# This presentation premiered at WaterSmart Innovations

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# Project PRS:
# How Much Water Can You Really Save?

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The Intelligent Use of Water.™

# Project PRS Study

Metropolitan Water District's Innovative Conservation Program (ICP)

Department of Soil, Water and Environmental Science, Karsten Turf Research Facility

# Why Study Pressure Regulation?

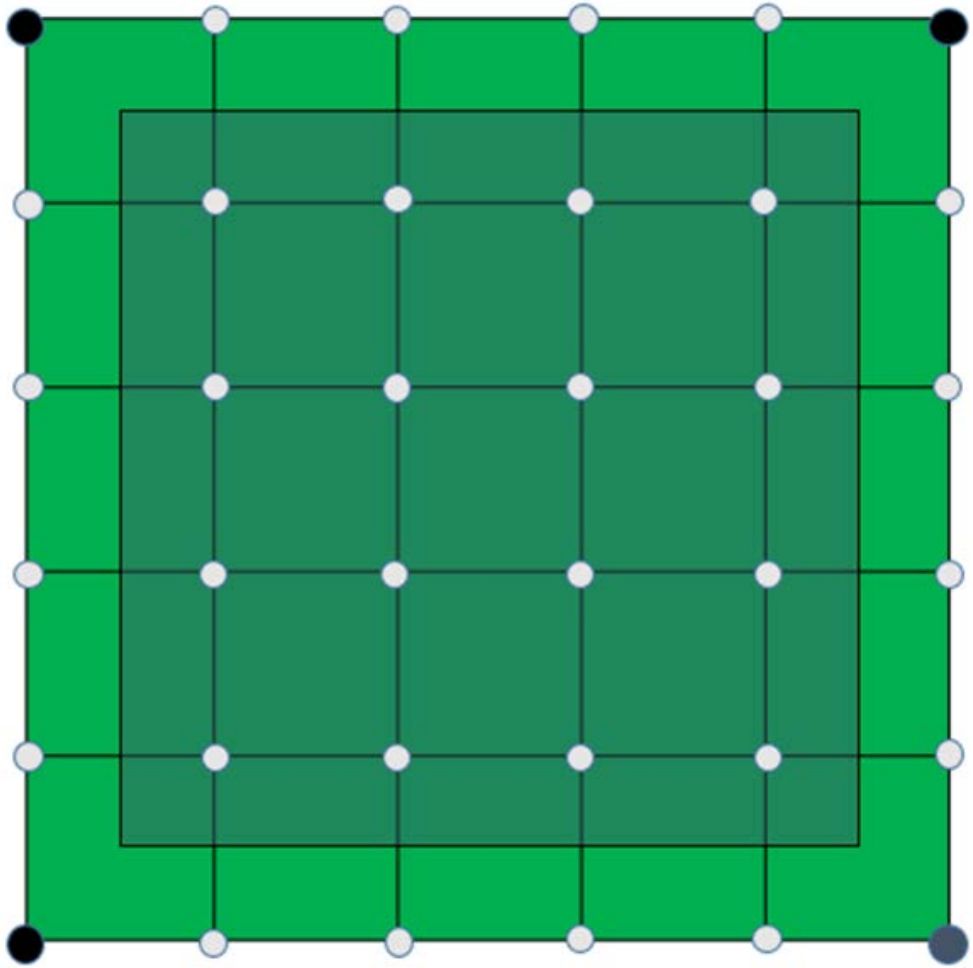
- **Premise**
  - Works like low-flow toilets or low-flow shower heads.
  - When you reduce pressure, you reduce flow and save water.


