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Reducing Dry Weather Runoff in So. California

WaterSmart Innovations Conference 2009
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Agency Partners-Water Agencies

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

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Moulton Niguel Water
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South Coast Water District
Providing Quality Water and Wastewater Services to the Coastal Communities

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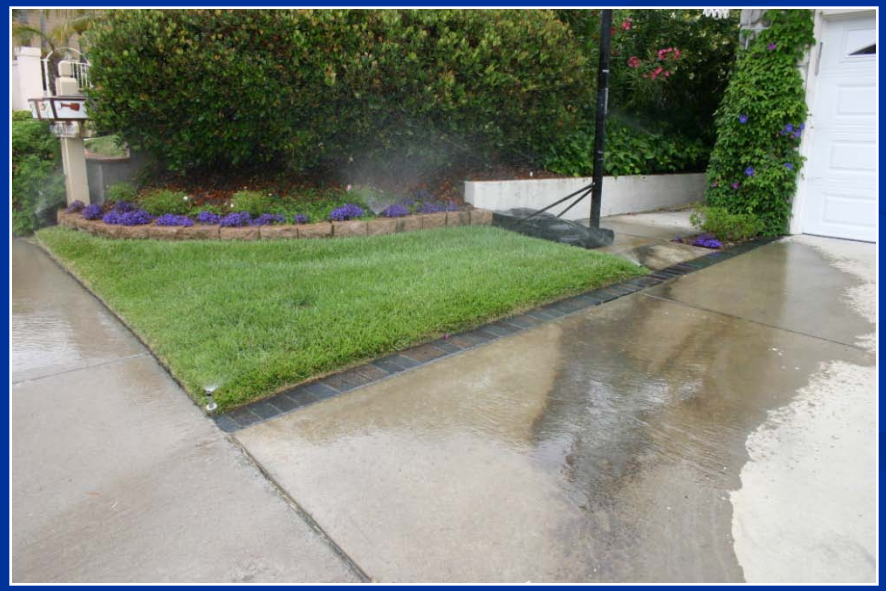
Landscape Irrigation in Urban So. California

- 60-70% of water consumed
- Main source of dry-weather runoff to stormdrains
- Conveys pollutants to creeks and ocean



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Study Area

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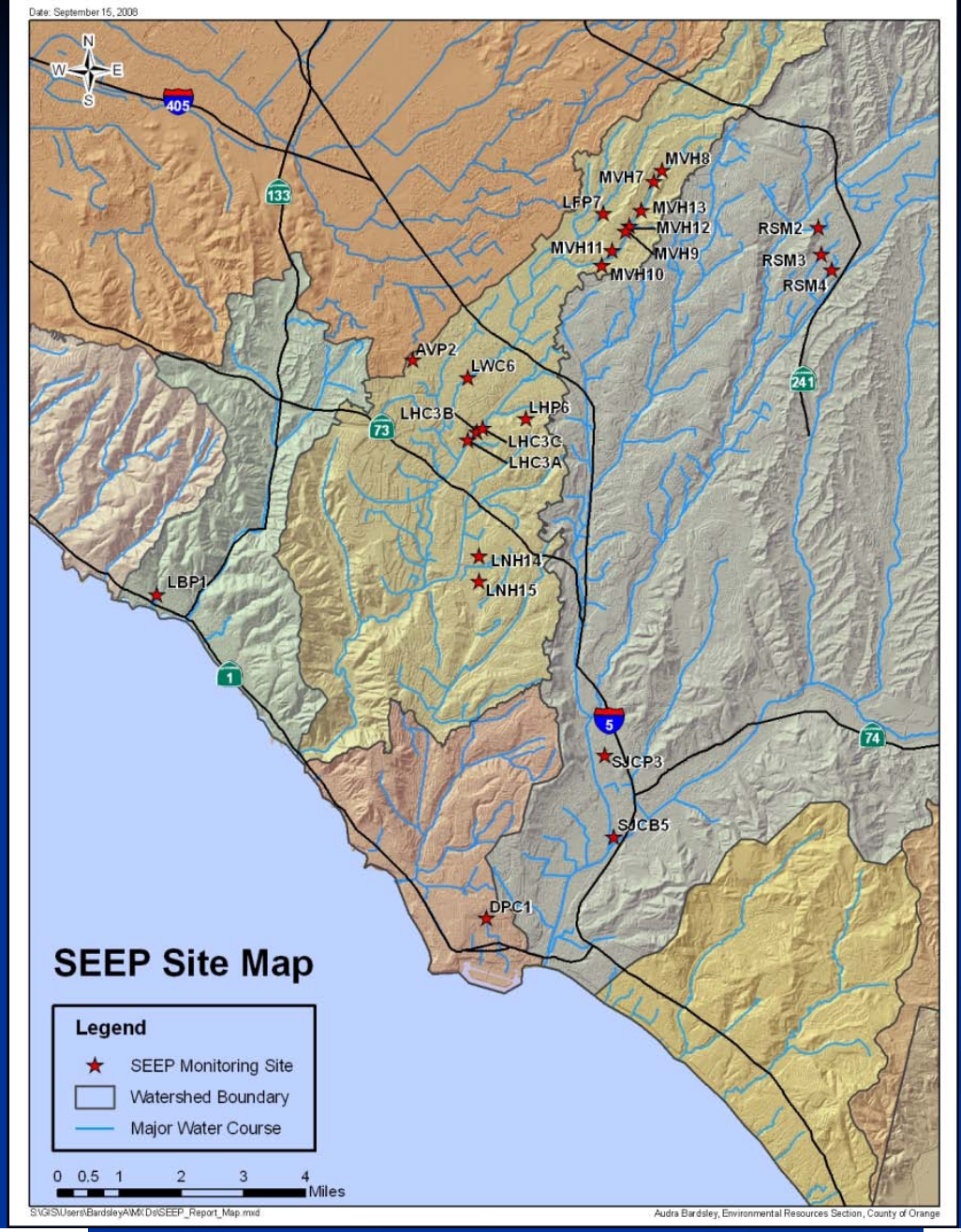

