This presentation premiered at WaterSmart Innovations

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Field Study of Uniformity Improvements from Multi-Stream Rotational Spray Heads and Associated Products

Preliminary Results – Distribution Uniformity Improvements

Kent Sovocool, Mitchell Morgan, and Michael Drinkwine

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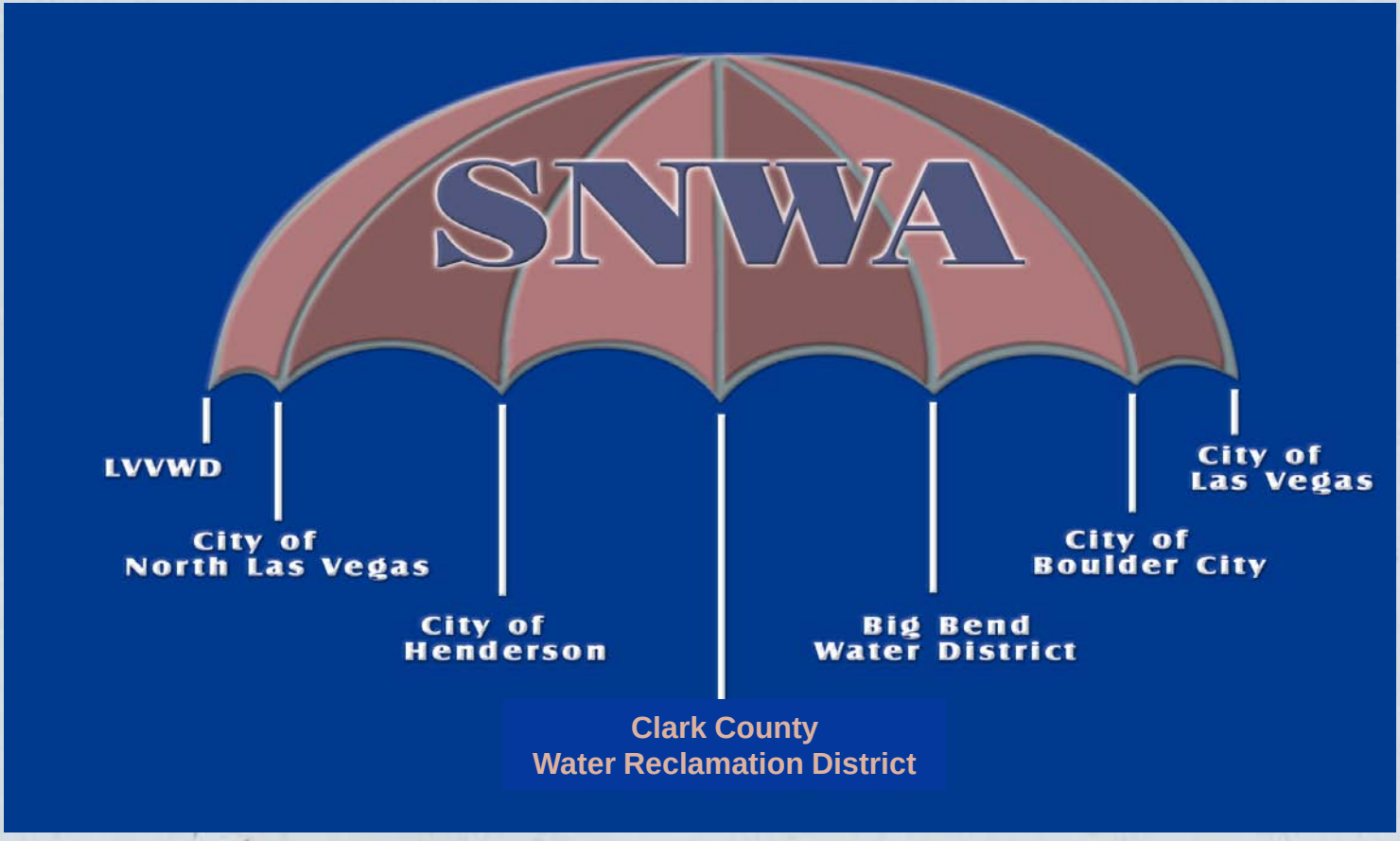
What is SNWA?



SNWA is the regional water wholesaler for the major municipal areas in Southern Nevada and is responsible for assuring adequate resources for these communities. Conservation is one of the major strategies employed to this end in addition to resource acquisition.

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What are Multi-Stream, Multiple-Arc Rotational Spray Heads (MSRSHs)?

•Have multiple trajectories of water application.

•Rotate.

•Should have advantages usually associated with rotors but on popup spray bodies.

•Arcs for small areas.

•Lower precipitation rates.

•Higher purported distribution uniformity and can be used for retrofit of pop-ups.

•Should theoretically save water.

Hunter MP Rotator

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Why a Field Study of MSRSHs?

- To date, there have been studies (many case studies) that support the improvements in DU, but generally small sample sizes and there is little data on what variables are important.
- Need for more systematic pre-/post retrofit testing.
- SNWA looking at rebating in future as well.
- Since more and more utilities are rebating, need **water savings** data in addition to DU improvement.
- Need to account for **behaviors too**!

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The Study

Two Phases

- **First Phase: Installations.** Can we demonstrate DU improvement at the sites and determine some of the important variables? *Reporting on today*

- **Second Phase: Monitoring.** How do customers water with the new technologies and how much water savings do they practically achieve? *Future*

Rain Bird Rotary Nozzle

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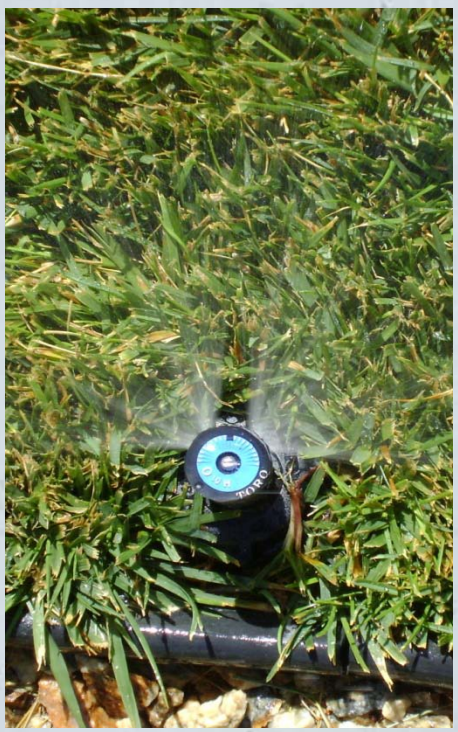
Associated Purported DU Improvement Products



Toro Precision Series

Little Valve (in stem control)

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Field Installations and Procedures (IA Audit Style)

- Record original settings (controller), get flow rates, stations info., etc.
- Perform Pre-installation DU – Lower Quarter Catch-can test.
- Install product.
- Perform Post-installation DU – Lower Quarter Catch-can test.
- Program a starting schedule.

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Installed Comparisons

- Hunter MP Rotators
- Hunter MP Rotators with Little Valves
- Rain Bird Rotary Nozzles
- Rain bird Rotary Nozzles with Little Valves
- Toro Precision Series
- Toro Precision Series with Little Valves
- Little Valves with Existing Components

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Preliminary Results

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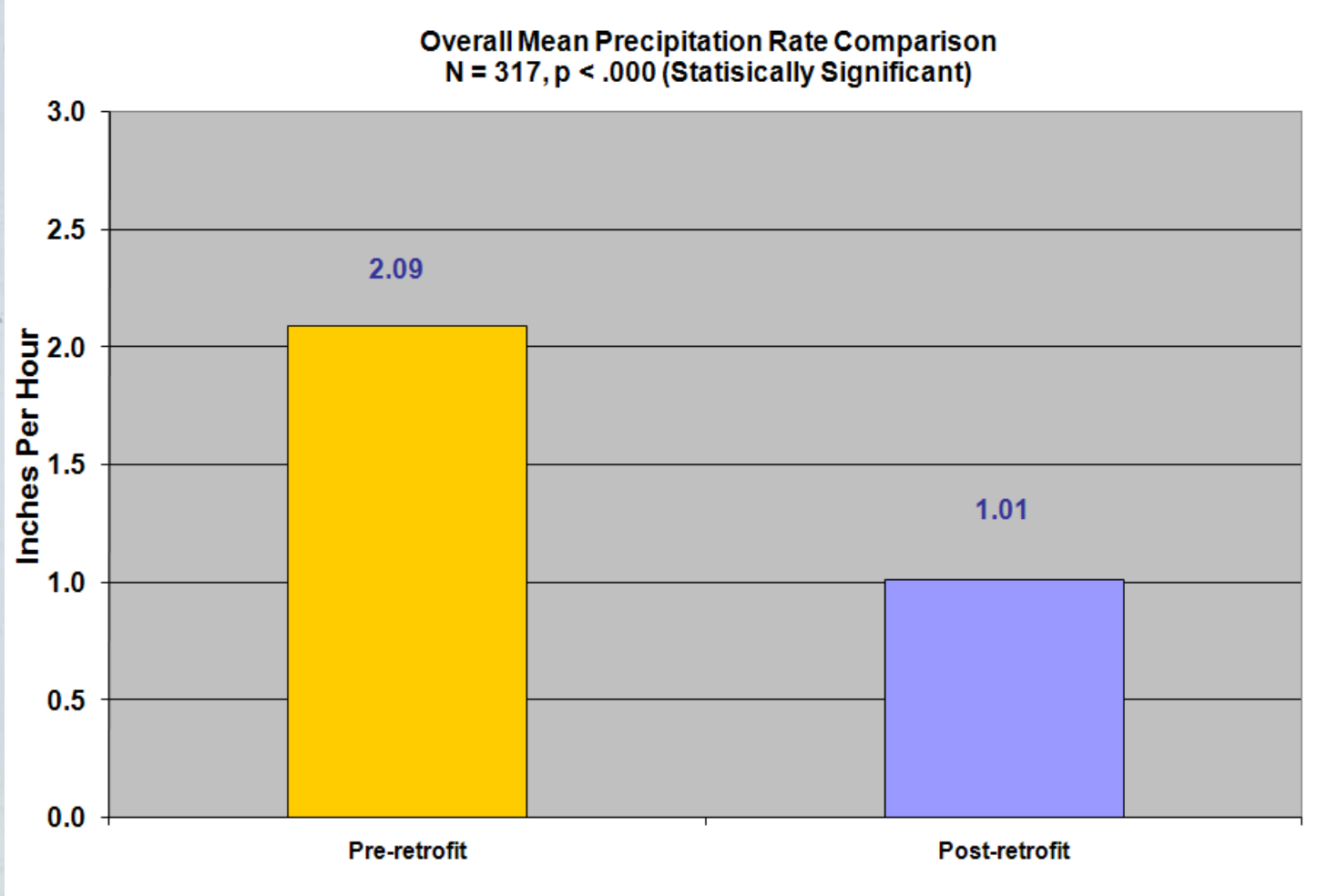
Descriptive Statistics – Precipitation Rates