- **Understand water pressure's impact on:**
  - Water savings
  - Performance characteristics
- **Compare in real world conditions**

# Study Methodology


## Sprays & Rotors

- 8 plots
  - 4 controls
  - 4 PRS
- 10 test runs each @ 3 different pressures
- Meteorological data collected @ 1 min. intervals
  - Air temperature
  - Wind Speed
  - Relative Humidity
  - Wind Direction



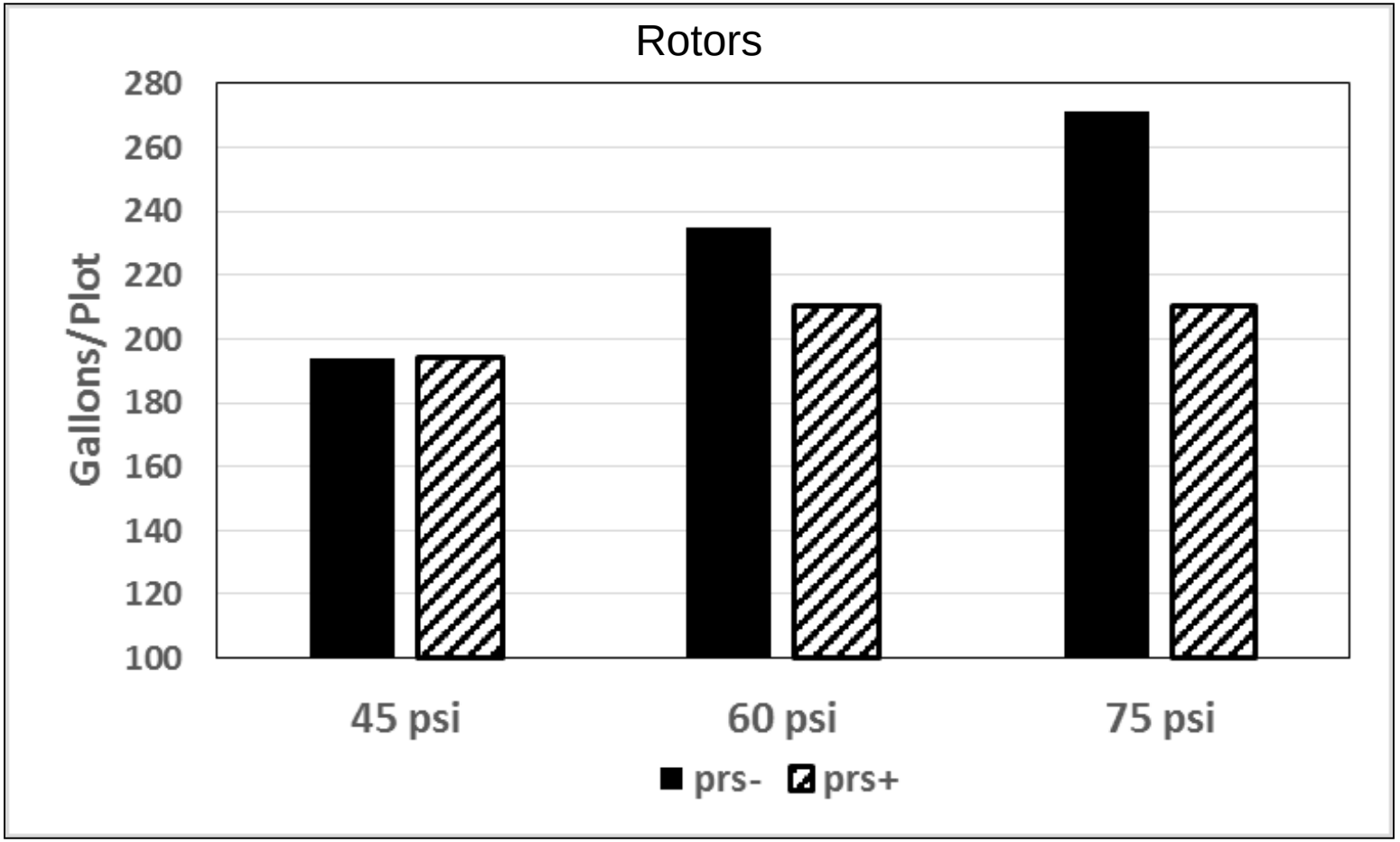
# Project PRS: Sprays Results

| Sprays PRS Water Savings Table | | | | |
|---|---|---|---|---|
| **Inlet Pressure** | Flow Rate No PRS | Flow Rate With PRS | Savings | % Savings |
| **psi** | GPM | GPM | GPM | |
| **30** | .65 | .65 | .00 | 0% |
| **40** | 0.66 | 0.63 | 0.035 | 5% |
| **50** | 0.71 | 0.64 | 0.077 | 11% |
| **60** | 0.75 | 0.65 | 0.108 | 14% |
| **70** | 0.79 | 0.66 | 0.134 | 17% |
| **80** | 0.82 | 0.67 | 0.154 | 19% |