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MWDOC SmarTimer Program History

2001
Westpark Study
Test installations at individual homes

2004
Residential Runoff Reduction (R3) Study
Neighborhood-wide installations

2006-08
SEEP
3 BMP Groups
23 Drainage Areas
10 Cities

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Key Landscape Retrofit BMP Tool #1: SmarTimers

- Automatic landscape irrigation controllers

Adjusts irrigation schedule daily

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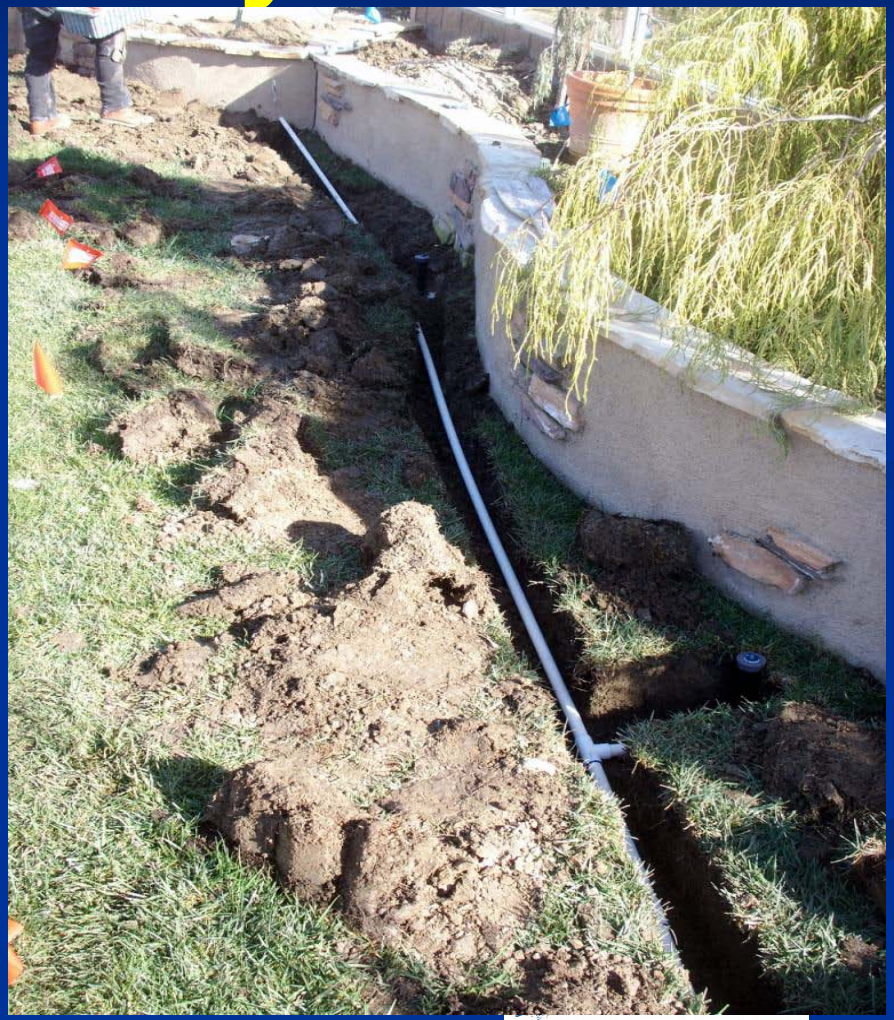
New Questions under SEEP

