference

October, 2018



MAKING SAN ANTONIO
WATERFUL



Outdoor Conservation = Behavior Based Programs

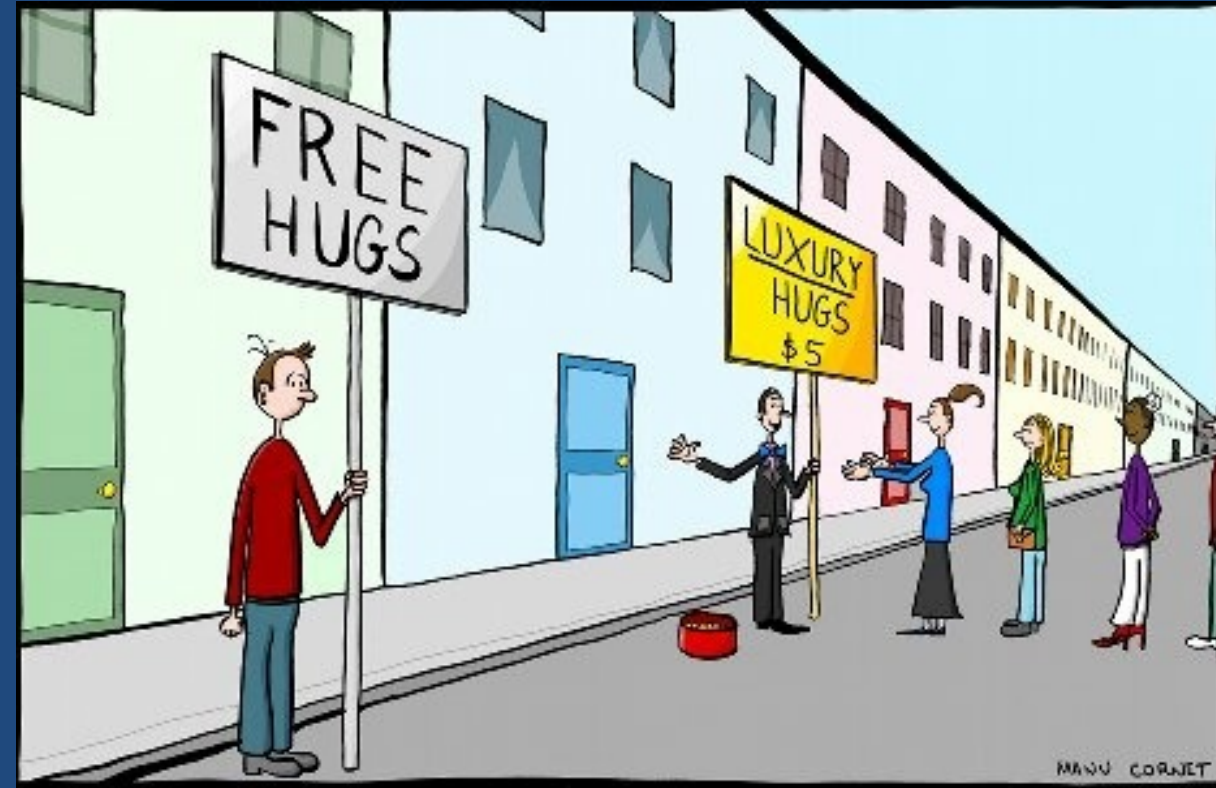
Human decisions/values/ideas determine outdoor water usage....not science

- 70% of households watered less than “theoretical irrigation requirement” in REUS study
- A percentage of households will increase water use after changing to low-water landscape plant material
- Some households increase usage after drip irrigation retrofit
- Letters pointing out usage data results in measurable reduction in household use...but often denial of impact

Behavior-based Programs Are Usually Planned with “Deemed Savings”

Often Deemed Savings Estimates Have A Key Assumption...

People Are Rational and Will Behave in Logical Ways



“Say It Ain’t So Results” Do Happen

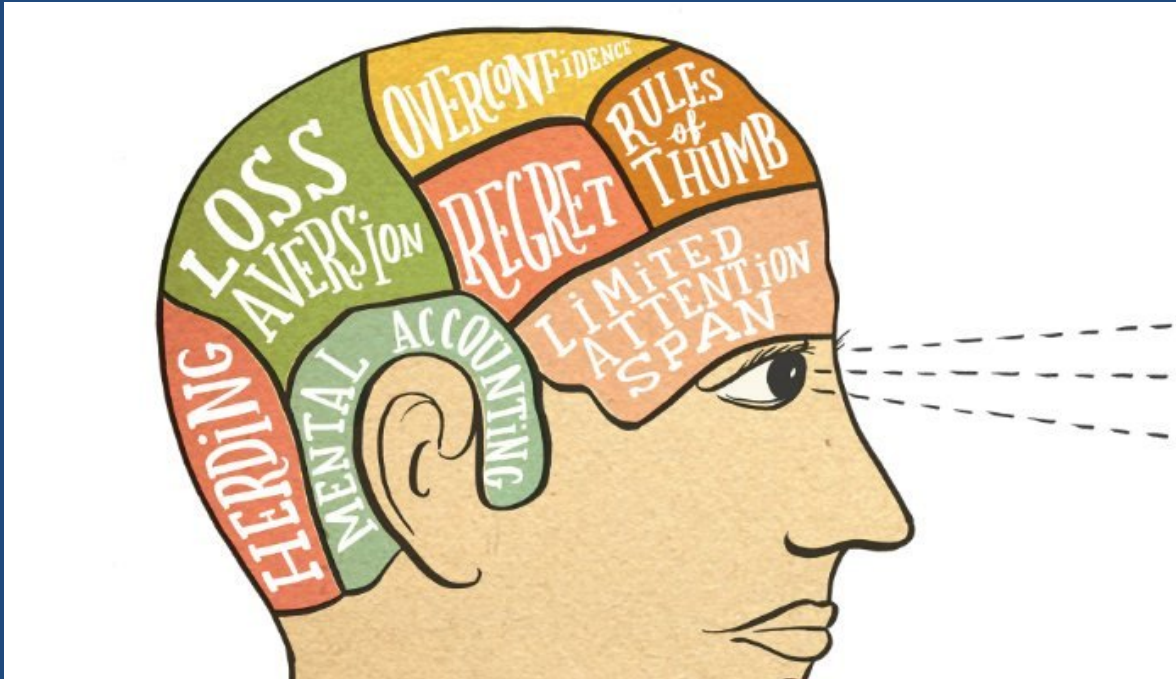
Program Results Are Not What We Always Expect