# Project PRS: Rotors Results

| Rotors PRS Water Savings Table | | | | |
|---|---|---|---|---|
| **Inlet Pressure** | Flow Rate No PRS | Flow Rate With PRS | Savings/Rotor | % Savings |
| **psi** | GPM | GPM | GPM | |
| **45** | 2.42 | 2.43 | 0.00 | 0% |
| **55** | 2.80 | 2.60 | 0.20 | 7% |
| **60** | 2.94 | 2.63 | 0.31 | 10% |
| **65** | 3.10 | 2.63 | 0.47 | 15% |
| **75** | 3.39 | 2.63 | 0.76 | 22% |

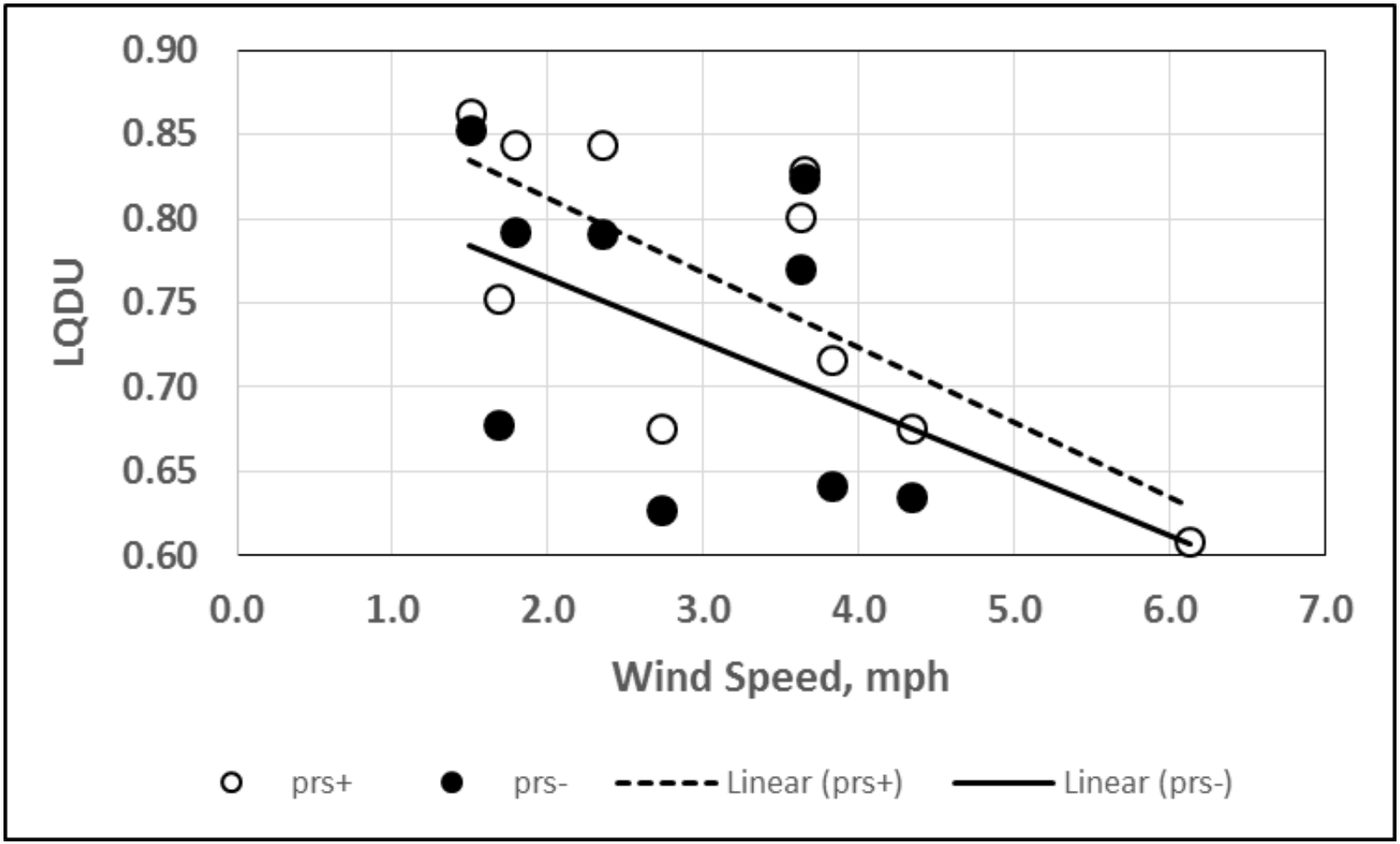
# Project PRS:  Rotor Results (Water Volume)




