

This presentation premiered at WaterSmart Innovations

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High Efficiency Nozzle Evaluation, Measurement and Verification

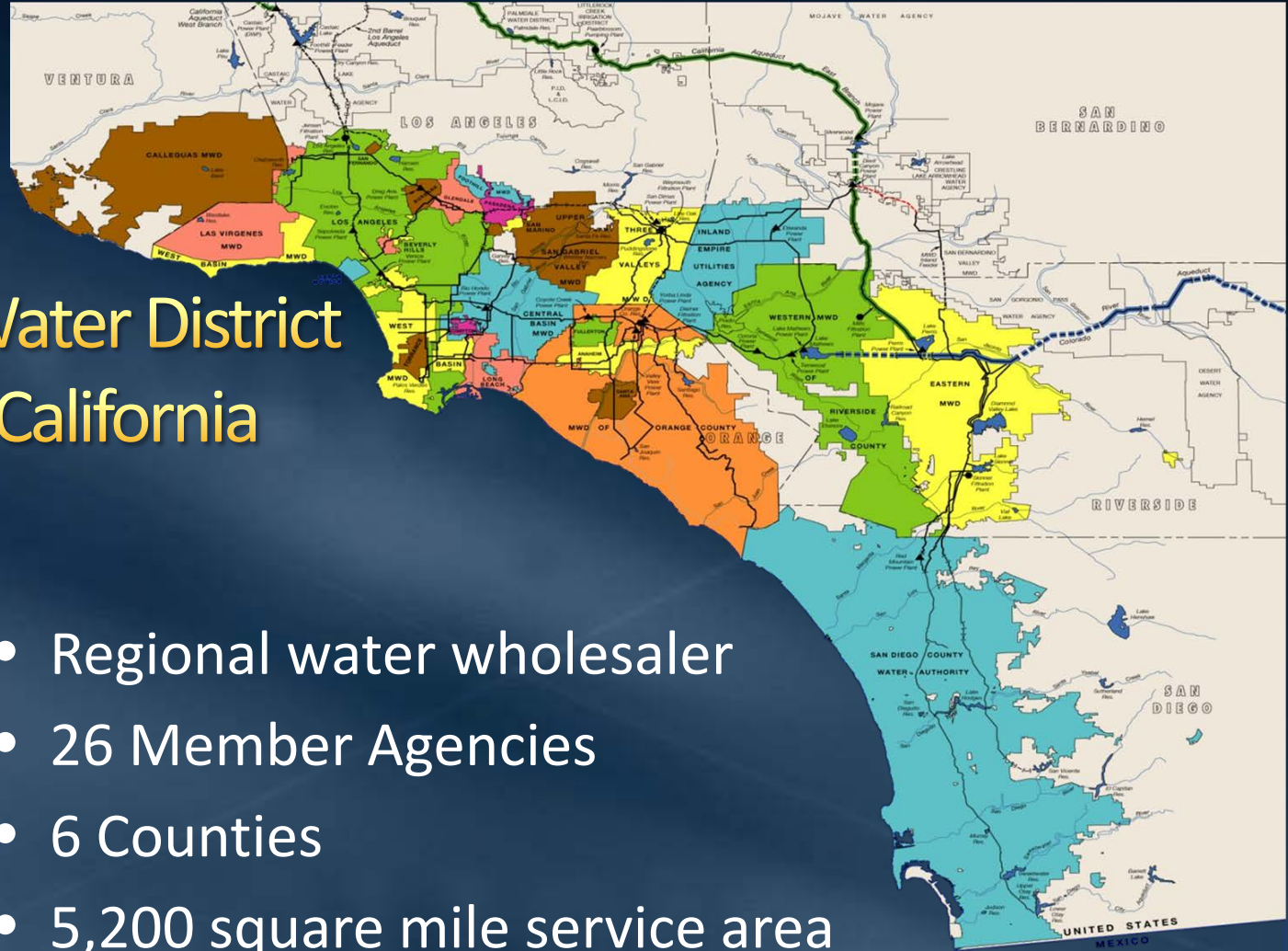


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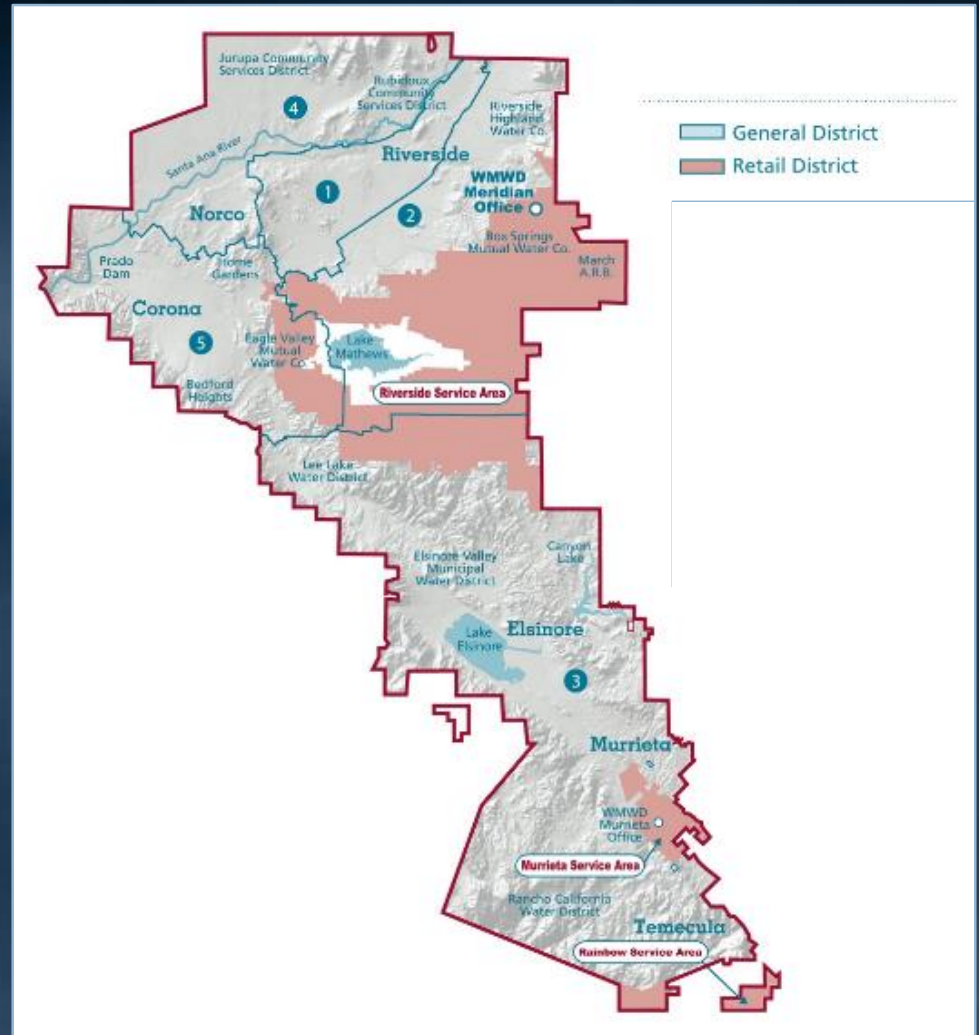
Metropolitan Water District of Southern California

- Regional water wholesaler
- 26 Member Agencies
- 6 Counties
- 5,200 square mile service area
- Serving Approximately 19 million residents
- Meet ~50% of potable water demand
- \$1 trillion economy



Western Municipal Water District

- 527 square miles of western Riverside County
- Population of nearly 1 million...1.5 million by 2030
- 25,000 retail customers
- 13 retail agencies
- 89,000 acre-feet of water annually
- 435 miles of pipelines
- 38 water storage reservoirs
- Metropolitan Water District member agency



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High Efficiency Nozzles Background