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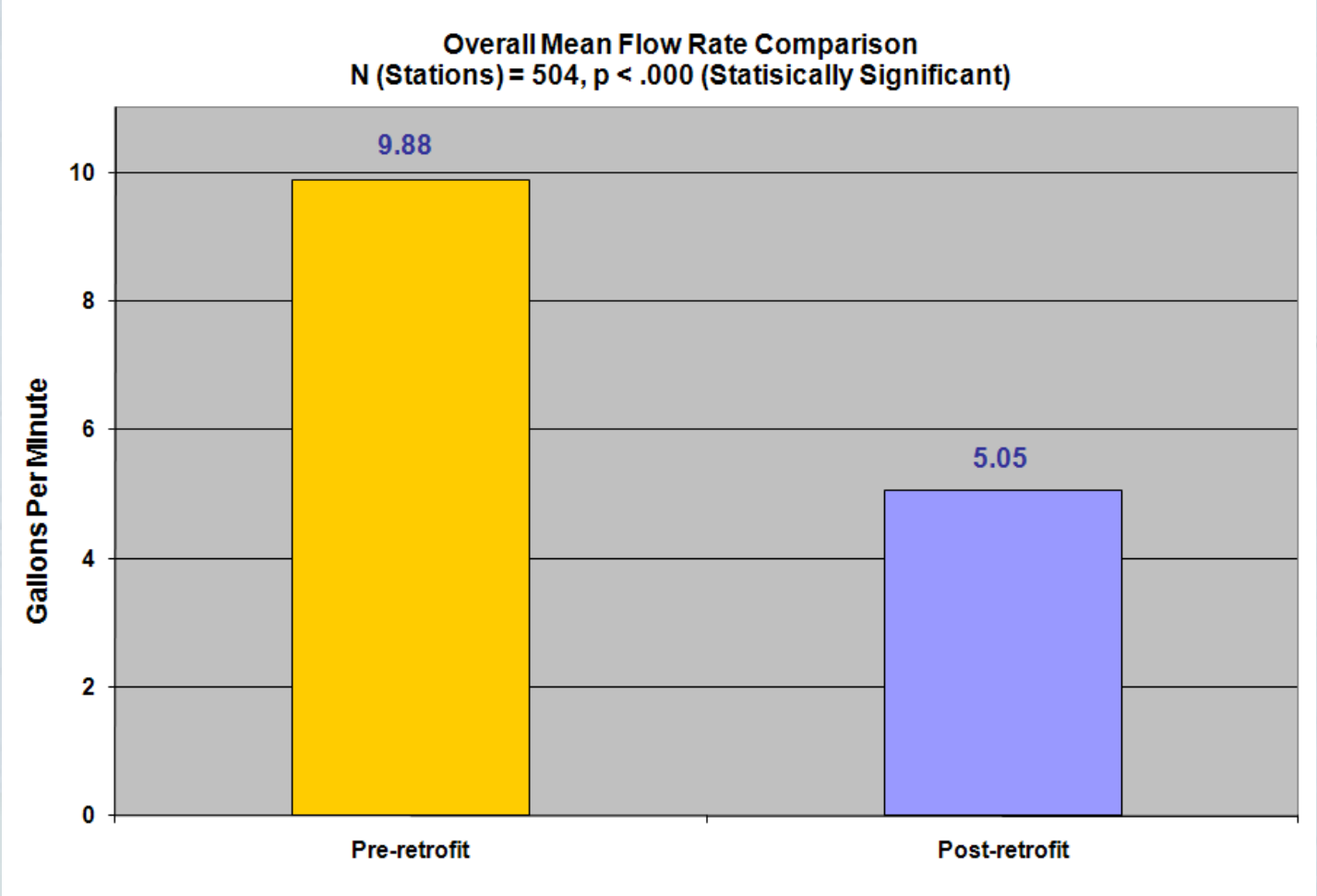
Descriptive Statistics – Per Station Flow



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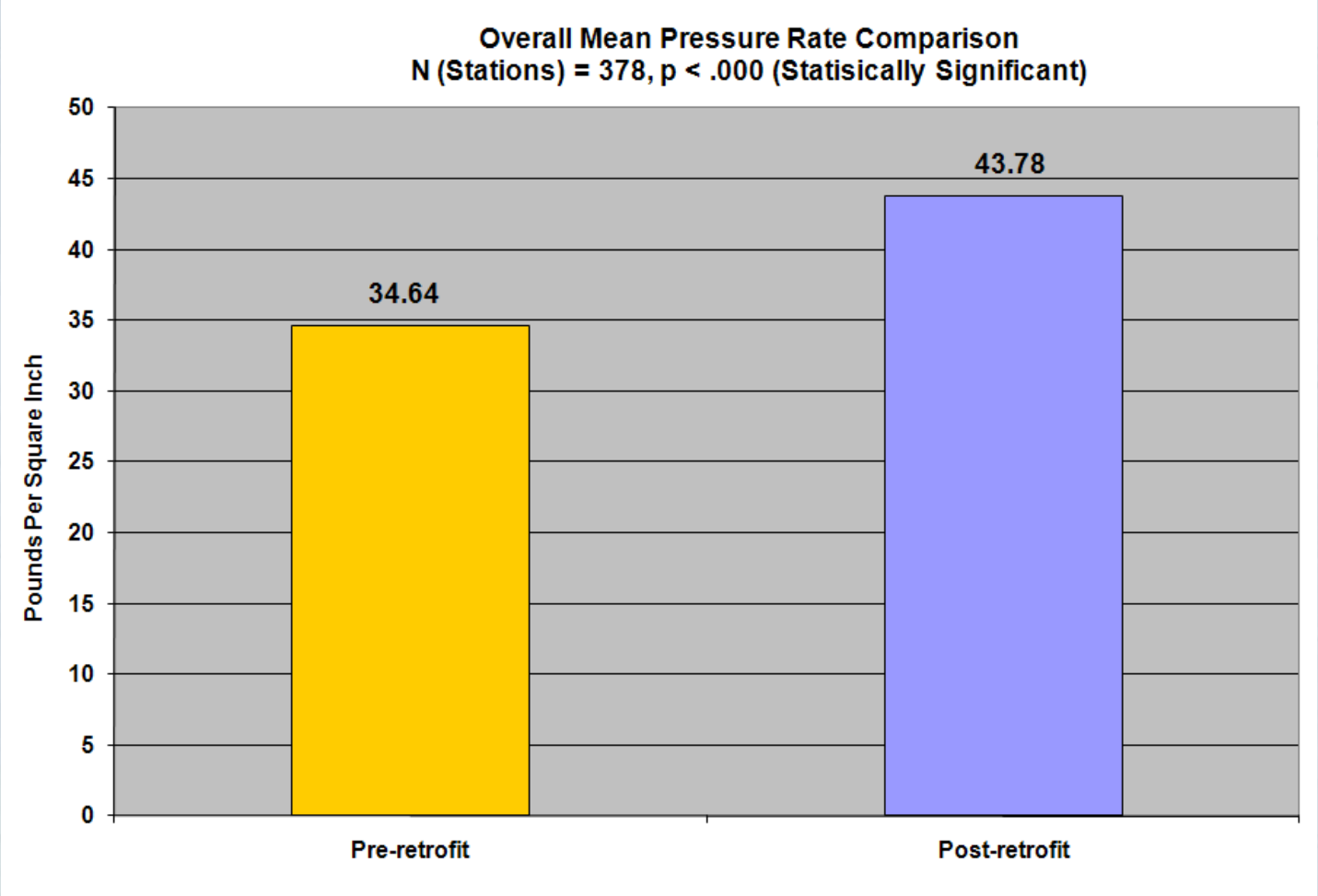
Descriptive Statistics – Operating Pressure