- ***Effectiveness of SmarTimers combined with other landscape retrofit BMPs?***
- ***Effectiveness across variable land uses & topography?***
- ***Is all dry-weather storm drain flow landscape irrigation?***

Landscape Retrofit BMP #2: Distribution System

- Minimize overspray
- Reduces precipitation rate
- Improves uniformity of water distribution



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Landscape Retrofit BMP #3: Edgescape

- Buffer strip along pavement reduces runoff
  - Replace grass with low water plants
- Modify sprinklers
- Add mulch

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Varied Assessment Areas

- 23 areas in 10 cities
- 14 Single-owner sites with large commercial controllers (“COM”)
  - Multi-family, Park, and Business land uses
- 9 single family neighborhood drainage areas with 1,000+ controllers (“SFR”)
- BMP retrofit areas and un-retrofitted ‘controls’
- Varied topography

Acreage Ranges			
	Min	Max	Median
COM	1.9	91.5	5
SFR	13	56	30

Runoff Evaluation Program

- Pre-project baseline (2007) compared to post-retrofit (2008)
- 14 weeks May - August
- Twice weekly grab samples:
  - Fecal Indicator Bacteria (FIB)
  - Nitrogen and Phosphorus
  - Dissolved Organic Carbon (DOC)
  - Electrical Conductivity
- Continuous flow measurement

Runoff flow reductions achieved?

- Challenging logistics
  - Clogs, vandalism, consultant bankruptcy

	Zero Flow Sites	Flow Rate Range (cfs)
Pre-Retrofit	3	0-1.72
Post-Retrofit	4	0-0.13

