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PEAK DAY WATER DEMAND REDUCTION STUDY

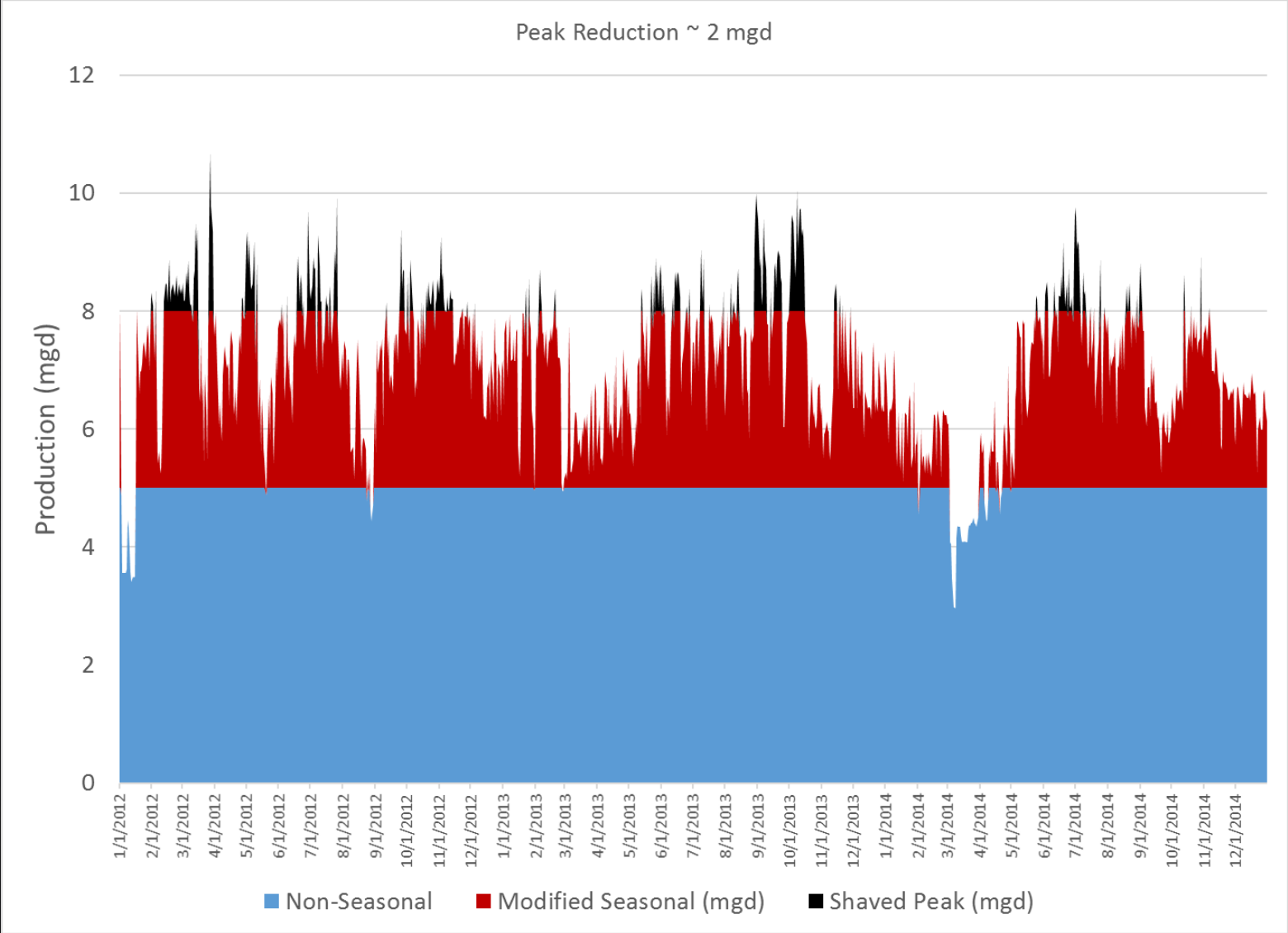
Peter Mayer, P.E.

Principal

WaterDM



Peak Demand Patterns



Energy Sector Demand Management

- ◆ Sophisticated demand-side peak shaving programs.
- ◆ Typically focused on reducing air conditioning demand.
- ◆ Agreement with customers.
- ◆ Incentives (including reduced rates and free equipment).
- ◆ Highly successful.
- ◆ Implemented widely based on need.