2016 Rain Barrel Incentive

- increased water usage
- decreased participation motivation
- nearly all participants were proud of their perceived savings

Behavioral Economics



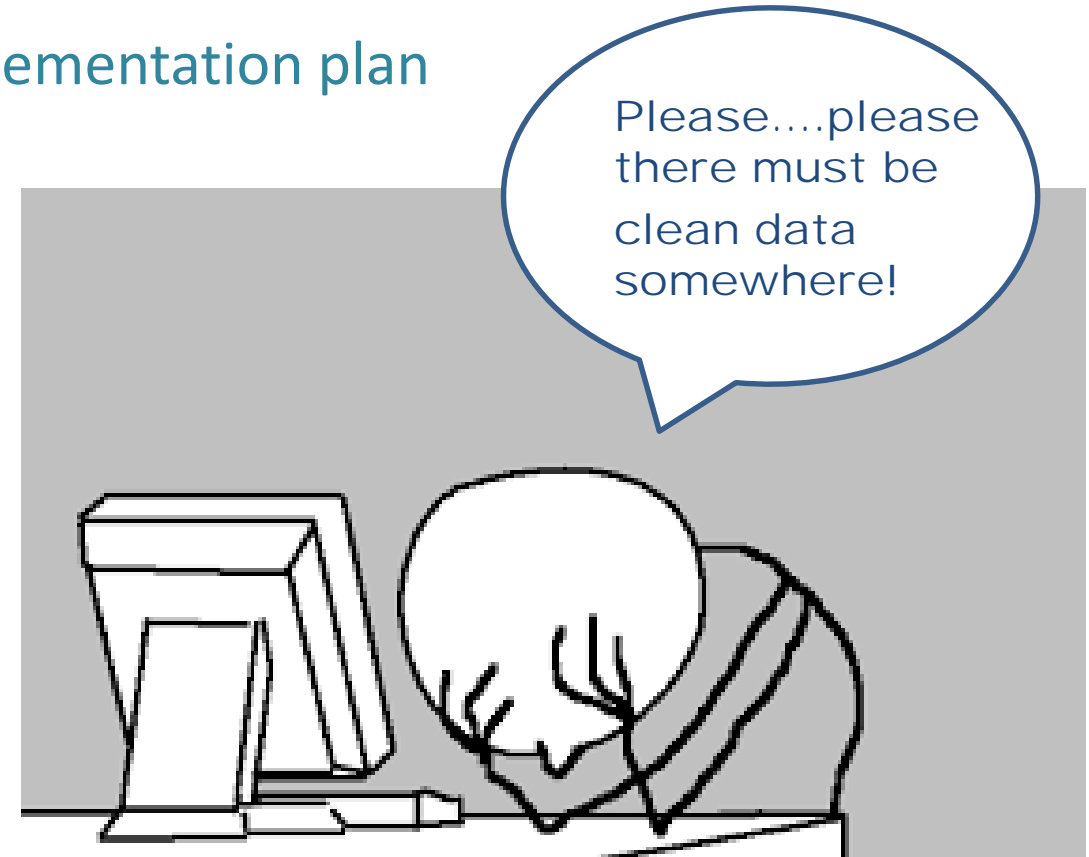
The basic message of behavioral economics is that humans are hard wired to make judgment errors and they need a nudge to make decisions that are in their own best interest.

Conclusion: Deemed Savings Assumptions May be False.
Behavior-Based Savings Must Be Tested “in the wild”

Start With Evaluation Plan to Avoid Issues

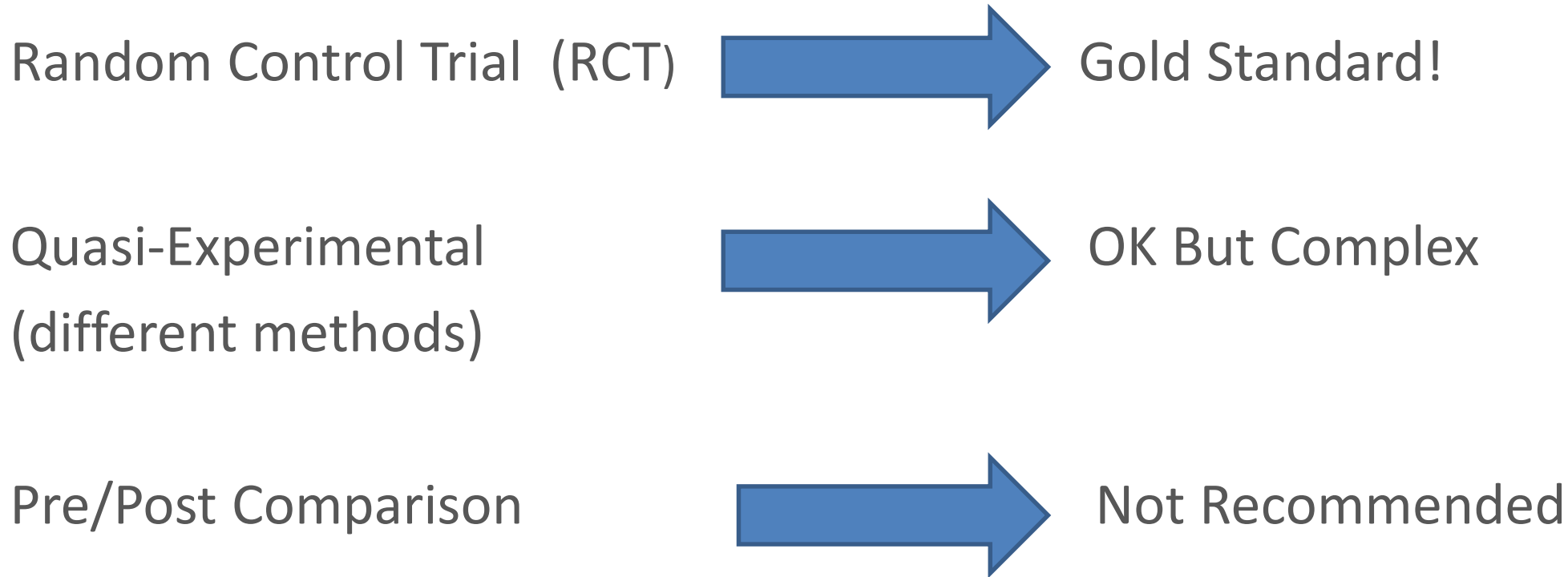
Evaluation should be part of our program implementation plan