- Daily volume down 55% at Controls
- Daily volume down 90% at retrofitted areas

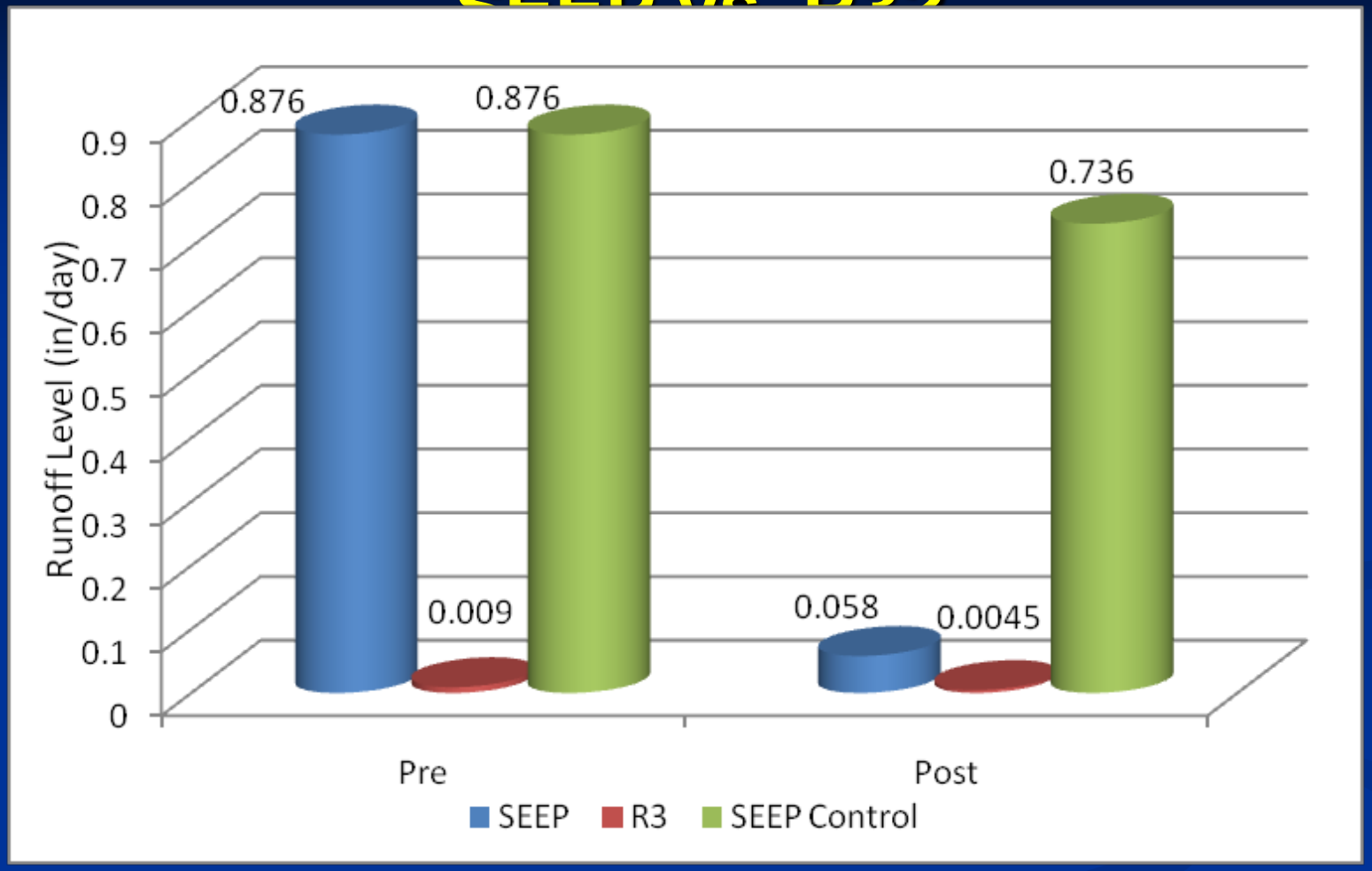
How did BMP groups and land uses compare?

- Too much diversity at too few sites to compare BMP Groups
- Average runoff rate from total land use area:

	Pre-Retrofit (in/day)	Change (in/day)
COM	0.02”	0.001”
SFR	0.3”	-0.2”