Rachio, Inc. – internet enabled irrigation controller



A turn-key, cloud-connected infrastructure

Rain
shut-off



Next
watering:
Tuesday



50% Shrubs
50% Flowers



Watering
now



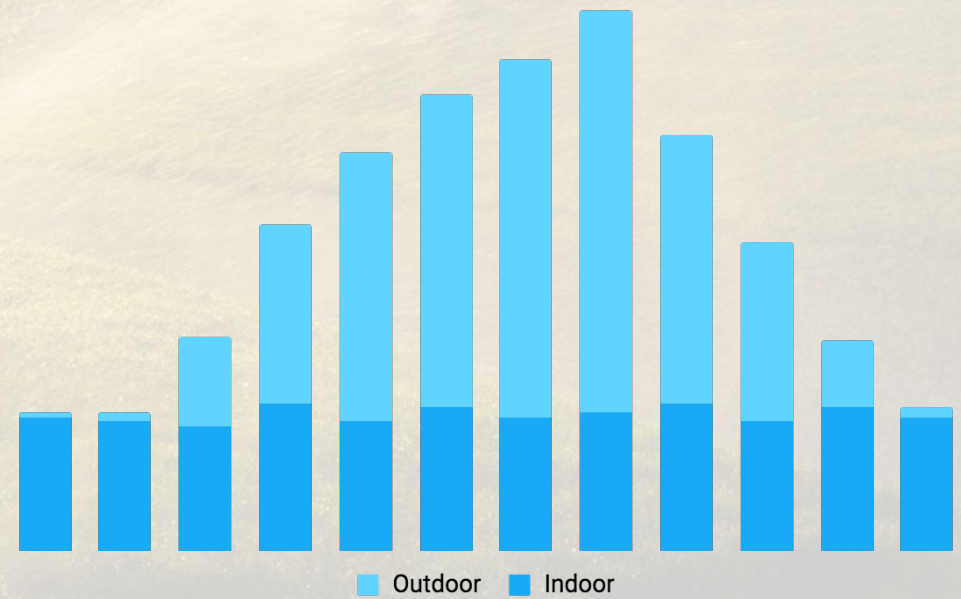
Watering
duration:
15 min

15

Waters
on Mon,
Wed, Fri



that dictates half of residential water use.



Pilot Peak Day Water Reduction Research



Peter Mayer, P.E. – concept development, research lead
Rebecca Smith – co-author



Margaret Hunter, John Kij, Kevin Keane, and Jonathan Fink – financial support, customer recruitment and installation, customer data, analysis

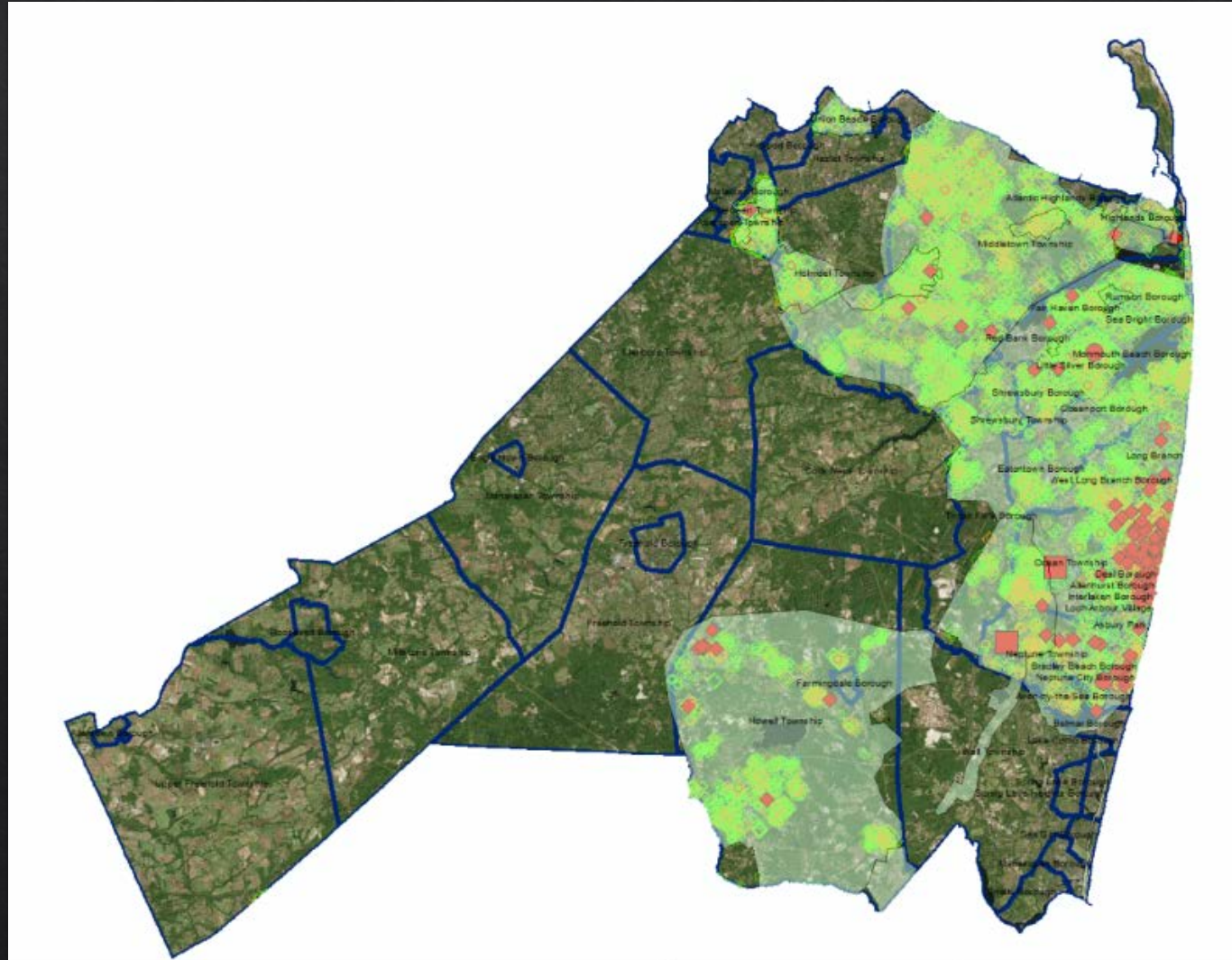


Ric Miles, Clay Kraus, Emil Motycka – free controllers, support, peak reduction implementation



Mary Ann Dickinson – project management

NJ American Water Service Area



REDUCE YOUR WATER BILL

Fill out our survey and see if you qualify to participate in our outdoor water efficiency pilot program!