Total volume of water applied.

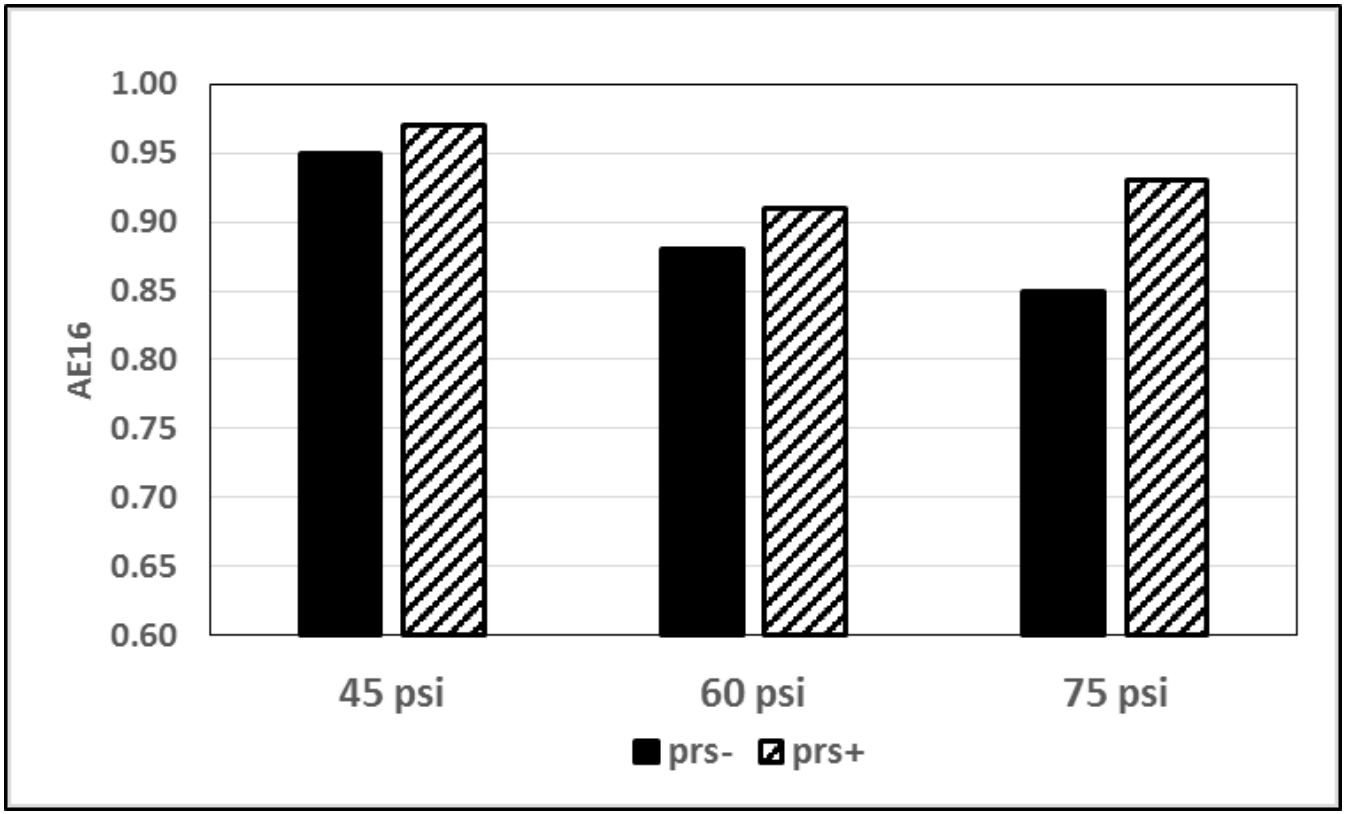
# Project PRS Rotor Results ($DU_{LQ}$)