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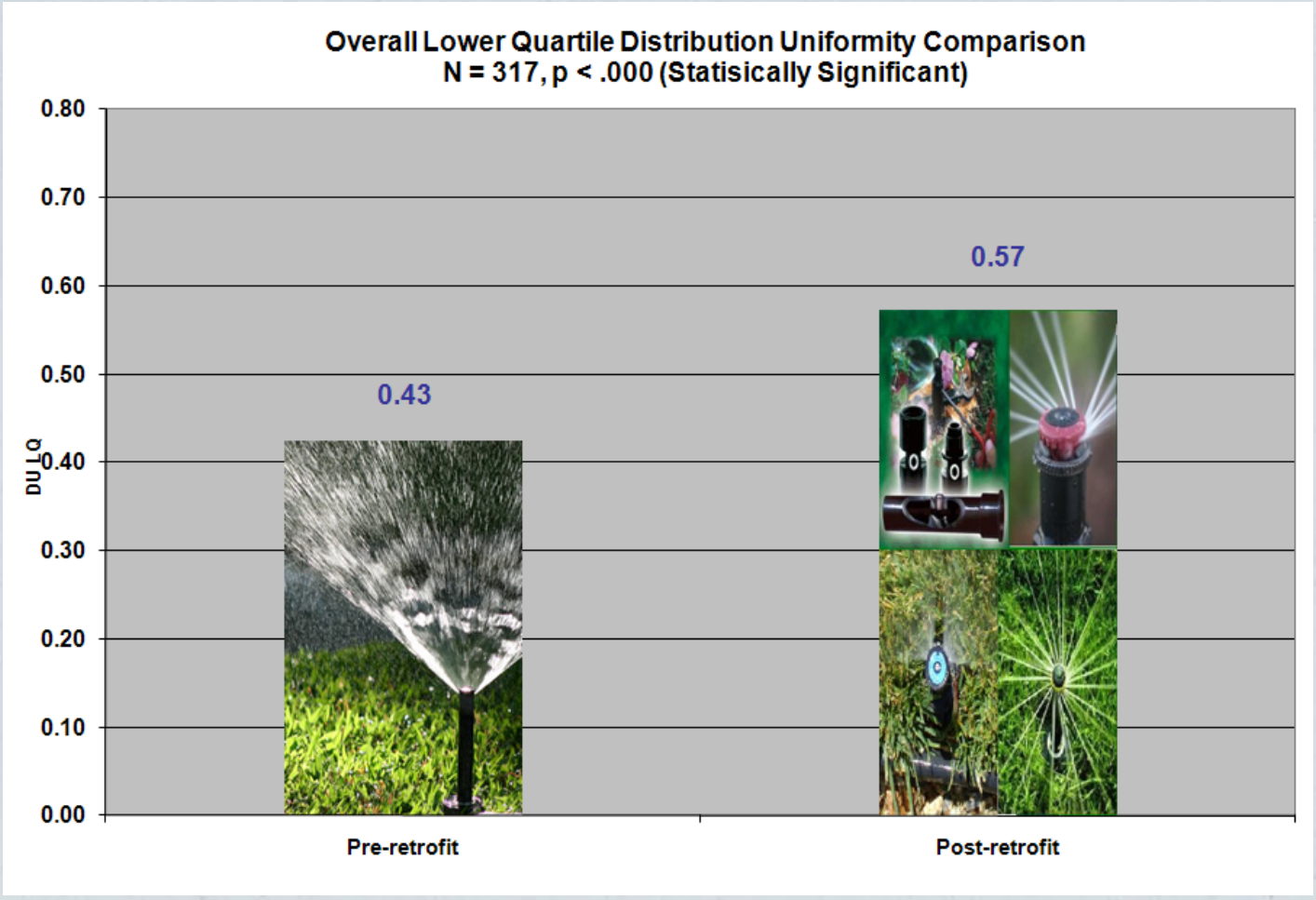
All Technologies Studied Comparison DU



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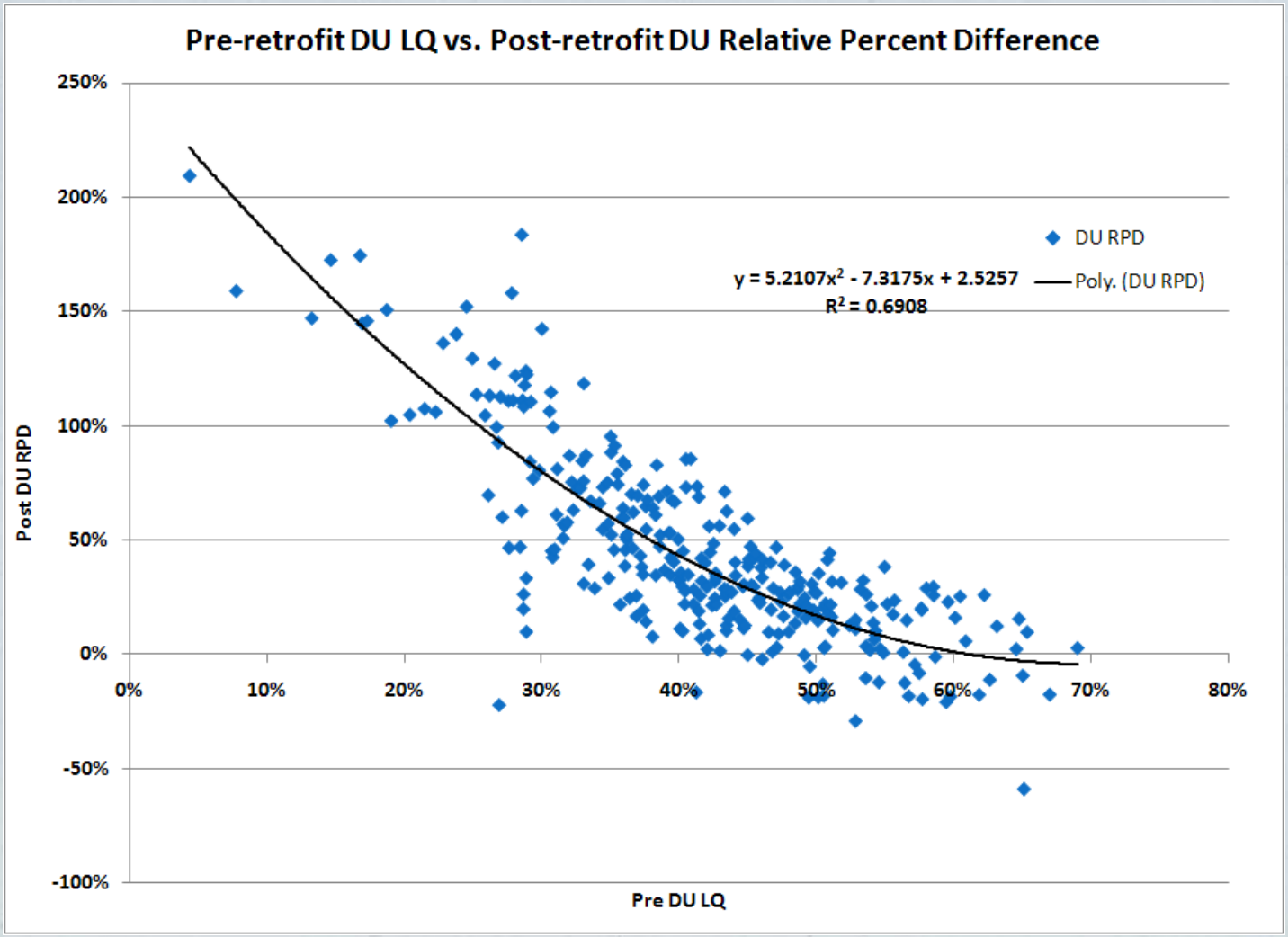
All Technologies: How might pre-retrofit DU influence how far improvements can go?