New Jersey American Water is performing a smart irrigation technology pilot study in its Coastal North Service Area. You were selected as a potential candidate for this study based on your location and water use in 2014.

The goal is to quantify and promote outdoor water efficiency by upgrading conventionally-controlled irrigation systems with EPA WaterSense-labeled smart irrigation controllers.

Smart controllers use technologies such as web-based weather data, on-site weather sensors, and soil moisture sensors to more effectively irrigate landscapes. On average, installation of these devices have been found to reduce water use by 26 percent (and as much as 59 percent).

Why conduct this pilot

A majority of the Coastal North service area where you are located is considered to be a "Critical Water Supply Area" by the New Jersey Department of Environmental Protection. The EPA estimates that the U.S. uses nearly 9 billion gallons of water daily for residential irrigation. And, some experts estimate that 50 percent of the water used outdoors is wasted due to inefficient watering methods.

Because of this, New Jersey American Water is funding the pilot study to assess smart irrigation technology to validate the water savings potential and ultimately to reduce outdoor water use in this water stressed area.

What's In it for you

This program will be offered on a first come, first serve basis to a limited number of customers who qualify. If you're selected for the pilot study:

- We'll partner with you to purchase and install the smart irrigation equipment on your system at little or no cost to you.
- You could reduce your outdoor water use by as much as 25 percent (based on industry studies of similar installations)
- You'll have wireless access to your irrigation system via computer/mobile phone
- You'll be helping New Jersey to become more water efficient!



How to apply

To determine if you qualify, please fill out the enclosed survey and return it by May 15 to:

Margaret Hunter, New Jersey American Water, 1025 Laurel Oak Road, Voorhees, NJ 08043. Once we receive your application, we will contact you within one week to let you know if you have been selected for a site visit to see if you qualify. Our goal is to have the equipment installed by the end of July.

Questions?

Contact Margaret Hunter, Senior Project Manager, at 856-727-6148 margaret.hunter@njwater.com 9 a.m.-5p.m., M-F



WE CARE ABOUT WATER. IT'S WHAT WE DO.®

Participant Recruitment

Smart Irrigation Pilot Program APPLICATION



1. Does your facility/property have an automatic irrigation system?
 Yes (please proceed with survey)
 No (Sorry to take your time. This pilot is focusing on properties that have irrigation systems installed.)
2. Approximately how many acres of land are you currently irrigating?
 Approximately _____ acres
 0 to 5 acres
 5 to 10 acres
 Greater than 10 acres
3. How many irrigation controllers/timers control your irrigation system? _____
4. How many irrigation zones do you have?? If you do not know exactly, please estimate. _____
5. Describe your current irrigation control system.
 Individual timers/controllers
 Controllers connected to a central computer
 Smart Controllers
 Other (please describe) _____
Manufacture(s) of your irrigation controller(s) _____
Model number(s) (if known) _____
Does each controller have a rain sensor?
 Yes, every controller has a rain sensor.
 Some controllers have rain sensors.
 No rain sensors.
If your system has rain sensors:
 The sensors have been tested and are functional.
 The sensors have not been tested, but I believe they are functional.
 I believe some of the sensors are not functional.
 I do not know if the sensors are functional.
6. Does your facility have access to internet? Yes. Internet provider: _____ No Not sure
7. How satisfied are you with the performance of your current irrigation system? Satisfied Neutral Dissatisfied
8. How would you rate the performance of your irrigation control system with regard to water consumption (Choose at that apply)?
 I feel the irrigation control system adequately irrigate the landscape with an appropriate amount of water.
 At times, I feel the irrigation control system applies more water than necessary to maintain a healthy landscape.
 At times, I feel the control system does not apply sufficient water to maintain a healthy landscape.
9. Any additional information regarding your current irrigation system?

10. Contact information and best method of communication for follow up (Name and Email or Phone)?

Please complete and return by May 15 to:
Margaret Hunter, New Jersey American Water, 1025 Laurel Oak Road, Voorhees, NJ 08043 using the self-addressed envelope provided.