● Origins

- Walla Walla Sprinkler Co. developed MP Rotator in 2001
- Added to Metropolitan's rebate program in 2006
 - Rainbird Rotary Nozzle & MP Rotator were only nozzles available
- Originally only available at irrigation specialty stores

● Benefits

- Improved distribution uniformity
- Lower precipitation rates
- Runoff reduction
- Reduced influence by wind



High Efficiency Nozzles Savings Estimates

- Early studies
 - Compared performance of high efficiency nozzles w/ fan spray nozzles
 - Findings
 - Higher distribution uniformity
 - ~ 20% water savings
- Metropolitan calculated engineering savings
 - Assumptions
 - Replace & cap existing nozzles not needed
 - Increase system pressure
 - Runtime adjustment
 - 22% estimated savings or 3.57 gpd/nozzle



Previous Studies

- Southern Nevada
 - 378 zones monitored
 - Improved distribution uniformity
 - No measureable water savings
- Eugene Water & Electric Board
 - 23 sites monitored
 - No measureable water savings
 - Goal was to reduce peak water demand
- Municipal Water District of Orange County
 - 230 customers studied
 - 8% residential savings
 - 11% commercial savings

High Efficiency Nozzles Study Scope

- Consultant – A&N Technical Services
- Estimate water savings
 - Residential & commercial
 - Control for weather & other demand variables
 - Establish control group for comparison
- Evaluate effectiveness of various programs
 - Different delivery mechanisms
 - Varying costs
- Estimate rate of installations
 - Field inspections for small sample
 - Determine installation rate



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High Efficiency Nozzles Rebate History

	Market Segment	Delivery Mechanism	# of Nozzles Replaced*
Regional Rebate	Res & CII	Rebate	620,762
Local Rebate	Res & CII	Rebate	47,060
Direct Installation	Res & CII	Direct Install	194,263
Distribution	Residential	Distribution	5,465
FreeSprinklerNozzles.com	Res & CII	Voucher	427,474
TOTAL			1,247,964

* As of November 2013

- Created by Western MWD
 - Web-based voucher program
 - 28 water agencies participate
 - Combines Metropolitan rebate w/ agency funding
- Process



First

Fill out the on-line form and print your voucher today (it'll take less than 10 minutes).



Second

Determine the nozzles your site needs.



Third

Visit a participating supplier and pick up your nozzles.



Fourth

Install your nozzles and start saving

Research Data

- FreeSprinklerNozzles.com participating agencies
 - Riverside
 - Hermosa Beach/Redondo Beach
 - Westlake Village
- Total customer accounts analyzed
 - Single Family Residential = 117,552
 - Commercial = 8,287
- Weather data – NOAA stations



Field Inspection

FreeSprinklerNozzles.com



Residential

83%

90%

92%

Vouchered Nozzles
Installed

Installed Correctly

Confirmed as
Vouchered Nozzles



Commercial

92%

100%

100%

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Field Inspection Findings

- Reasons not installed/retained
 - Incorrect thread type
 - Disappointment in performance
 - Replaced nozzles w/ drip system
- Reasons for incorrectly installed nozzles
 - Incorrect nozzle selection, i.e. wrong spray radius
 - Clogged nozzles
- Noted irrigation problems
 - Brown areas – scheduling or system design
 - Incorrect nozzle distance
 - Clogged nozzles
 - Inappropriate sprinkler spacing

Water Savings Results



Water use < 1,250 gpd

1.15 gpd/nozzle



Water use > 1,250 gpd

6.2 gpd/nozzle



Aggregate Net
Water Savings

1.57gpd/nozzle

Original MWD Savings Estimate – 3.57 gpd/nozzle

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Study Findings

- Savings lower than Metropolitan's calculation
- No statistical savings difference between:
 - FreeSprinklerNozzles.com, and
 - Rebate programs
- High use participants pose greatest savings potential
- FreeSprinklerNozzles.com effective program type
 - Significant rebate activity
 - High installation rate



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