75 psi in Wind



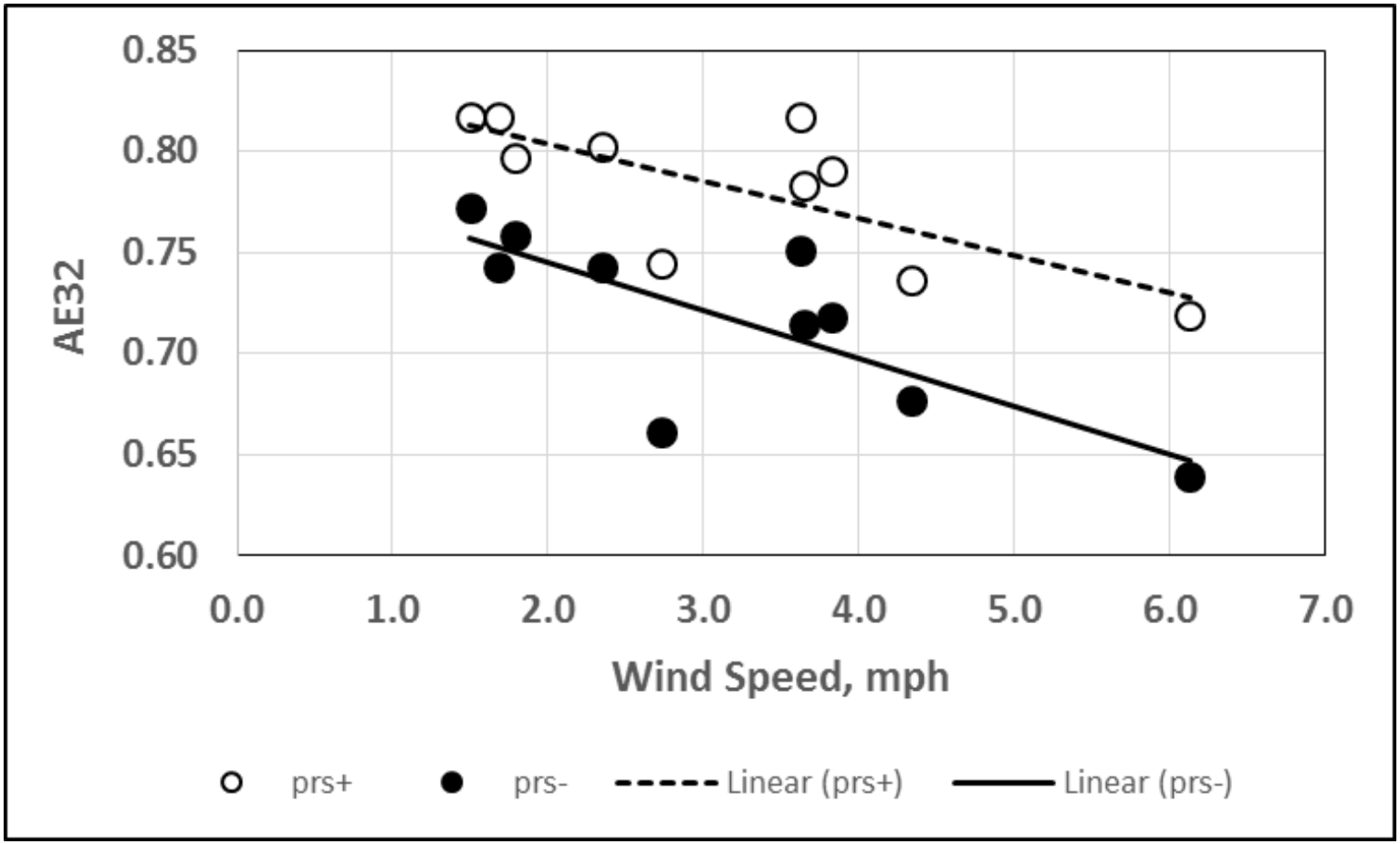
# Project PRS:  Rotor Results (AE)

**Application Efficiency (AE):**  The amount of water that stayed in the target zone vs. the amount that drifted outside the zone.