05-2015

Visit us online at www.newjerseyamwater.com



Experiment 1 – August 19, 2016

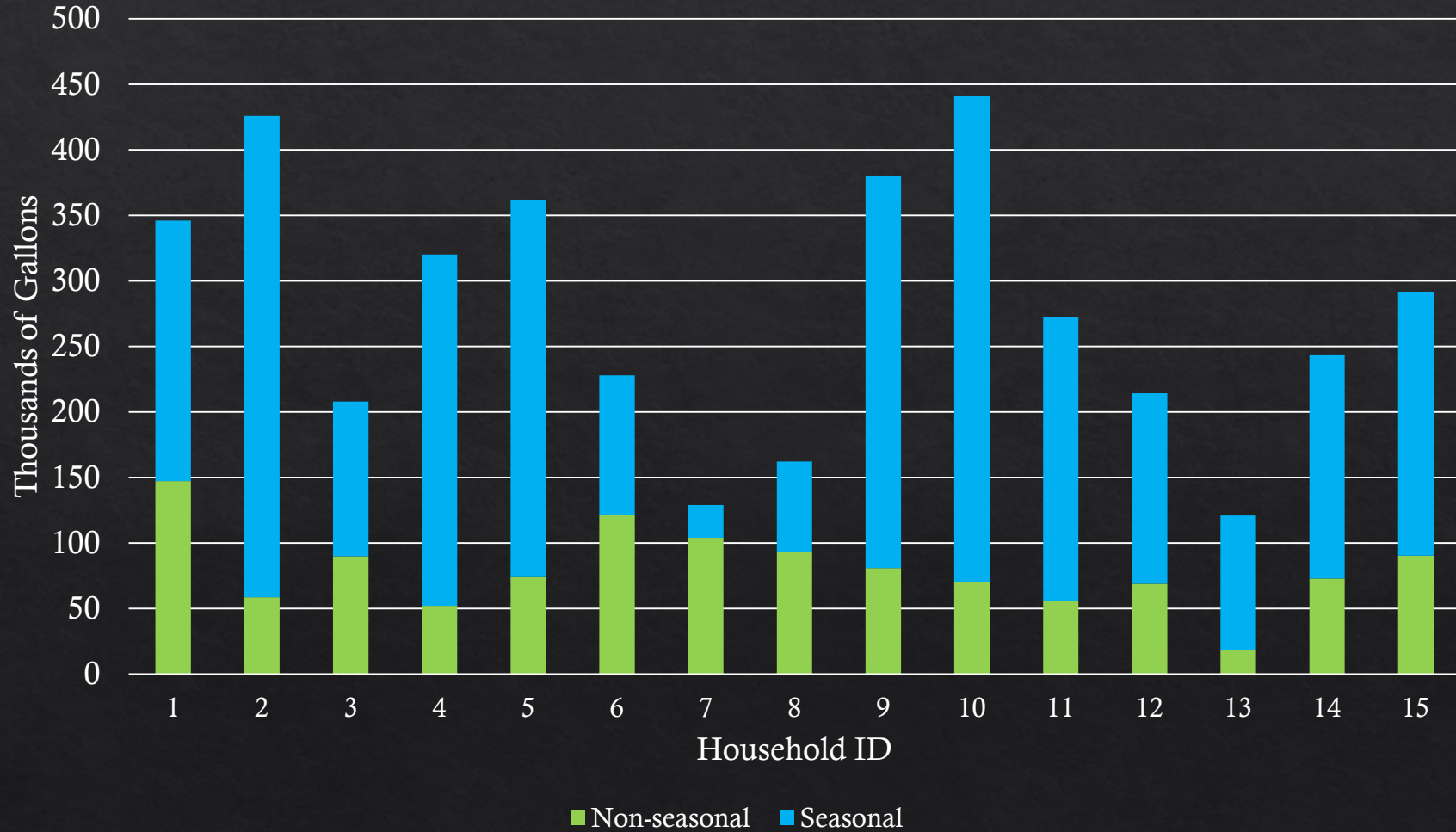
Household	8/14/16	8/15/16	8/16/16	8/17/16	8/18/16	8/19/16	8/20/16
1	0	0	0	0	X	0	X
2	0	0	0	X	X	0	X
3	X	X	X	X	X	0	X
4	X	X	0	0	0	0	X
5	X	X	X	X	X	0	X
6	X	X	0	X	0	0	X
7	X	0	X	X	X	0	X
8	X	X	X	X	X	0	X
9	X	X	X	X	X	0	X
10	X	X	X	X	X	0	X
11	X	X	X	0	0	0	X
12	X	X	X	X	X	0	X
13	0	0	X	0	0	X	0
14	X	X	0	X	0	0	X
15	X	0	X	0	0	0	X
Max. Temp	99.7°F	89.6°F	94.5°F	91.6°F	87.1°F	93.4°F	90.7°F
Min. Temp	79.5°F	75.9°F	76.1°F	73.8°F	73.2°F	71.6°F	71.4°F
Precip. (in.)	0	0	0	0.09	0.02	0	0
X	= irrigation system operated			0	= irrigation system idle		

Experiment 2 – August 26, 2016

Household	8/21/16	8/22/16	8/23/16	8/24/16	8/25/16	8/26/16	8/27/16
1	0	0	X	X	X	0	X
2	0	0	X	X	0	0	X
3	0	0	X	X	X	0	X
4	X	0	X	0	X	X	X
5	0	0	X	X	X	0	X
6	0	0	X	X	0	0	X
7	0	X	0	X	X	0	X
8	X	0	X	X	X	0	X
9	0	0	X	X	X	0	X
10	0	0	X	X	X	0	X
11	0	0	X	X	X	0	X
12	X	0	X	X	X	0	X
13	X	0	X	X	X	0	X
14	0	0	X	X	X	0	X
15	0	0	0	X	0	0	0
Max. Temp	87.1°F	82.8°F	86.4°F	90.5°F	86.7°F	94.8°F	89.2°F
Min. Temp	73.0°F	67.1°F	58.8°F	61.2°F	65.3°F	72.1°F	69.6°F
Precip. (in.)	0	0	0	0	0	0	0
X	= irrigation system operated			0	= irrigation system idle		