- **Pre/Post:** Finding valid comparison weather periods challenging
- **Data issues:** meter read dates may vary by 15 days in a cycle
- **Confounding variables:** rate change, news, education events
- **Our Bias:** risk “data mining/massaging” until data looks the way we expected



How to Plan for BB Evaluation?

Some Advice From Energy Efficiency Literature



How to Do RCT in Real World..and Keep Our Jobs

Process Easiest with Entirely New Program Options Rather Than Existing Programs

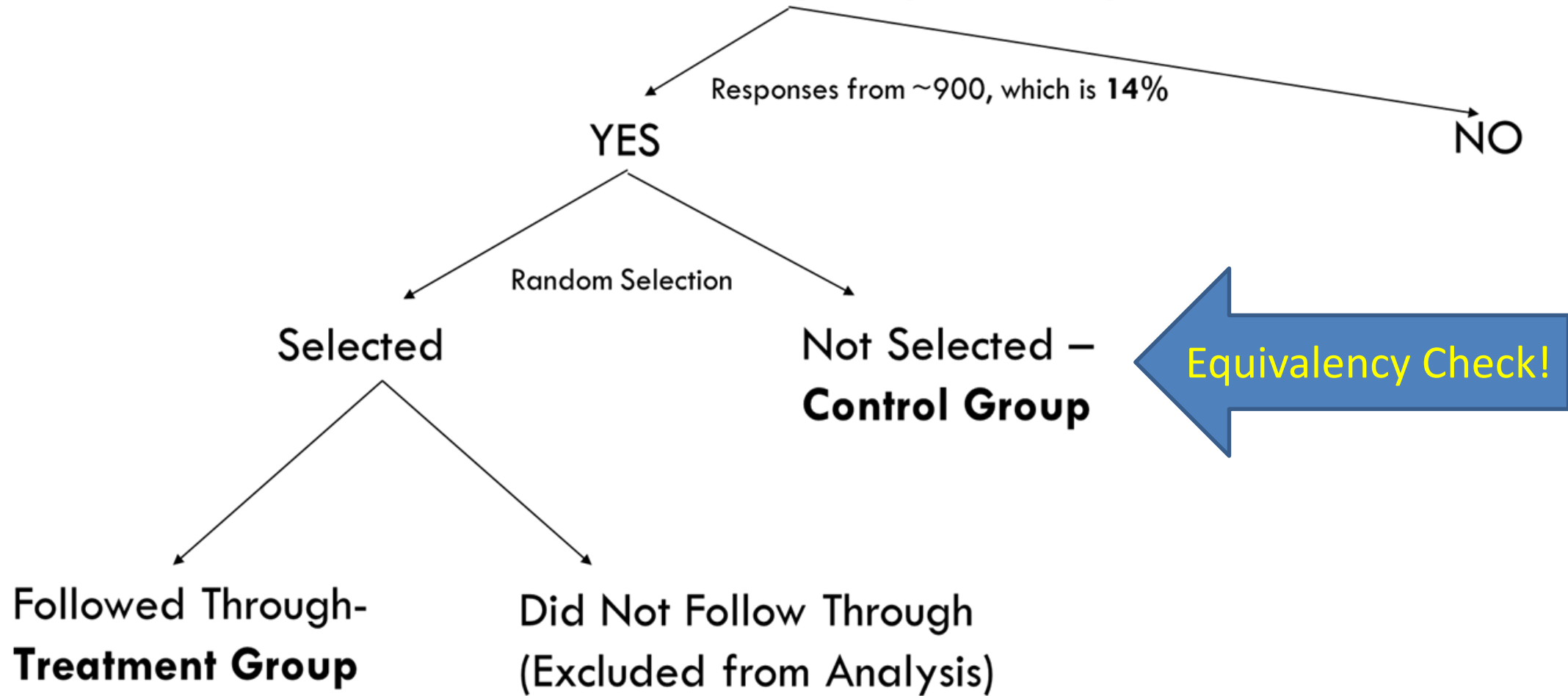
Opt In Pilot Process

1. Define/select target population
2. Market: Tell them it is a pilot and half will get program offer
3. Randomly assign half of those who opt in to control group
4. Do program
5. Compare intervention & control group to assess savings