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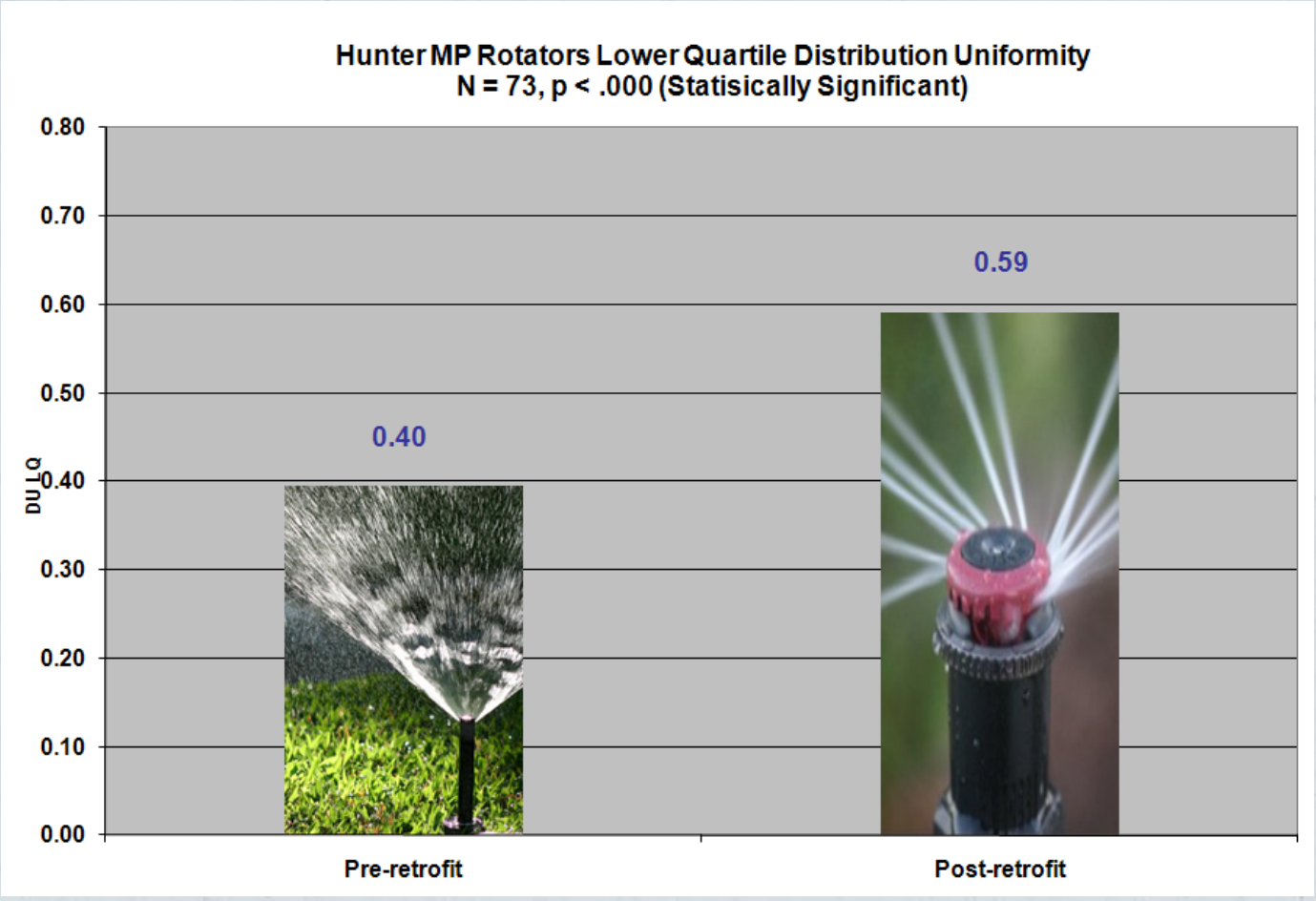
Hunter MP Rotators



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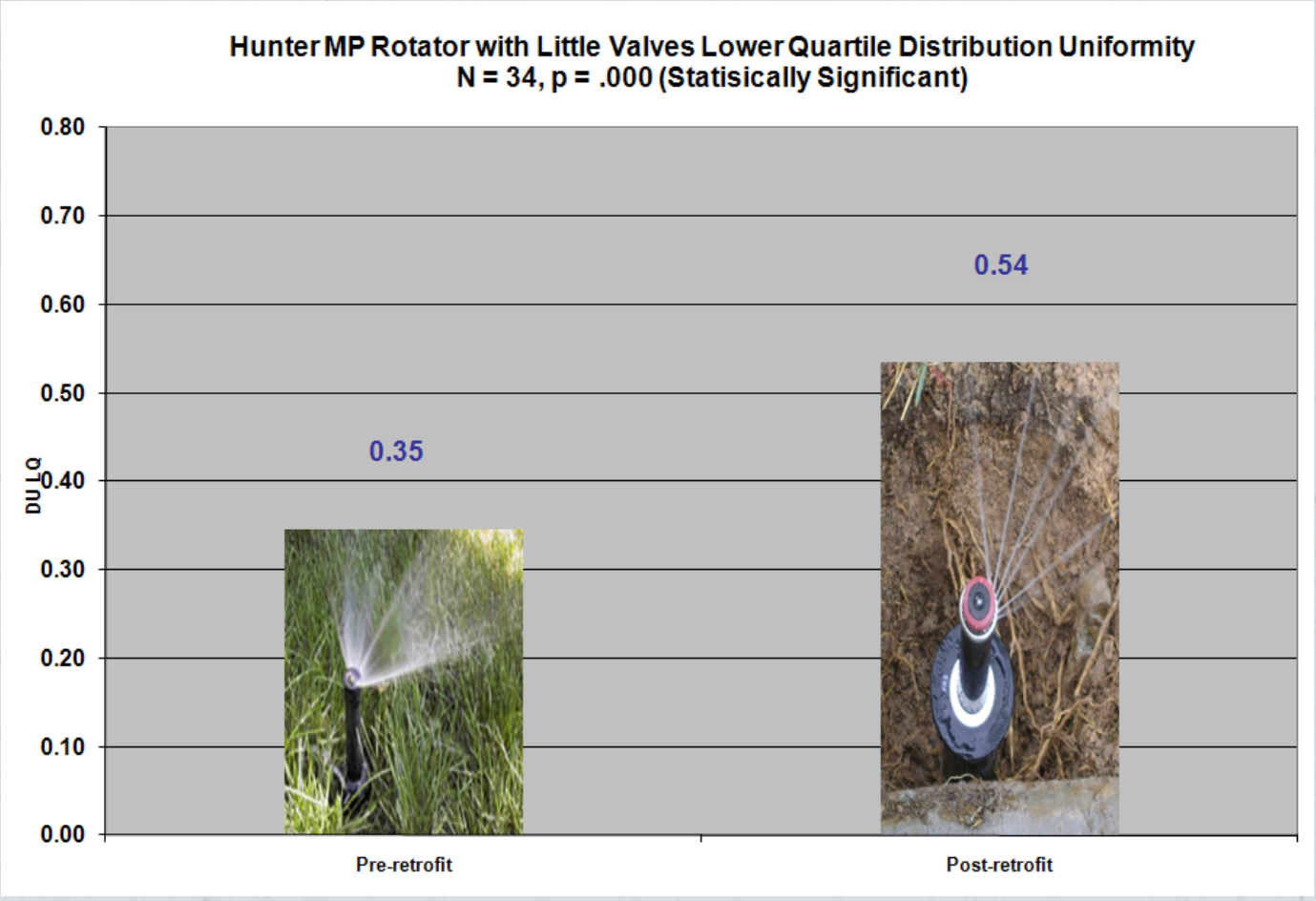
Hunter MP Rotators with Little Valves



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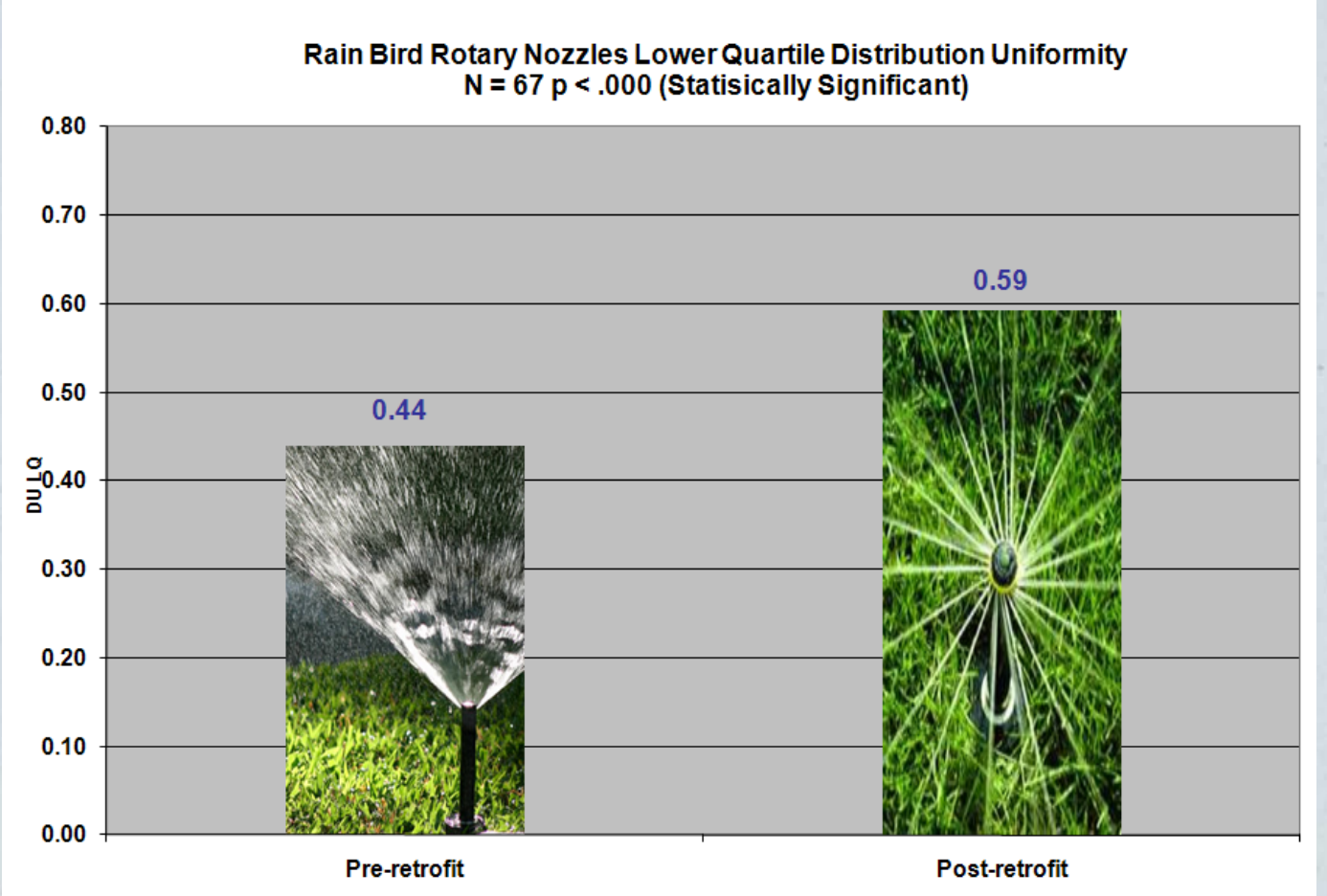
Rain Bird Rotary Nozzles