Annual Seasonal Use

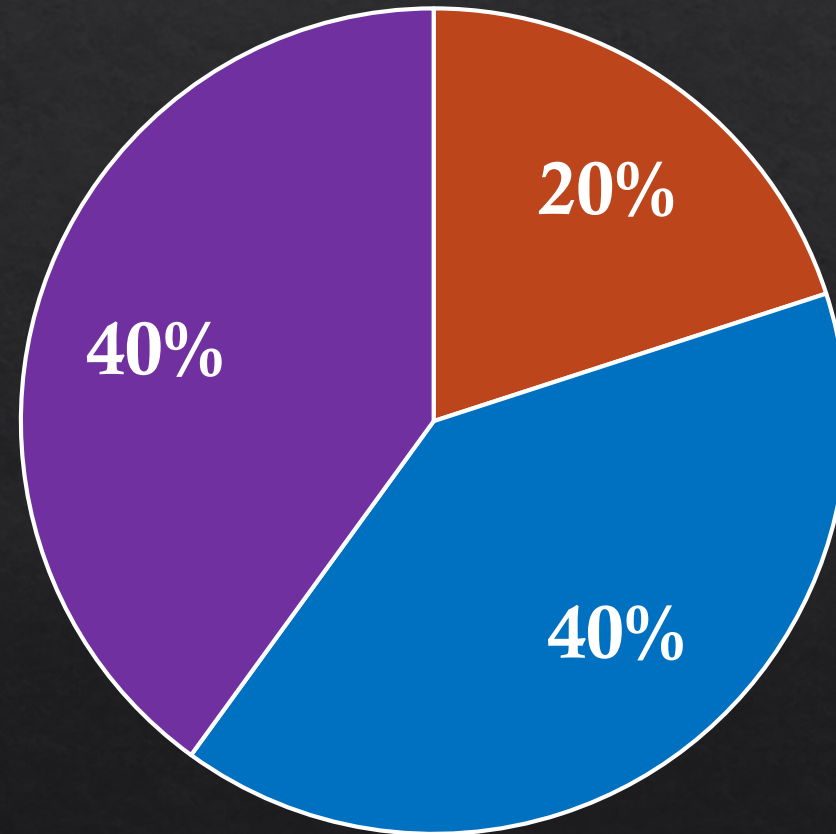
Annual Household Water Use



Peak 2016 Monthly Outdoor Use

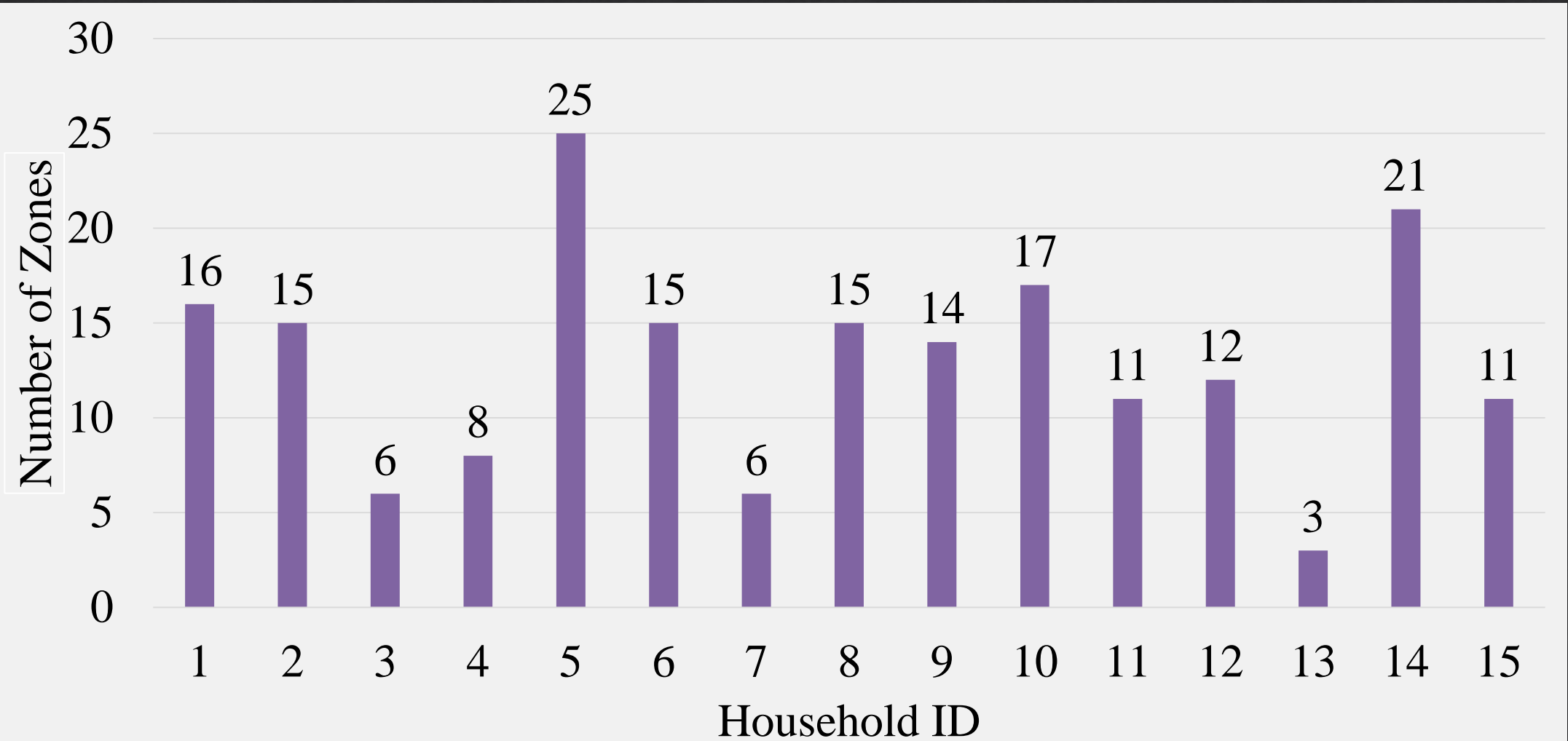