Recent Pilot RCT Efforts

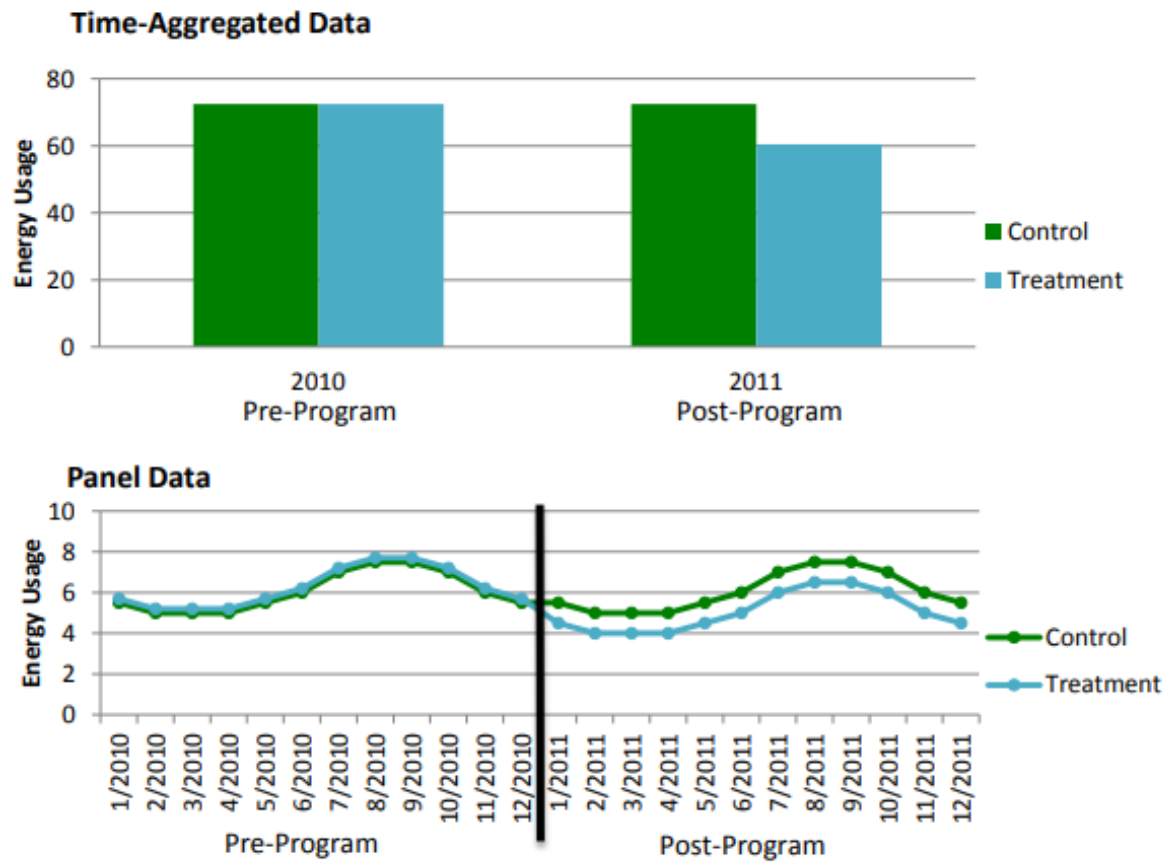
- (Opt Out Design) WaterSmart Monthly Reports
- Rachio Controllers; Top1% Users
- Pool Check-Up

Sent invitations to ~6,600 people via print & email



What Does RCT Results Graph Look Like?

Source: State & Local Energy Efficiency Action Network Paper



- Control and treatment groups must be equivalent in key ways that influence water usage
- Water use should track closely pre-treatment
- Post-treatment tracking best done for long period
- Larger sample size give more confidence for differences being real and not by chance

WaterSmart “High User/Low Engagement” Pilot

Will high users with no conservation activity in 5 years save with WaterSmart Reports?

Large Selected Population in Random Groups:

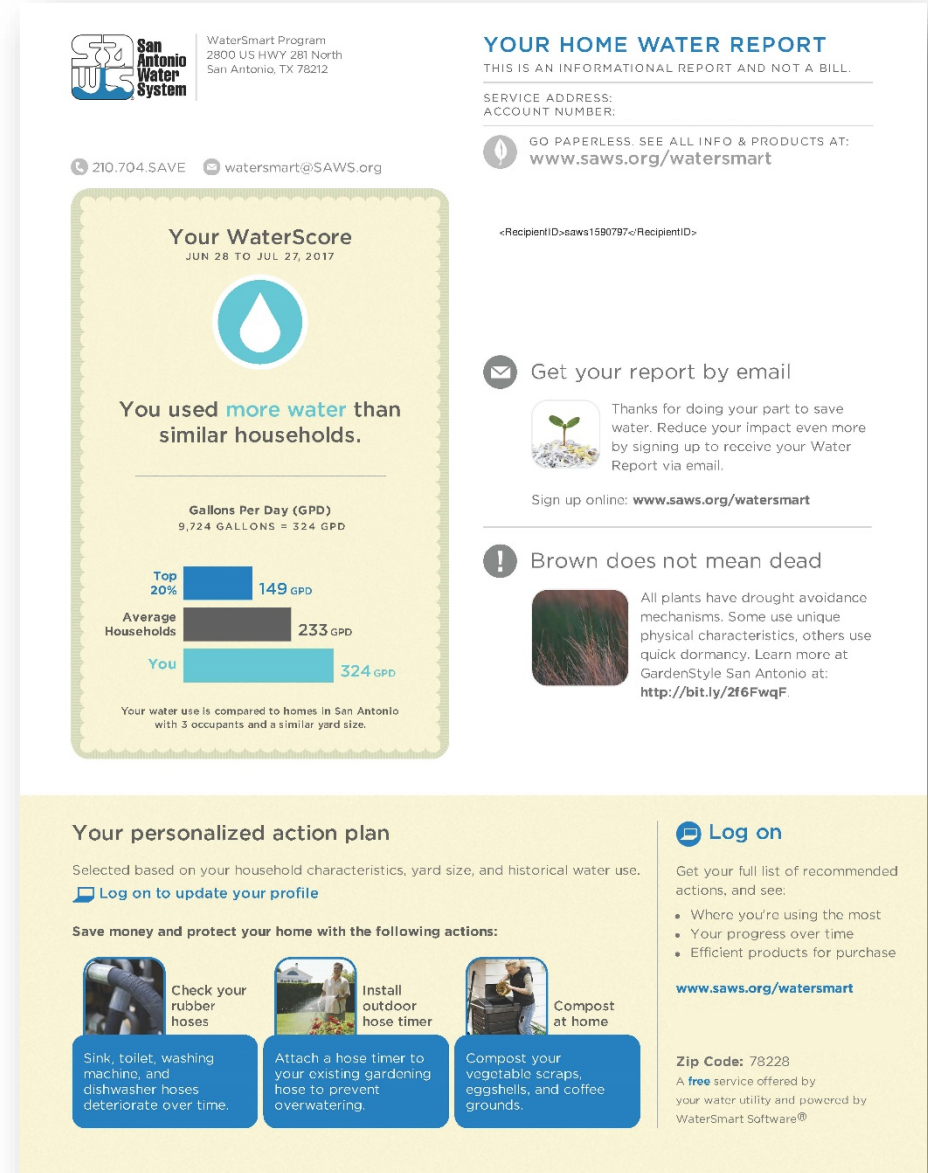
1. Email WaterSmart Report
2. Snail Mail WaterSmart Report
3. SAWS mailer group (monthly personalized SAWS letter)
4. Controls: Separate for mailer groups vs. email groups as characteristics not quite same