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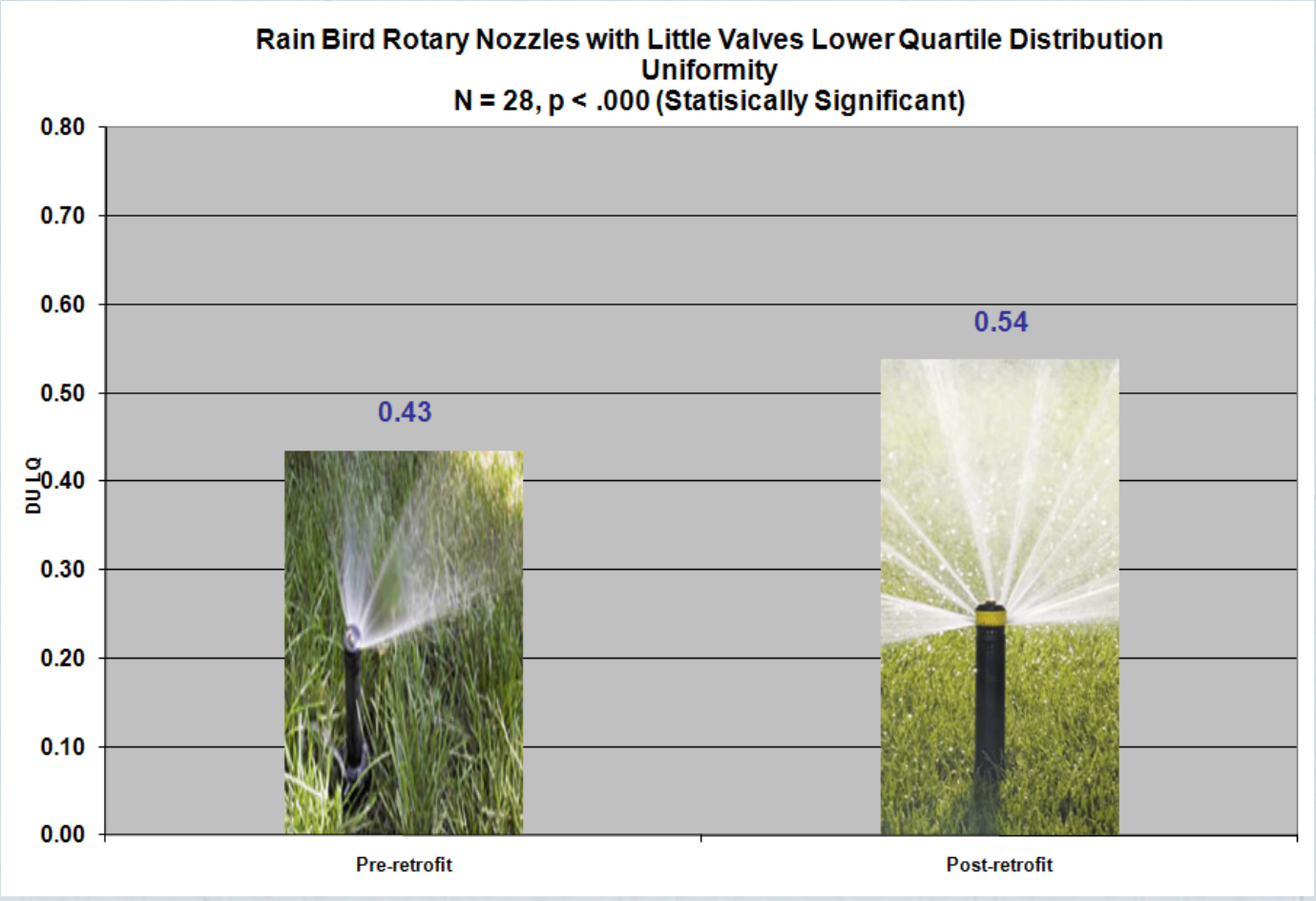
Rain Bird Rotary Nozzles with Little Valves



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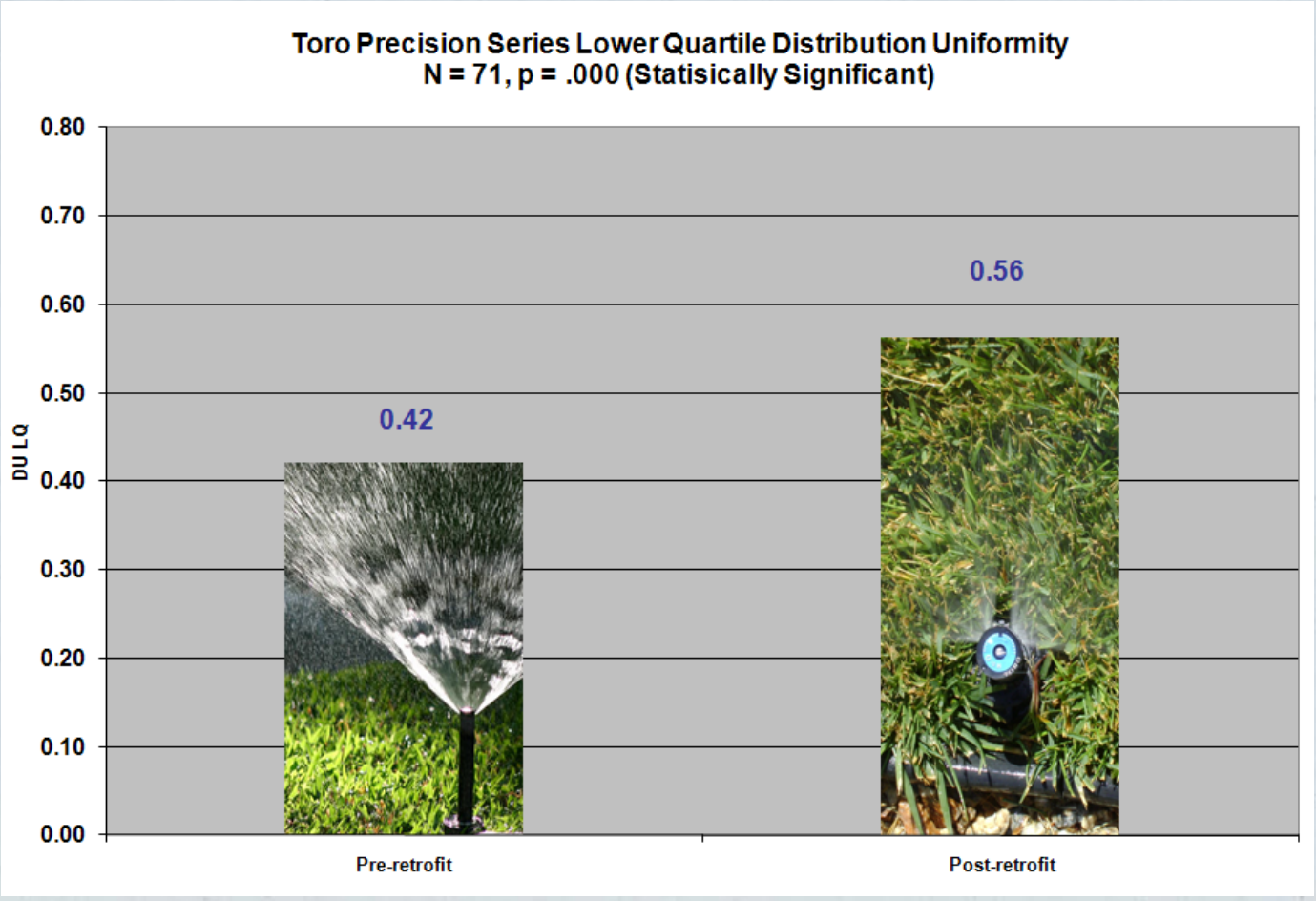
Toro Precision Series