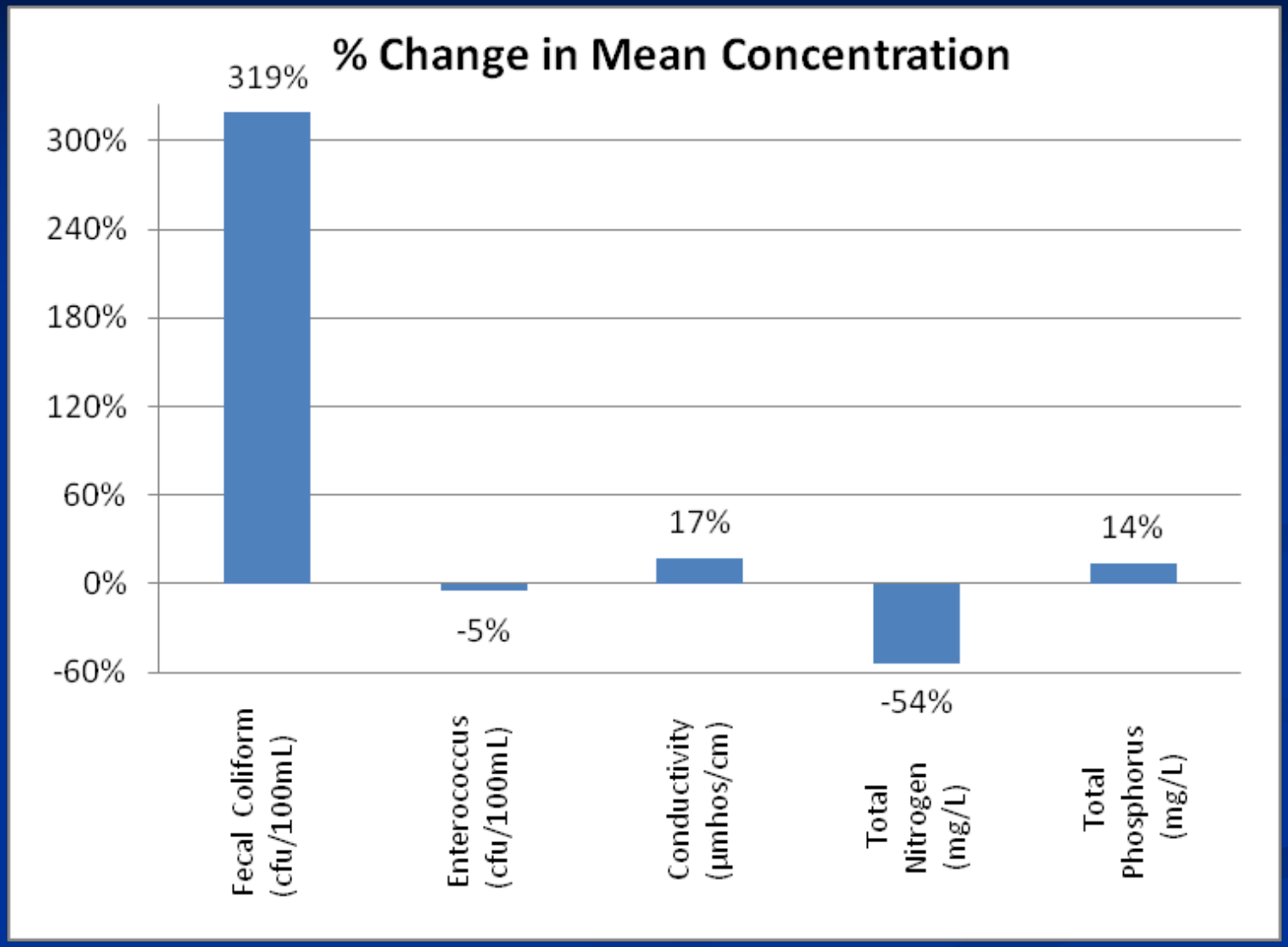
- 5/6 SFR decreased; 50/50 COM
- SFR had a greater reduction despite lower BMP coverage %

SEEP vs. R32



- Caused by topography, soil type, groundwater?