Irrigation Frequency Before 2016 Pilot Study

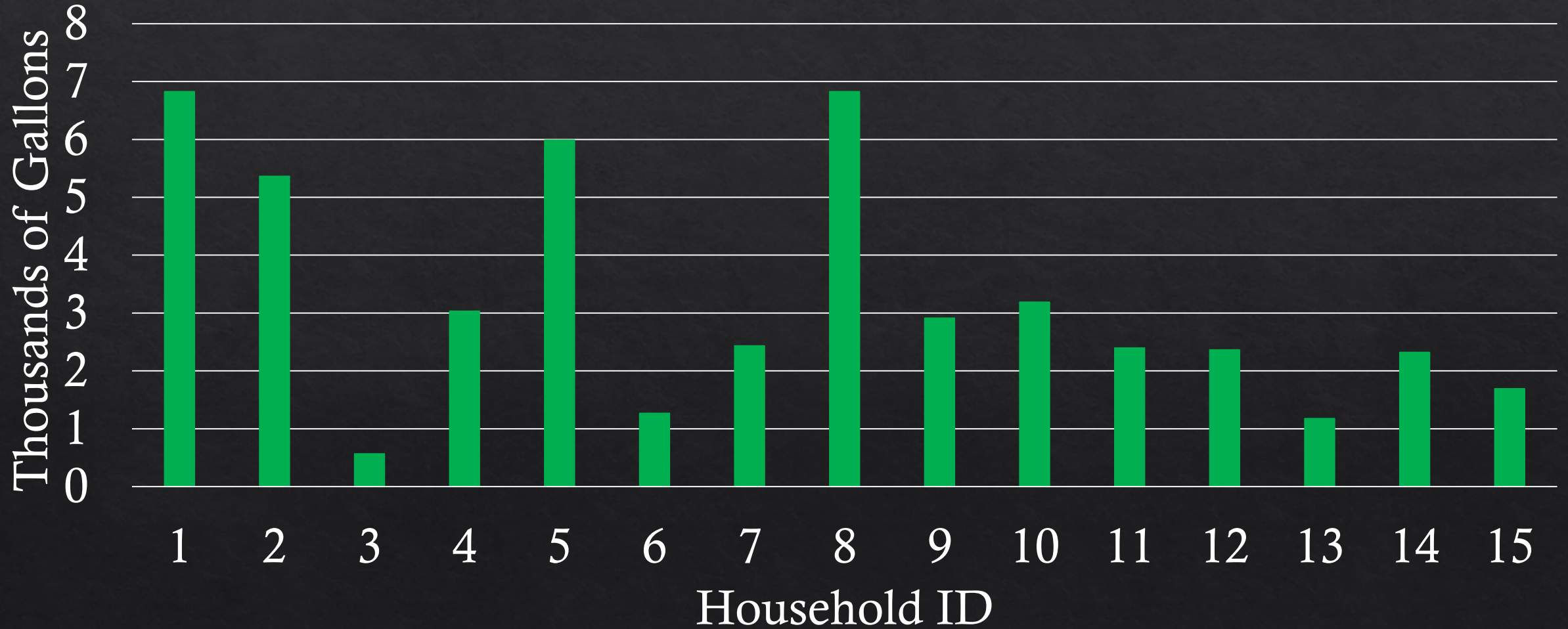


■ 0 - 14 days/month ■ 15 - 22 days/month ■ 23 - 31 days/month