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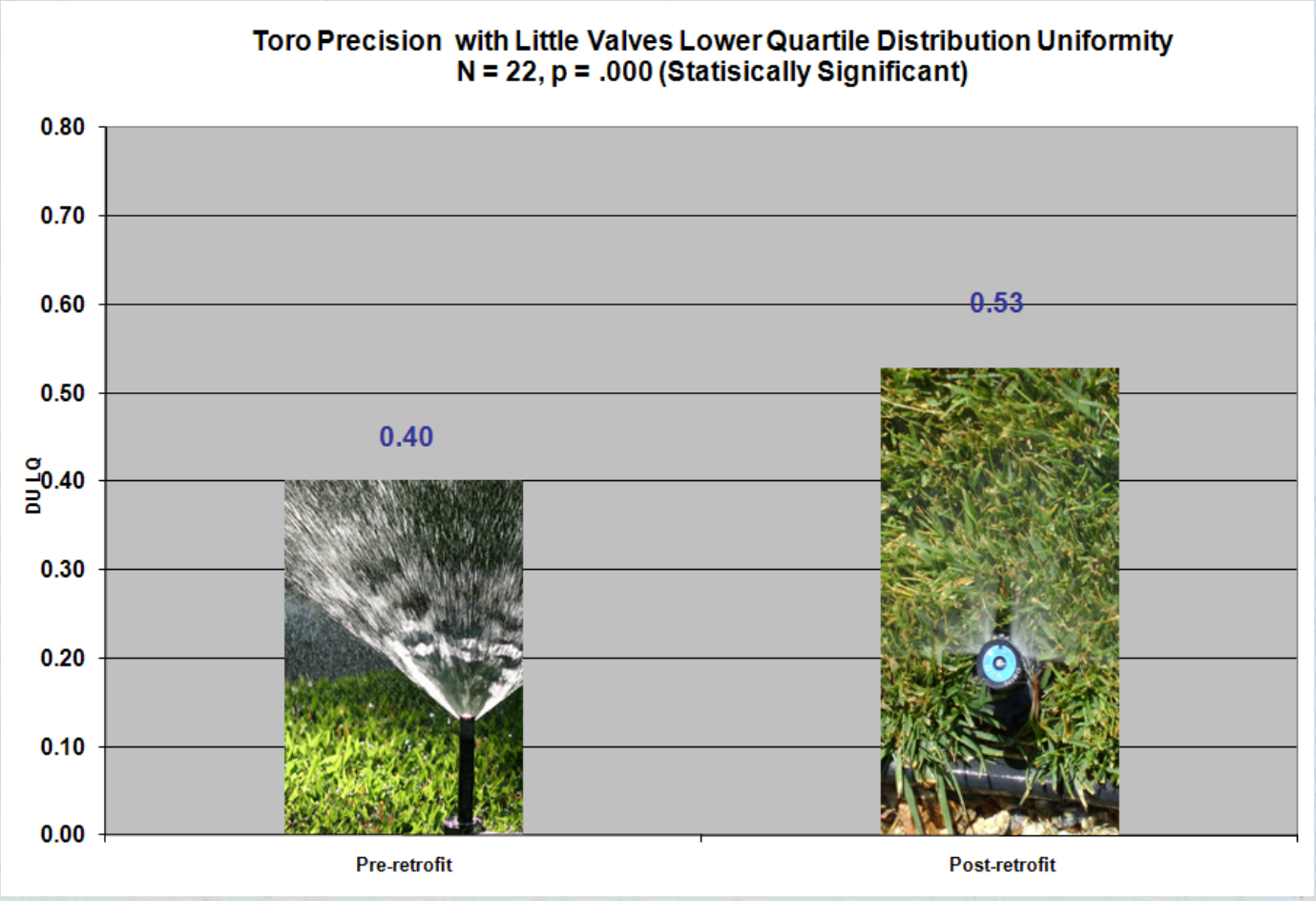
Toro Precision Series with Little Valves



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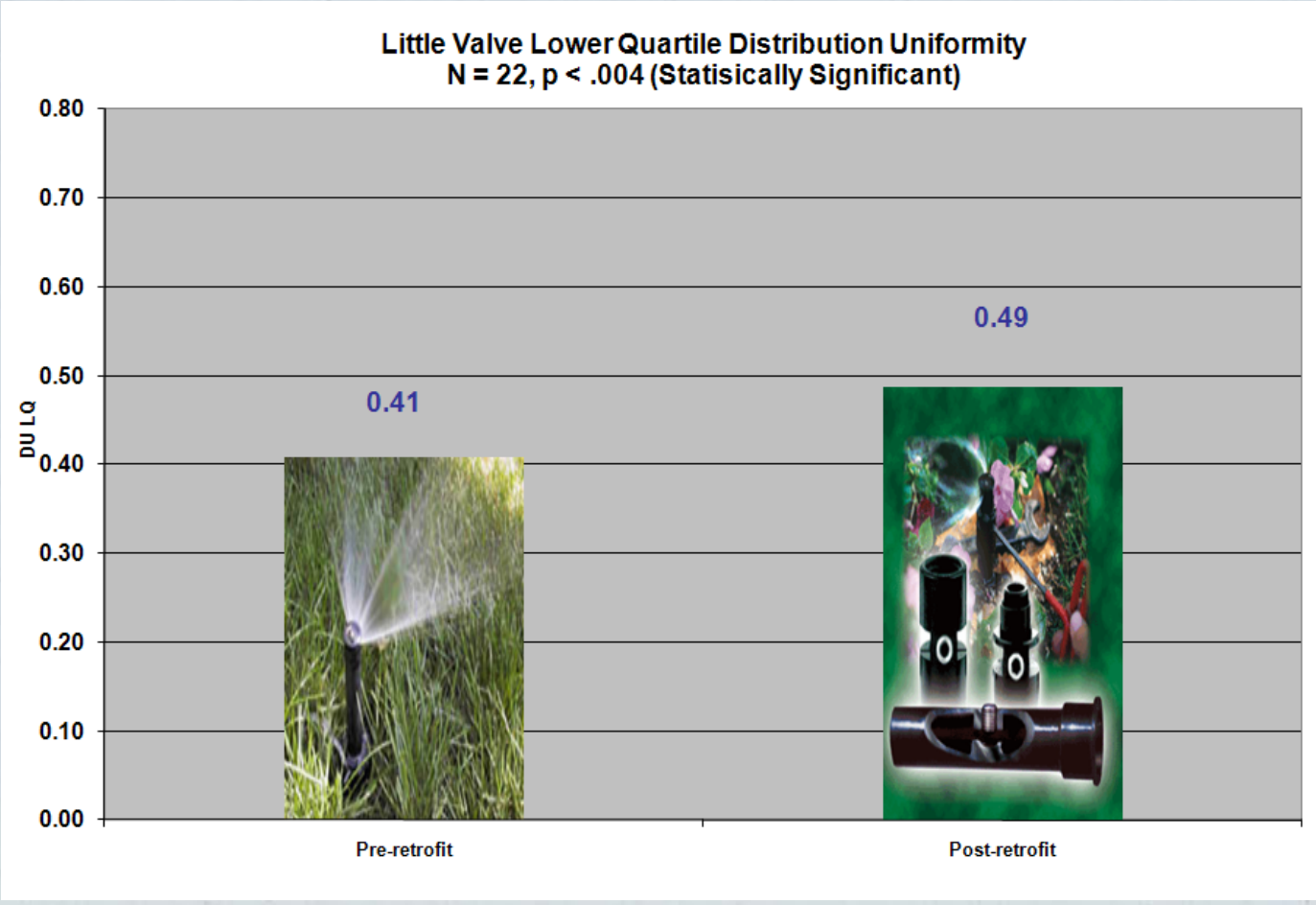
Little Valve with Existing Components



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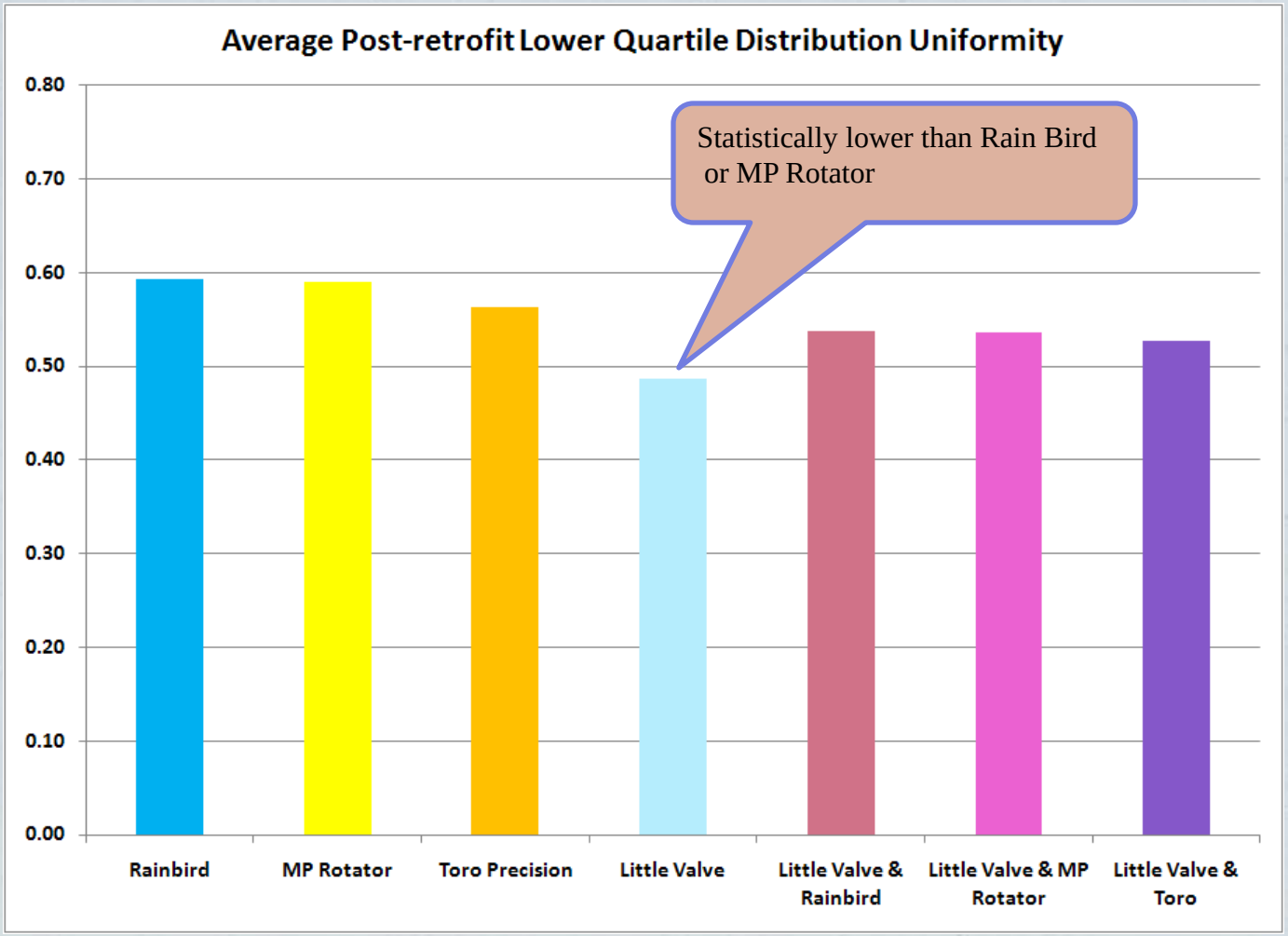
Post-Installation Distribution Uniformity Summary Results



