Water Loss Control Program Development

May 21, 2015

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Outline

- Initial Water Loss Assessment – 2013
- Water Assessment and Loss Management Approach
- Identifying Water Loss Components
- Deliverables
- Results
- Next Steps

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2013 Water Loss Assessment

- Loss calculation approach – AWWA M36
- Customer Billing Data, Imported Metered, Exported Metered, Unmetered, Unbilled, and Operational Use Estimates

	Water out					
Water In	Billed Authorized			Unbilled Authorized		
1	4	5	6	7	8	14
Volume From Own Sources	Water Exported	Billed Metered	Billed Unmetered	Unbilled Metered	Unbilled Unmetered	REAL LOSSES
(OC79 + OC81 + CM10 + SC2B)	(SJC, SCWD, ETWD)	Domestic + Commercial minus Exported Water	SCWD 920 Zone	JRP, SOCWA, 3A, 2A Basins	Flushing and VACCON Water Loss	Line Breaks, Service Line Leaks, Sheared Hydrants, Over Flowing Tanks

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CY 2013 Water Loss Results

January – December 2013:

Water Source Volume	= 29, 095 AF
Consumption + Accounted-for-Losses	= 26, 363 AF
Estimated Water Losses (Apparent/Real)	**= 2,732 AF**
	= 9.4 % Water Loss

Theoretical Unavoidable Real Losses	**= 4.0 %**
Potentially Recoverable Water Losses	**= 1,570 AF**

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Water Assessment and Loss Management Approach

- Expert Consultant - Water System Optimization (WSO)
- Develop Scope of Work
- Define Assessment Period
- Data Validation
- Prepare Tailored Water Balance Model – AWWA Water Audit
- Identify Non-Revenue Water Loss Components
- Develop Appropriate Water Loss Control Strategies

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Components of Water Balance

WATER SUPPLIED	Authorized Consumption	Billed Authorized Consumption	Billed Metered Authorized Consumption	REVENUE WATER
			Billed Unmetered Authorized Consumption	
		Unbilled Authorized Consumption	Unbilled Metered Authorized Consumption	
			Unbilled Unmetered Authorized Consumption	
	Water Losses	Apparent Losses	Consumption metering errors	
			Unauthorized consumption	
		Real Losses	Leakage/overflow at service reservoirs	
			Leakage from trunk mains	
			Leakage from distribution mains	
			Leakage from service connections	