WaterSmart Report: Results

10,000 “Low-Engagement” Customers

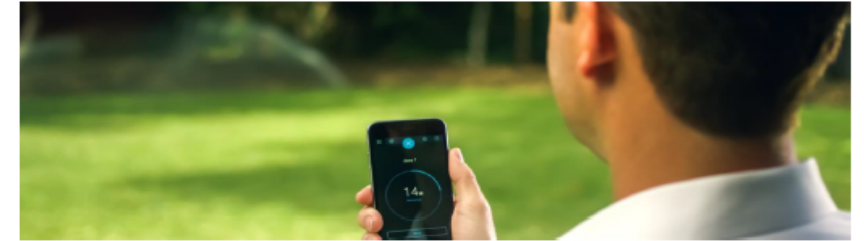
- High open/click through rates
- 15% improvement in key Customer Satisfaction Metrics
- **2% cumulative water use reduction but 3.6% at peak months**
- Email/snail mail not different result
- SAWS mail/WaterSmart not different savings but WaterSmart email reports & dashboard features good \$\$ value



Rachio 2 “SuperUser” Pilot

Target: Top 1% SF Residential Customers

1. Sent out invitations to participate
2. Got opt in population number desired
3. Randomly selected from opt in group to get controller installation vs. control
4. Checked Equivalency
5. Contractor Installed Product
6. Tracking difference between two groups
7. Watching Rachio dashboard each month for other issues that might come up



December 12, 2017

Dear «SENDTOLINE1»:

San Antonio Water System wants to help you maintain a beautiful landscape while keeping your water use efficient and low cost! We know that management of home irrigation systems is challenging. A new pilot project being offered to you will assess how new technology may help.

We have selected households to assess interest in a new type of irrigation controller by a company called Rachio. The products work with home Wi-Fi and mobile phones to provide intuitive, user-friendly irrigation system management. In order to assess the effect of the new product on seasonal water usage, we will randomly select 300 households from those who respond to this email offer. This randomization process is critical to a scientific evaluation of the technology.

If you would like to be considered for a free product and installation valued at \$400, please visit <https://www.surveymonkey.com/r/SAWS-Rachio> to enter your offer code and answer a few questions before December 18, 2017. Customers who are selected for the pilot will receive an email with a link to Rachio.com to complete the pilot program application and to schedule installation of the product.

YOUR PERSONALIZED OFFER CODE IS: «PersonalizedCode»

San Antonio Water System offers other programs designed to help you save water. You can find these by visiting www.GardenStyleSA.com. If you have any questions, please call the Conservation Department at (210)704-SAVE (7283).

Thank you for helping to keep San Antonio water efficient!

Thank you,

A handwritten signature in black ink, appearing to read "Karen Guz".