Runoff Quality Concentrations



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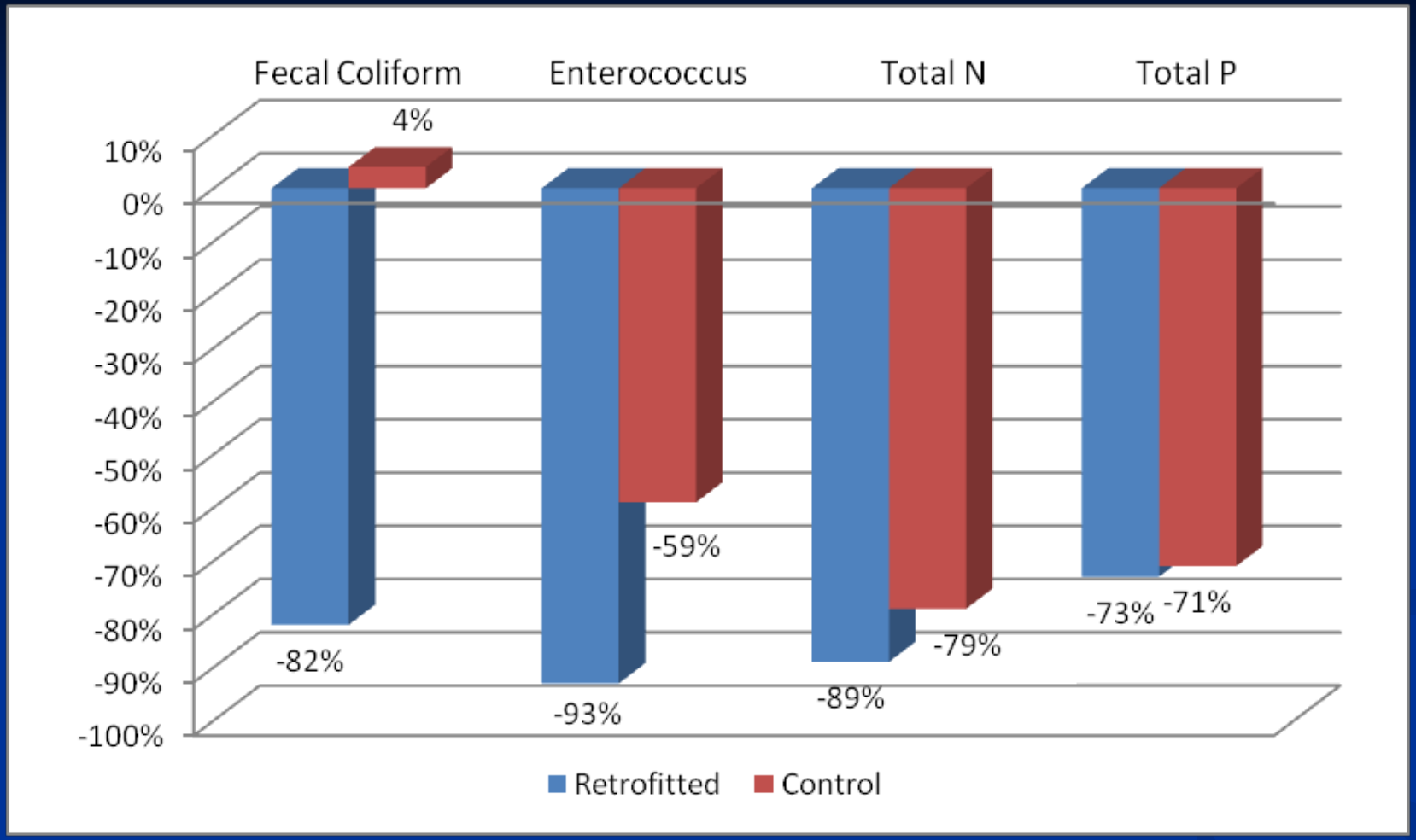
Runoff Quality Concentrations

- All exceeded concentration-based Basin Plan Water Quality Objectives
- 3 out of 5 increased concentration when irrigation surface runoff decreased post-retrofit
- N:P ratio shifted overall from 16:1 to 7:1 – beneficial per WQO of 10:1

Loading Change Pre- to Post-Retrofit



- Overall: Fecal Coliform daily load decreased by about 35%, and Enterococcus load decreased by about 85%

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Concentrations Increase and Runoff Decreases-Why?

- Fecal bacteria underground sources (biofilms, wildlife, rotting leaves) may be less diluted with less total flow
- Phosphorus occurs naturally in local soil & geologic structures
- Nitrogen decrease due to less wash-in of high-nitrogen fertilizers or reclaimed water from surface?

Implications

- **Implications for Concentration-based WQOs**
  - Elimination of surface irrigation runoff may not achieve compliance with concentration-based Water Quality Objectives or numeric effluent limits in MS4 discharge
  - WQOs may need to be revisited re: local natural sources of constituents
- **Implications for Load-based TMDLs**
  - Irrigation runoff reduction is worthwhile for load reduction and water supply
  - Dry weather modeling and load allocations need to recognize underground infiltration into MS4

Next Steps

- Completion of SEEP water consumption data collection and statistical analyses
- Future Study
  - San Clemente SFR Project –Focus on intensified irrigation system retrofits in area draining to Poche “Bummer” Beach
    - Cost-effectiveness of irrigation system retrofits with respect to water consumption and runoff?
- Implication for Rebate Programs
  - Prioritize regionally-based on cost effectiveness?
  - Rebate nexus to Fix-it Tickets as cost control?

- Acknowledgements
  - SEEP Study Partners-City and Retail Water Agency staff
  - A&N Technical Services, Inc.
  - Sierra Analytical Labs, Inc.
  - GEOtivity, Inc.
  - County of Orange-OC Watersheds Program
  - San Diego Regional Water Quality Control Board
  - CA State Water Resources Control Board
- Funding Partners
  - People of the State of California
  - State Water Resources Control Board funded through the Proposition 40 Urban Stormwater Program
  - Agency Partners
  - Municipal Water District of Orange County
  - Metropolitan Water District of Southern California

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