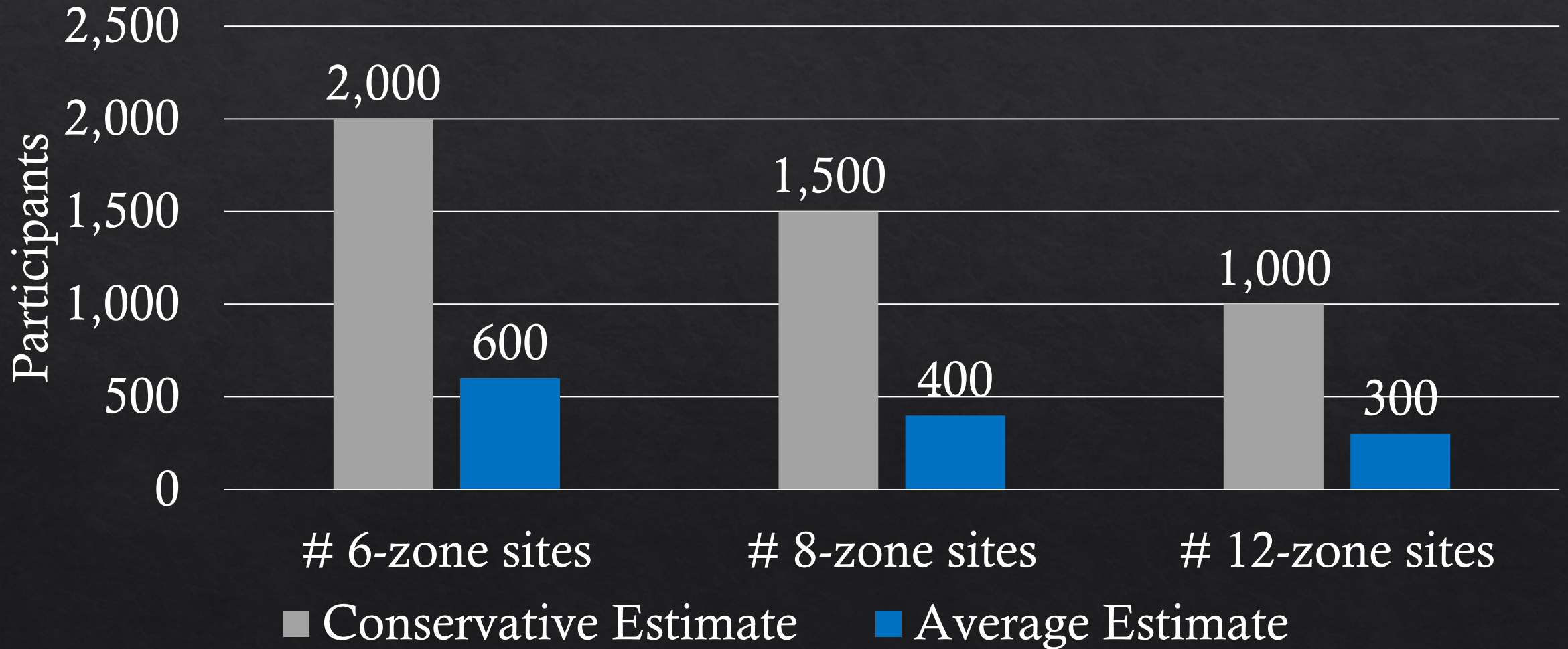
Total Zones by Household



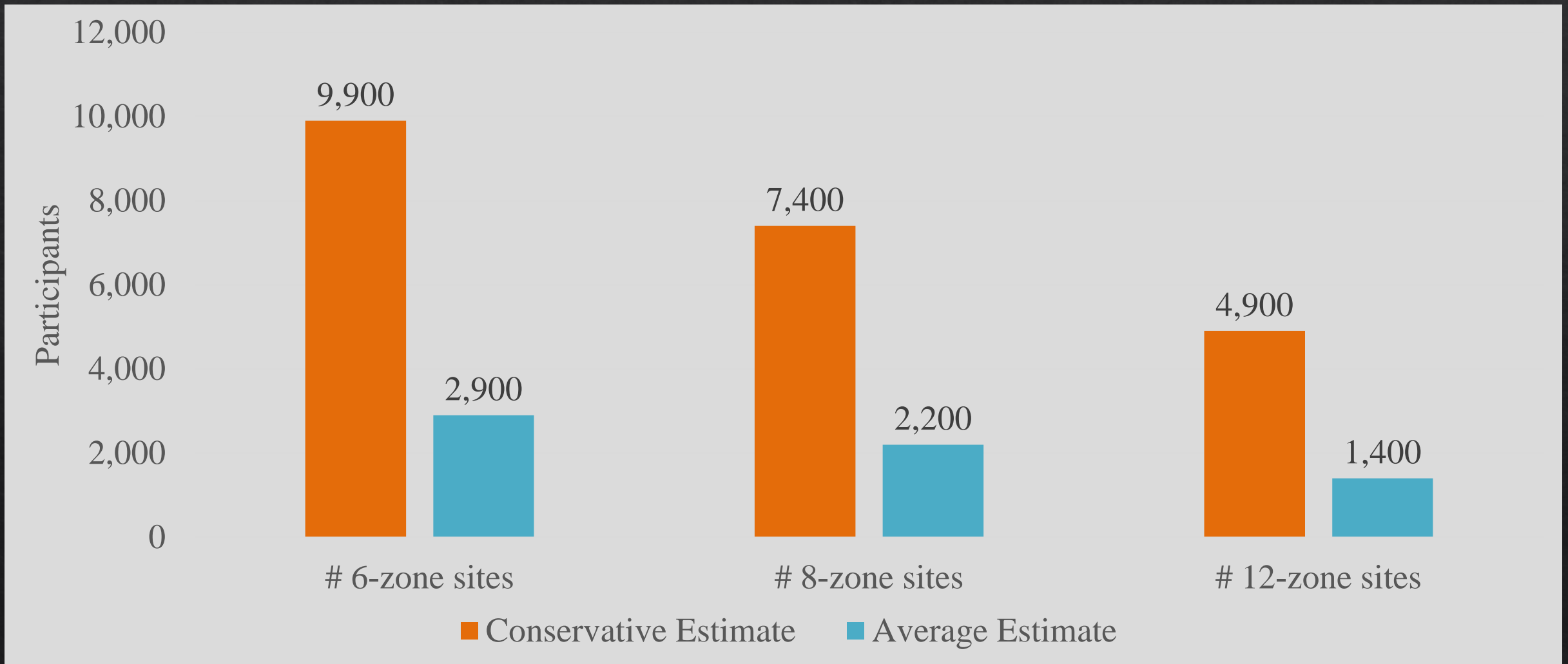
Estimated Irrigation Day Use (kgal)