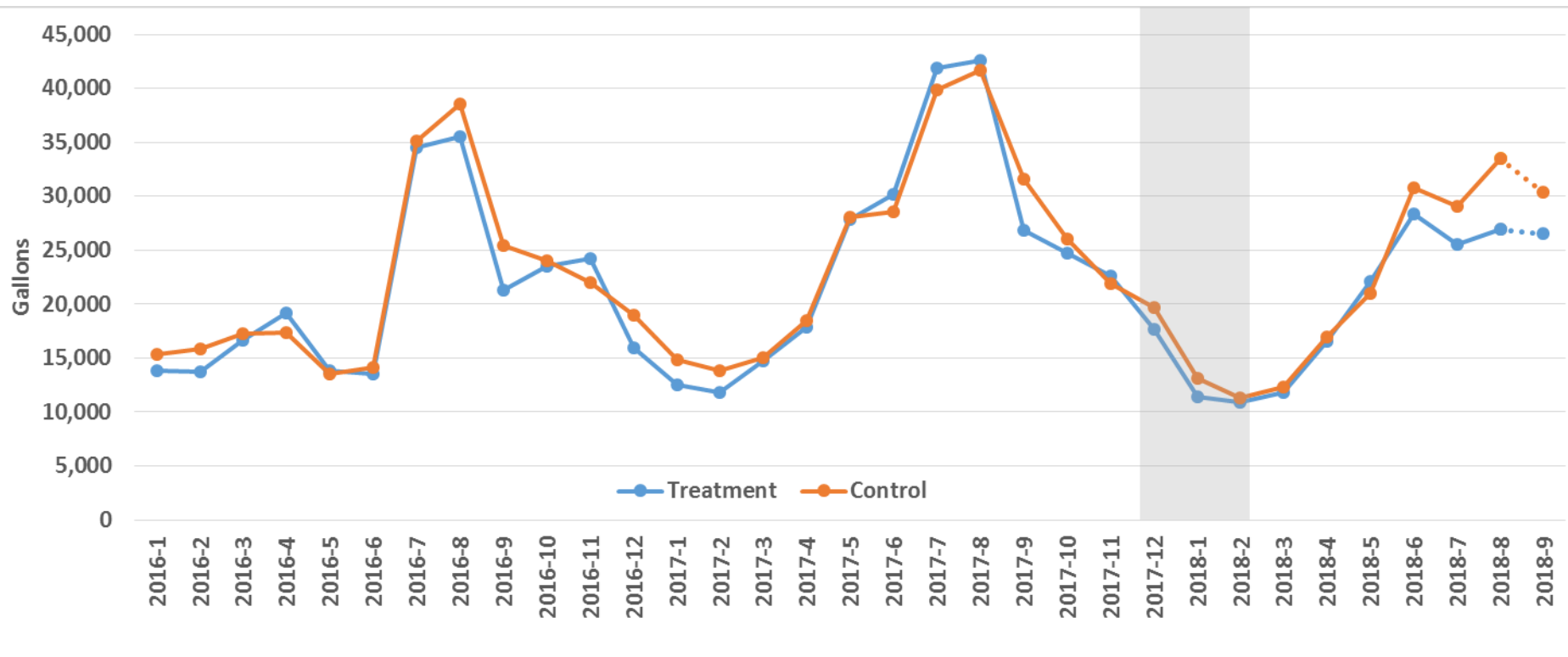
Karen Guz
Director of Conservation

2800 U.S. Hwy. 281 North • P.O. Box 2449 • San Antonio, TX • 78208-2449 • www.saws.org

Rachio; Savings Good in Summer So Far

Control Group & Intervention Track Same Usage...Until Drought Restriction Onset

Install



- Saving started post drought restriction onset
- No difference March, April, May and then 17-20% difference in August
- Less difference post record rain in September
- Need more non-drought months

Pool Check Up Pilot

23,623 homes with pools in SAWS service area



Questions:

- Do pool owners want help?
- Does teaching people about pool chemistry/pool care decrease water usage?
- Do many pools leak or have problems?
- Does sending them information by mail have same effect?
- Does education improve their practices?

Pool Study: Randomized Groups

1. Control Group
 - 192 customers
 - Received no notice
2. Free Pool Check Up Service Group
 - 197 got notice of selection & information
 - *only 50% phoned to schedule free service
3. Mailer Group
 - 187 customers
 - Received education mailer from SAWS



SWIMMING POOLS & WATER CONSERVATION

Pools offer relaxation and recreation, but can be time consuming and water wasting.
A few tips will help you save time, money, and water.

7 WAYS TO CONSERVE WATER

- 1 **Have your pool tested for leaks** – For a self-test, use a grease pencil to mark the water level at the skimmer, check the mark in 24 hours. If the level has dropped, you may have a leak.
- 2 **Time your pool fill** – Use a timer that turns off water when filling the pool to prevent overfilling.
- 3 **Free refills? Not with autofill** – Malfunctioning autofill devices will fill and drain continuously, causing an alarmingly high bill. Autofills are never recommended. They can also hide leaks, so check frequently.
- 4 **Keep your water level low** – Keep the water level to 1 inch above the bottom of pool tile. You'll save water lost to splashing.
- 5 **Keep filters clean** – Remove debris from pool and filters to reduce frequency of backwashing. Backwash only long enough for water in sight glass to run clear.
- 6 **Turn off unnecessary fountains & waterfalls** – You'll save water lost to evaporation and aeration and save energy by turning off the pumps.
- 7 **Maintain chemical balance** – Using the right amount of the proper chemicals may prevent unnecessary draining (and refilling) of the pool to correct an imbalance.

HOW DOES A POOL LOSE WATER?

Evaporation • Pool Leaks
Filter Backwashing • Splashing

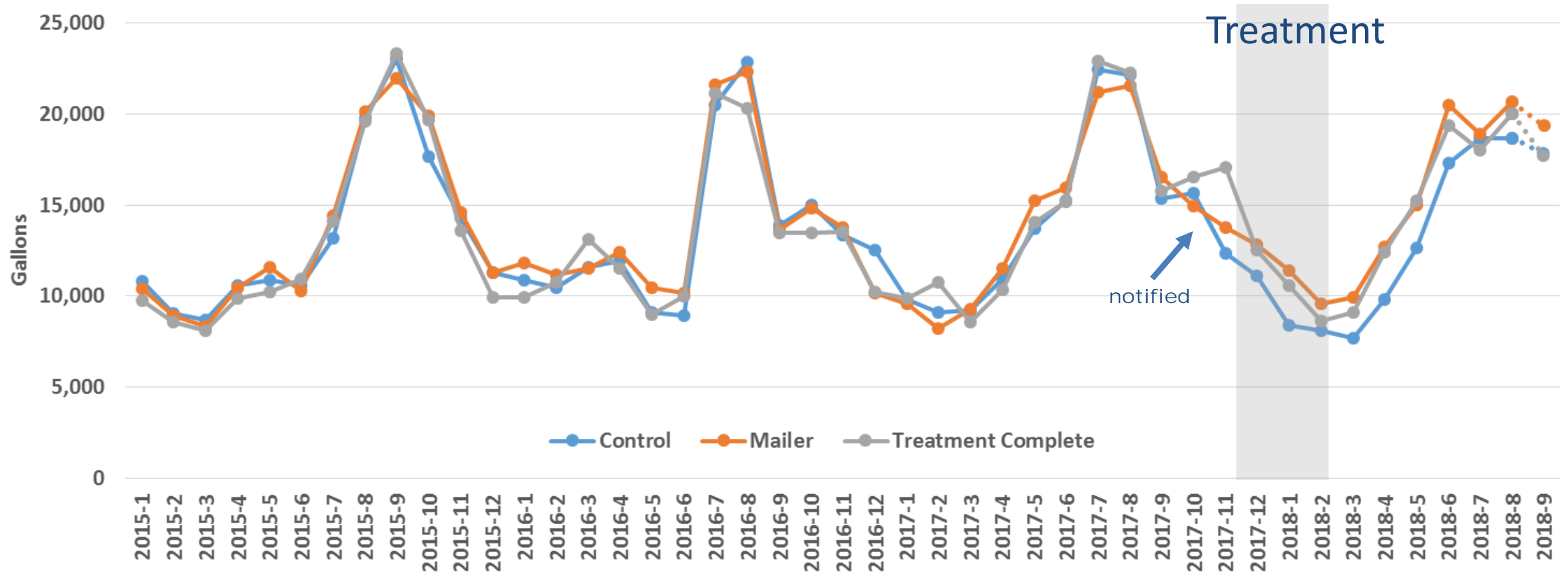
DID YOU KNOW?