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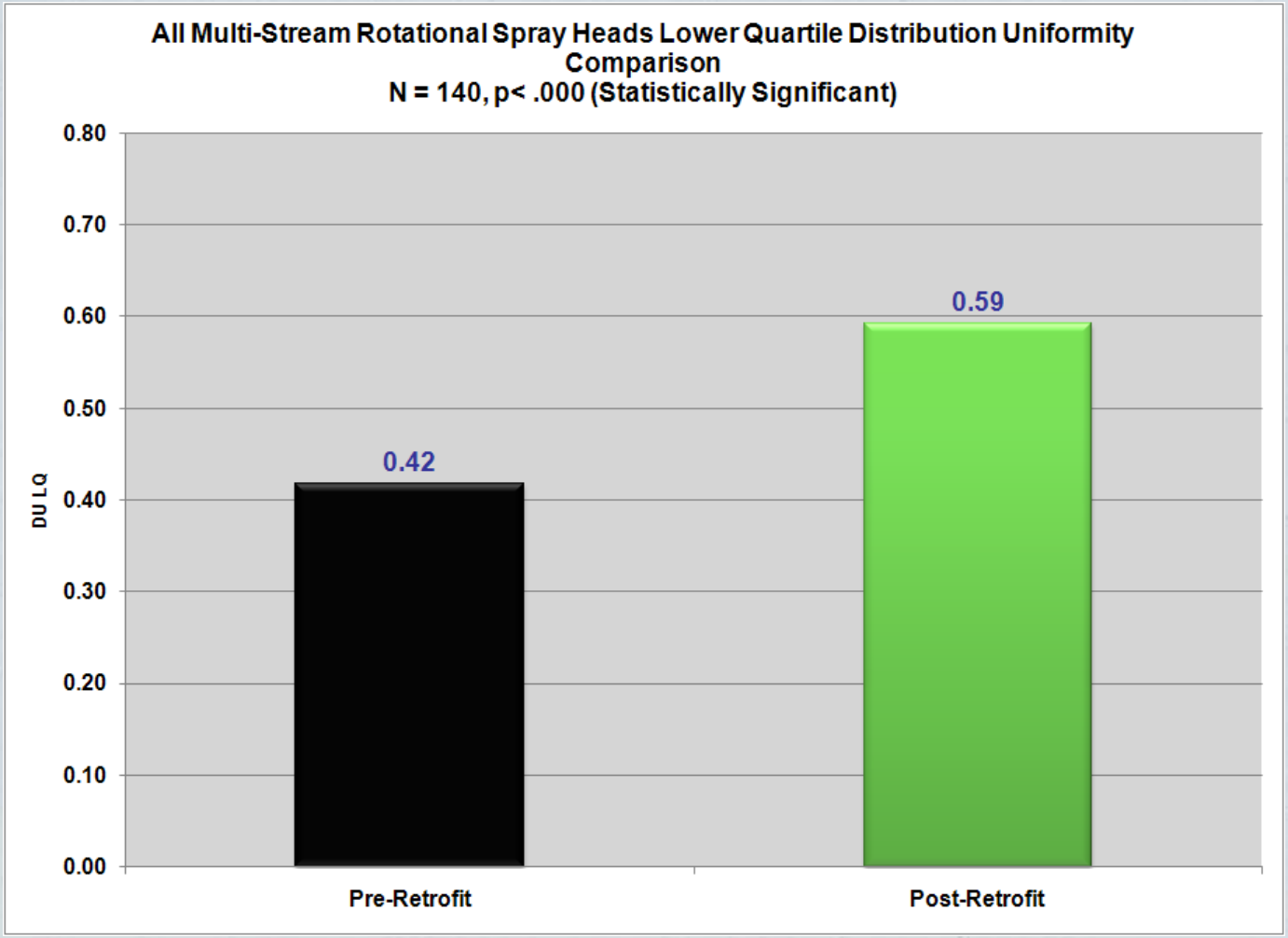
All MSRSHs (Hunter MP and Rain Bird Rotary)



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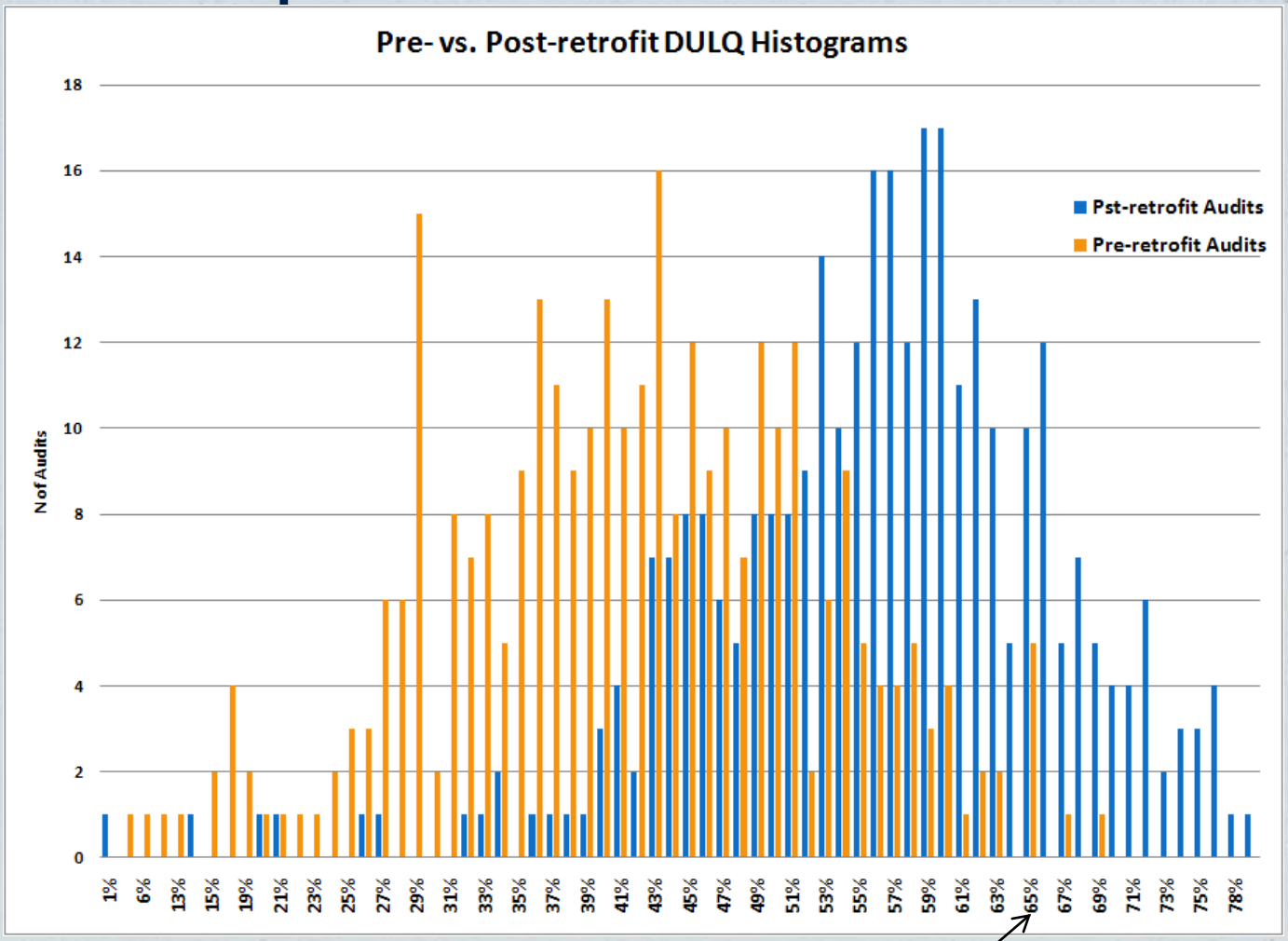
Improved technologies, Distribution Uniformity and EPA's WaterSense® New Homes Specification