Participation for 1 MGD Peak Reduction

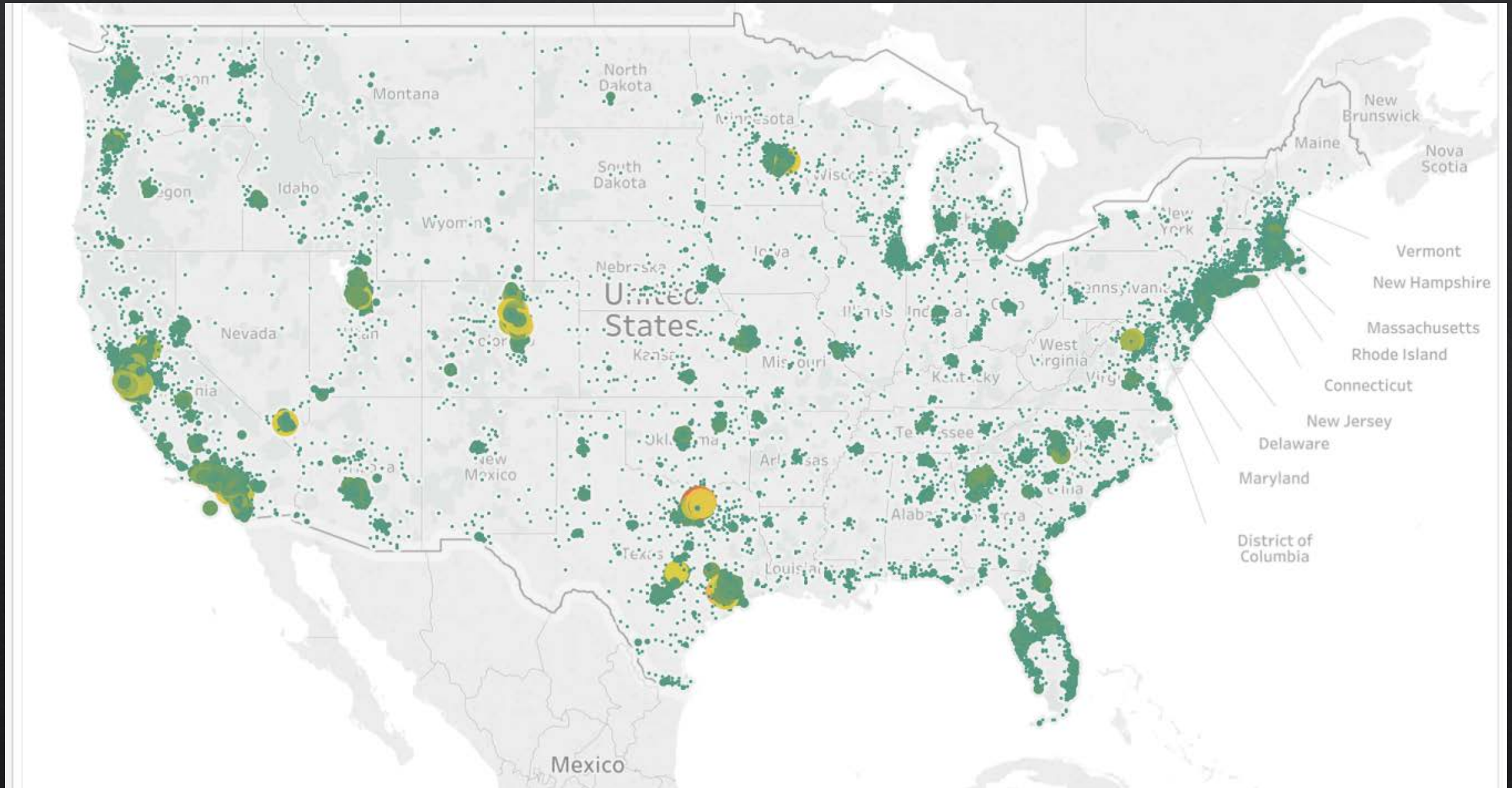


Participation for 5 MGD Potential Peak Reduction

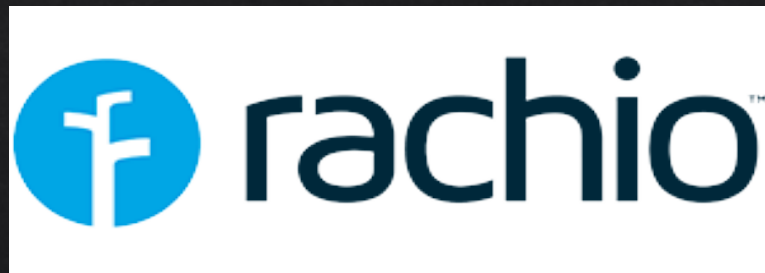


Conclusions

- ◇ Great potential
- ◇ Additional research and evaluation is needed
- ◇ It is not enough to simply shut systems off one day and shift the load to the next, thus creating a different, but similarly large peak day.
- ◇ With thousands of enabled irrigation controllers in a system, much more sophisticated load shifting approaches become possible.
- ◇ In a fully developed water demand management system, urban irrigation could be orchestrated to match water production profiles during key parts of the summer.
- ◇ Remote emergency shutdown of irrigation systems during an emergency such as a water main break, a major fire, or an earthquake.
- ◇ This pilot study is a small step in the direction of a more advanced approach to water demand management of urban water systems.



Interested?
**Rachio and WaterDM are seeking
new research locations.**





Thank you! Questions?

Peter Mayer, P.E.

peter.mayer@waterdm.com