A normal 2 minute backwash for a sand filter uses about 200 gallons of water.
Up to 30% of all pools have a leak.
Without a cover, an 18'x36' pool loses about 1 inch of water per week, adding up to 7,000 gallons annually.

WWW.GARDENSTYLESA.COM (210)704-SAVE (7283)

Pool Check-Up Results Confounding!

Treatment groups diverged from control as service was being scheduled and after it occurred



No RTC Possible: Analysis to Create Control Group

Irrigation Consultations Very Behavior Based & Challenging to Assess Pre/Post



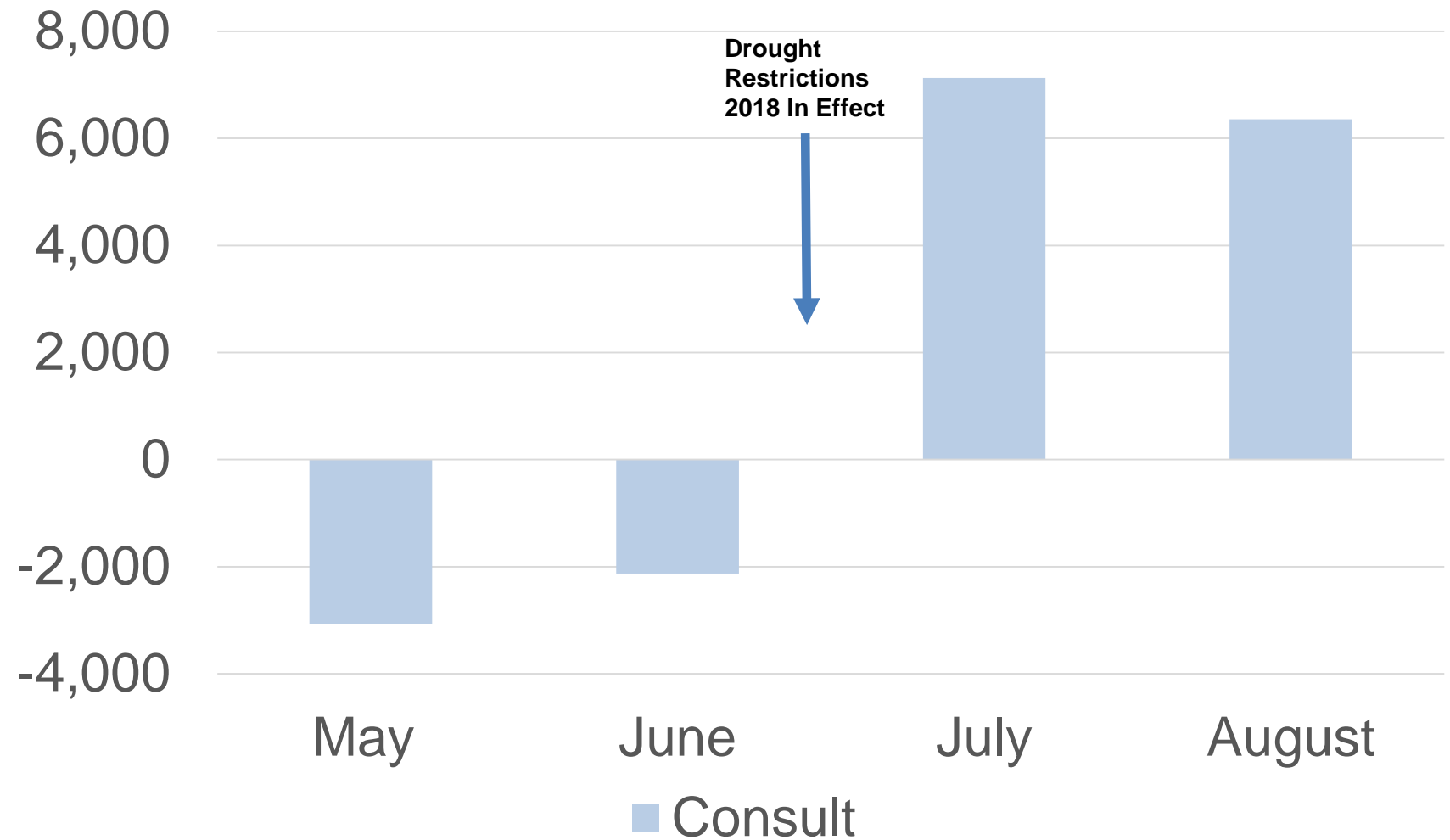
- Weather & Precipitation wildly variable month to month and year to year
- Drought restrictions greatly impact usage
- Rates have changed annually
- Rate structure changed recently

Consult Results

- Used more water in May and June compared to previous year
- Saved water in July and August compared to previous year
- **Average four month savings: 2,035 gallons/month**