Largest turfgrass area must be ≥ 65%

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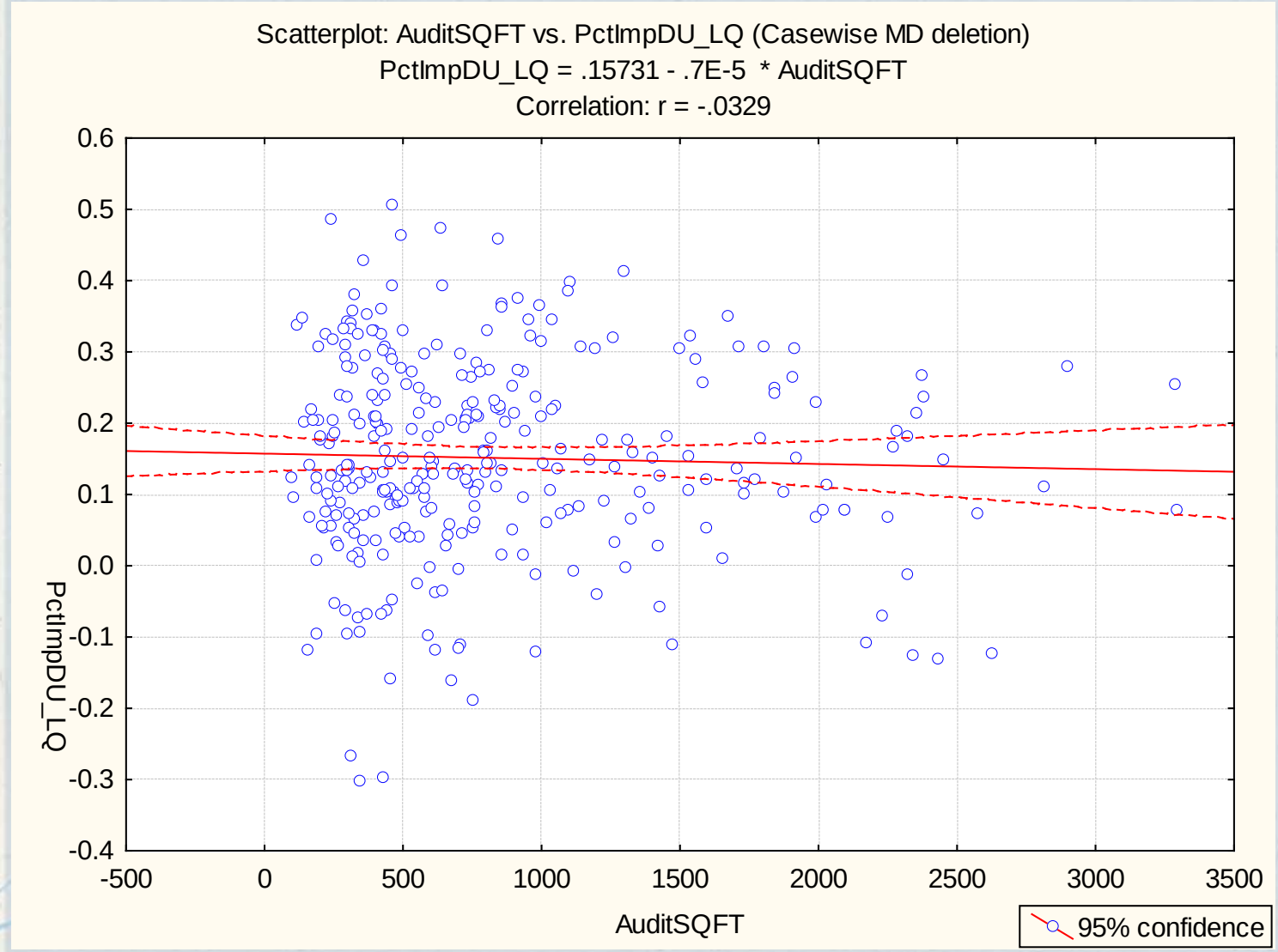
No Correlation Between Audit Size and Efficiency Improvement



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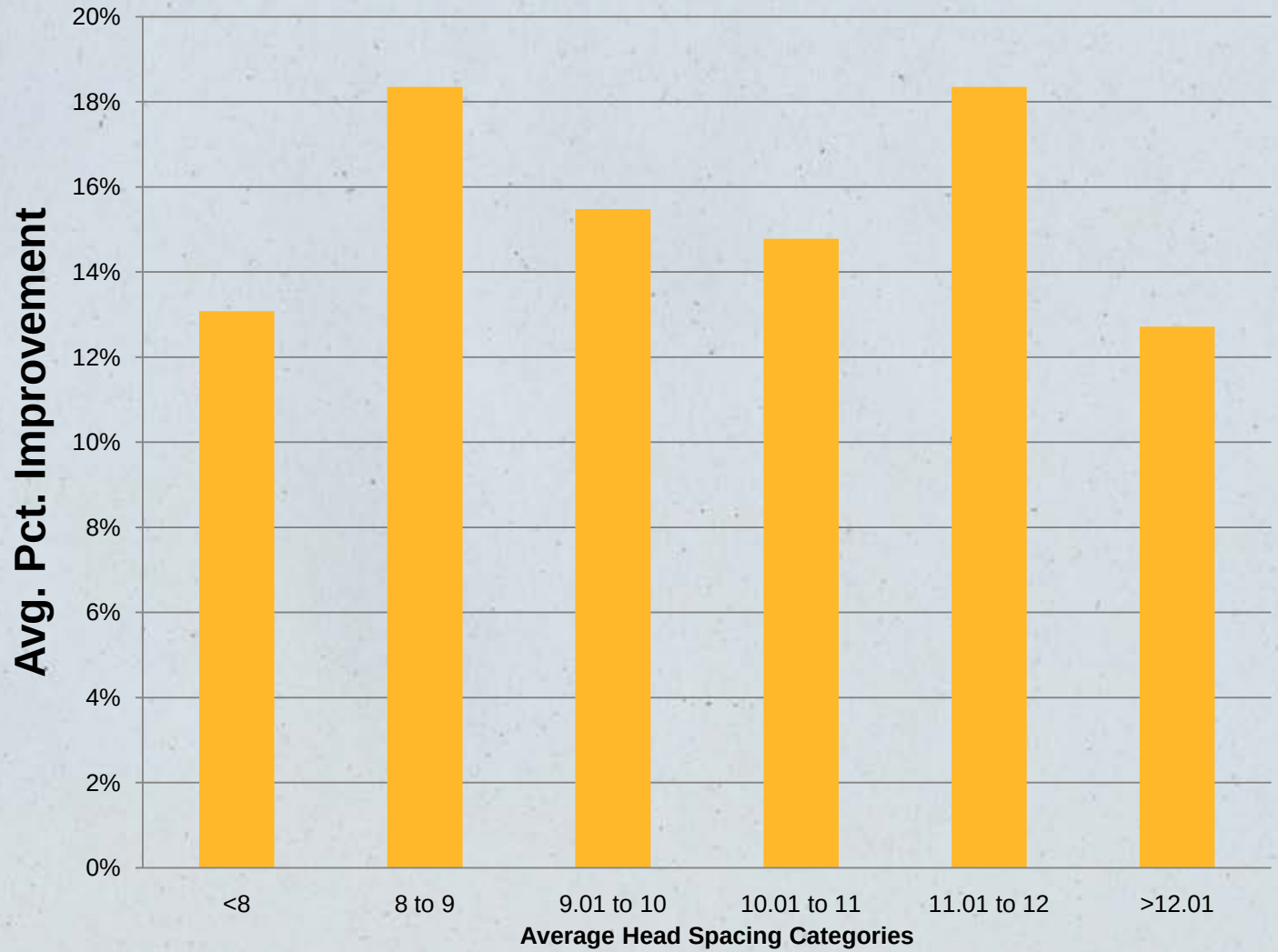
Head Spacing Vs. Percent DU LQ Improvement

Differences are not statistically significant



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Findings to Date

- All of the sprinkler head improvements technologies appear to work. The average improvement in DU was 0.17 (a relative improvement of 40%) for MSRSHs. For all technologies it was 0.14 (33% relative improvement).

- There may be a diminishing returns effect in any simple head retrofit in that the higher the pre-retrofit DU, the less relative improvement was obtained. Going beyond 0.60 DU values, at least in Southern Nevada, is difficult.

- The improvement for the Toro Precision series was statistically similar to the Rain Bird and Hunter MSRSHs products.

- The Little Valve product by itself is capable of imparting DU improvement (about 0.08). The concept though of “stacking” it with another technology, does not “further” raise DU.

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Findings to Date

- Though using these improved technologies certainly does not guarantee any given turf area with pop-ups will make the WaterSense® New Home requirements (design is critical), not using such technologies probably makes it much harder to make the spec requirement.

- The results here are impressive and robust. They do not however necessarily match the levels of improvement sometimes advertised (and found in some studies).

- Practical water conservation levels obtained are unknown at this time, but should be revealed by completion of the study.

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Questions?
(and thanks to the manufacturers for their support of the research and for the products!)