Internal Catch Cans (16 Total)

# Project PRS:  Rotor Results (AE & Wind)



# Why Does Any of This Matter?

## AWWA Research Foundation Residential End Uses of Water Study (1999)

**Table 5.16 Water Pressure Ranges in Distribution Systems**

| | |
|---|---|
| Boulder, Colorado | 80-160PSI |
| Cambridge, Ontario | 20 - 100 PSI |
| Waterloo, Ontario | 20-100PSI |
| Denver, Colorado | 40-110 PSI |
| Eugene, Oregon | 40-80 PSI |
| Las Virgenes MWD, California | 30-500 PSI |
| Lompoc, California | 85 - 120 |
| Phoenix, Arizona | 60 - 120 PSI |
| Municipal Region of Waterloo | 50-70 PSI |
| San Diego, California | 40-85 PSI |
| Scottsdale, Arizona | 40-120 PSI |
| Seattle, Washington | 40-80 |
| Tampa, Florida | 20 - 65 PSI Typical = 45 PSI |
| Tempe, Arizona | 50-90 PSI |
| Walnut Valley WD, California | 40-180 PSI |

# Translating Gallons Per Minute to Real Savings

**Spray Savings with PRS over Time**

| Pressure | Daily | Weekly | Monthly | Yearly |
|---|---|---|---|---|
| Operating Pressure (PSI)<br>Optimal – 30 psi | Gallons * 10 heads | | | |
| | | | | |
| Above – 45 psi | 5 | 38 | 166 | 1,994 |
| Severe – 60 psi | 8 | 54 | 234 | 2,808 |
| Extreme – 80 psi | 11 | 77 | 333 | 3,996 |

Based on 10 minute run time, 1 cycle per day, 5 days per week. Savings based on 10 sprays.

**Rotor Savings with PRS over Time**

| Pressure | Daily | Weekly | Monthly | Yearly |
|---|---|---|---|---|
| Operating Pressure (PSI)<br>Optimal – 45 psi | Gallons * 10 heads | | | |
| | | | | |
| Above – 50 psi | 36 | 250 | 1,083 | 13,000 |
| Severe – 60 psi | 55 | 385 | 1,667 | 20,020 |
| Extreme – 80 psi | 135 | 946 | 4,097 | 49,205 |

Based on 25 minute run time, 1 cycle per day, 5 days per week. Savings based on 10 rotors.

# Project PRS: Real World Retrofits

**California Project PRS Water Savings**

| Product | Retrofits | Total Annual Flow w/o PRS (Gal) | Total Annual Flow using PRS (Gal) | Annual Water Savings (Gal) | Annual Water Reduction |
|---|---|---|---|---|---|
| Sprays | 51,071 | 133,505,577 | 85,033,215 | 48,472,362 | -36% |
| Rotors | 6,325 | 26,574,436 | 17,589,825 | 8,984,611 | -34% |
| **Total** | **57,396** | **160,080,013** | **102,623,040** | **57,456,973** | **-36%** |

**U.S. Project PRS Water Savings**

| Product | Retrofits | Total Annual Flow w/o PRS (Gal) | Total Annual Flow using PRS (Gal) | Annual Water Savings (Gal) | Annual Water Reduction |
|---|---|---|---|---|---|
| Sprays | 144,721 | 376,875,066 | 240,960,465 | 135,914,601 | -36% |
| Rotors | 35,385 | 177,976,532 | 98,405,685 | 79,570,847 | -45% |
| **Total** | **180,106** | **554,851,598** | **339,366,150** | **215,485,448** | **-39%** |

# In Summary

- **PRS retrofits are as easy as changing out a showerhead.**
- **Savings from PRS are immediate and no other changes to the irrigation system are required.**
- **Sprinkler performance improves with the installation of pressure regulation.**
  - Application Efficiency increases.
  - Distribution Uniformity improves.
- **Calculating savings is easy.**

  Annual Total Gallons Used for Irrigation

  X % Savings (Based on Water District or Zone Average Pressure)

  = Annual Gallons Saved

# Questions?

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