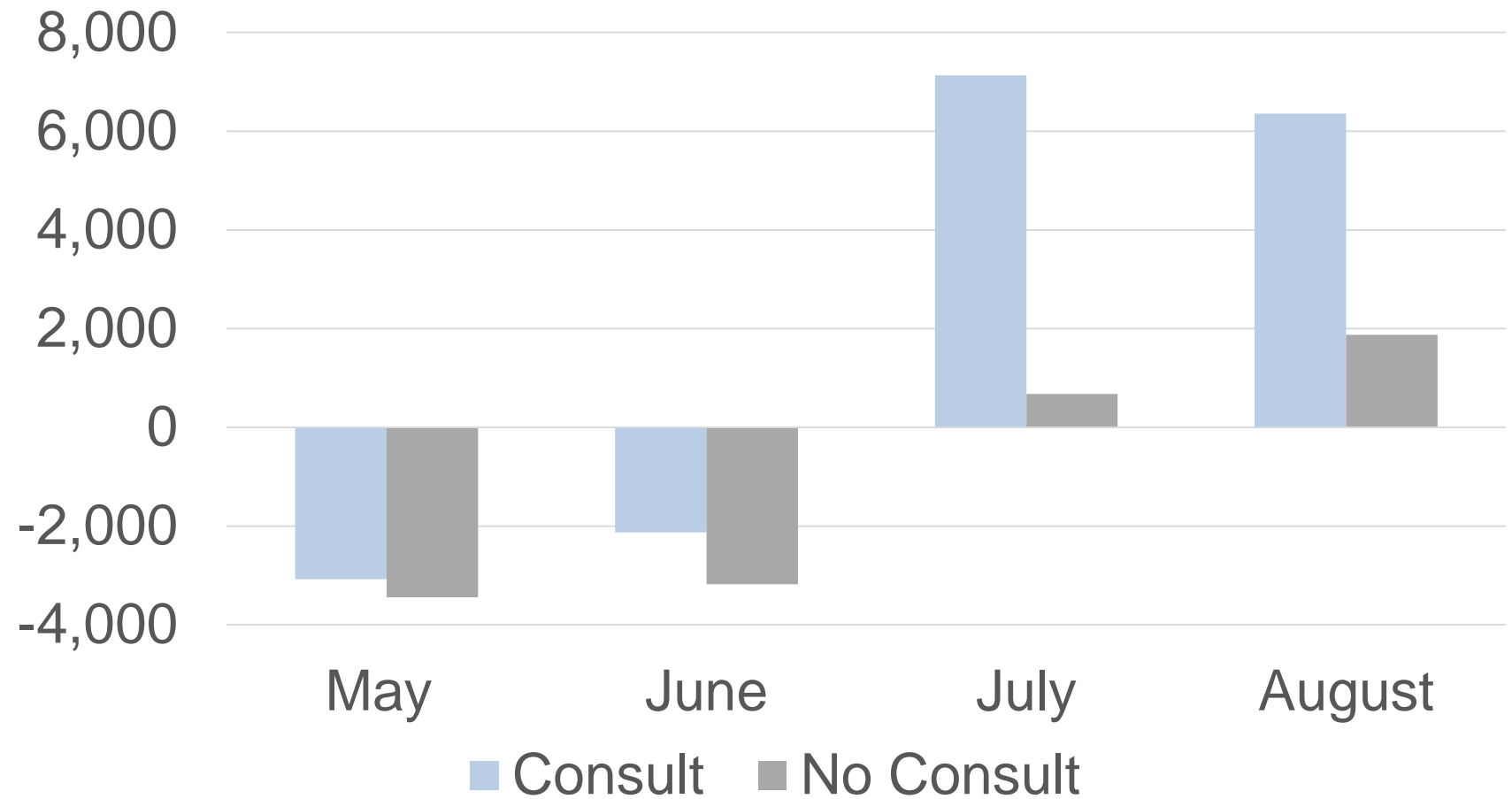
BUT.....

2017 Pre vs. 2018 Post



- Comparing to similar non-consult households changes answer
- Residents without consult used **1,012 more gallons/month**
- Average difference = savings: **3,088 gallons/month saved** comparing people who had consults vs. those who did not

Add Comparison to “Control Group”



So Many Questions & So Little Time

We Can Do Better!

- **Joining Forces;** combined pilots to compare results in different locales
- Thoughtful Sample Sizes; Statistics Plan
- Third Party Design & Review

Next SAWS Pilot Interests:

- Home Flow Sensor Impact:
 - Cross Sample of User Types
- Rachio 3 Plus Flow Sensor:
 - Moderate Irrigation Households
- Pool Filter Retrofit
 - Targeting All Pool Households
 - Survey on Pool Will Be Key
- Mailer On High Winter Average

Follow-Up Interest?

Contact: karen.guz@saws.org

210 233-3671

SAWS Conservation Program Information:

www.saws.org/conservation

GardenStyleSA.com

Alliance for Water Efficiency: Measurement & Verification Evaluation Committee

Interesting Reading on Behavior-Based Program Evaluation:

Evaluation, Measurement, and Verification (EM&V) of Residential Behavior-Based Energy Efficiency Programs: Issues and Recommendations

- Customer Information and Behavior Working Group Evaluation, Measurement, and Verification Working Group
- May 2012
- https://www4.eere.energy.gov/seeaction/system/files/documents/emv_behaviorbased_eeprograms.pdf

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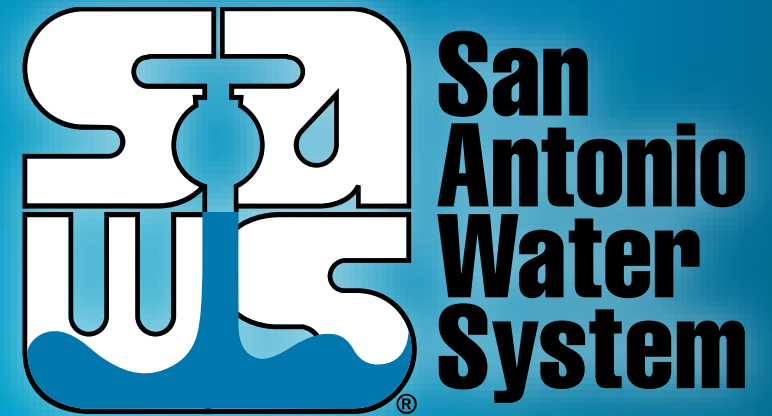
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