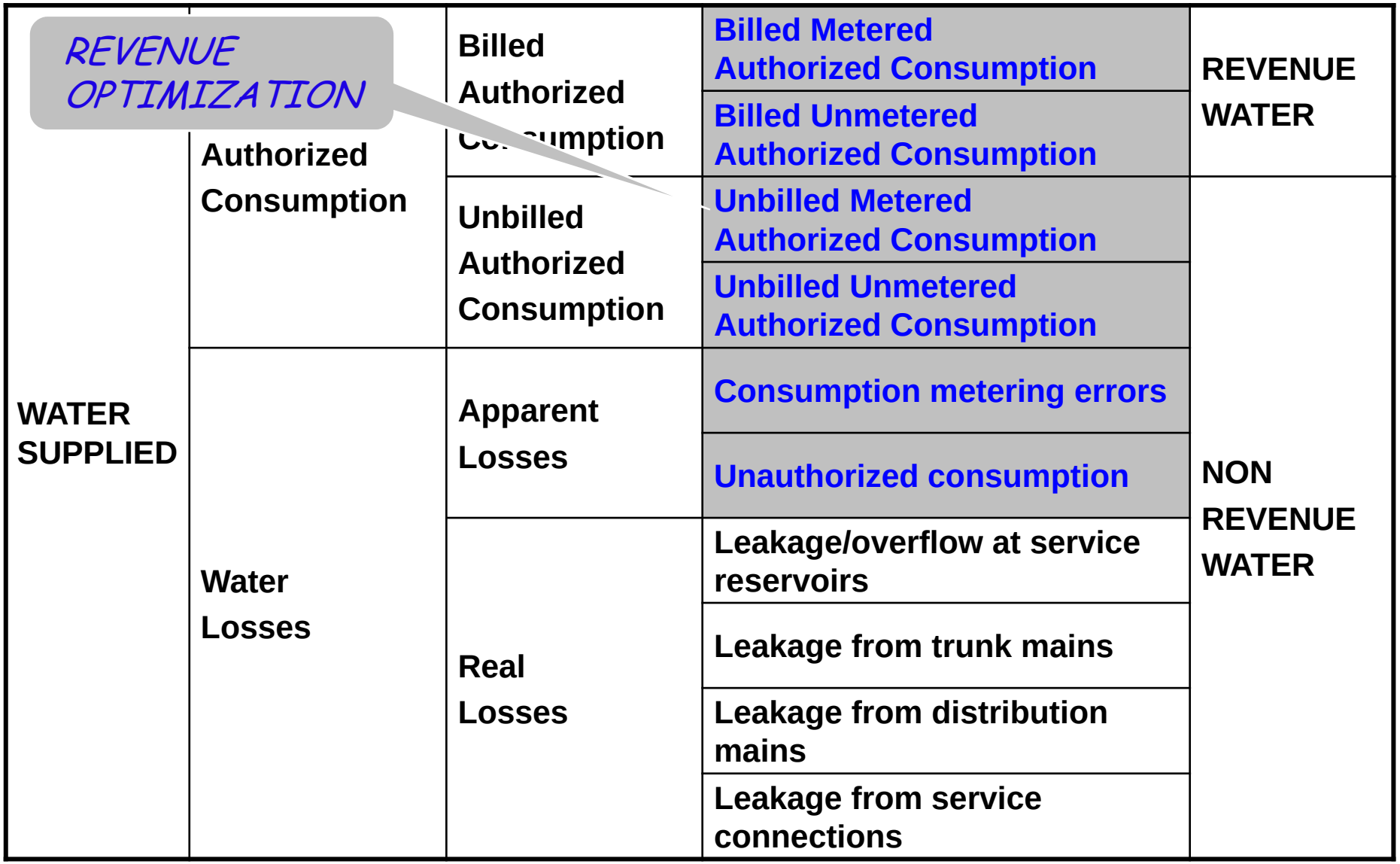
Revenue Water

WATER SUPPLIED	Authorized Consumption	Billed Authorized Consumption	Billed Metered Authorized Consumption	REVENUE WATER
			Billed Unmetered Authorized Consumption	
		Unbilled Authorized Consumption	Unbilled Metered Authorized Consumption	
			Unbilled Unmetered Authorized Consumption	
	Water Losses	Apparent Losses	Consumption metering errors	
			Unauthorized consumption	
		Real Losses	Leakage/overflow at service reservoirs	
			Leakage from trunk mains	
			Leakage from distribution mains	
			Leakage from service connections	

Non-Revenue Water

WATER SUPPLIED	Authorized Consumption	Billed Authorized Consumption	Billed Metered Authorized Consumption	REVENUE WATER
			Billed Unmetered Authorized Consumption	
		Unbilled Authorized Consumption	Unbilled Metered Authorized Consumption	NON REVENUE WATER
			Unbilled Unmetered Authorized Consumption	
	Water Losses	Apparent Losses	Consumption metering errors	
			Unauthorized consumption	
		Real Losses	Leakage/overflow at service reservoirs	
			Leakage from trunk mains	
			Leakage from distribution mains	
			Leakage from service connections	

Revenue Optimization

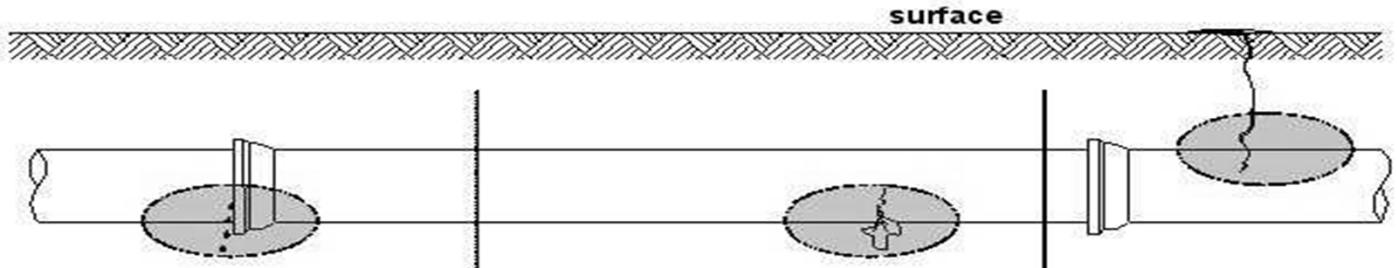


Real Loss Reduction

WATER SUPPLIED	Authorized Consumption	Billed Authorized Consumption	Billed Metered Authorized Consumption	REVENUE WATER
			Billed Unmetered Authorized Consumption	
		Unbilled Authorized Consumption	Unbilled Metered Authorized Consumption	NON REVENUE WATER
			Unbilled Unmetered Authorized Consumption	
	Water Losses	Apparent Losses	Consumption metering errors	
			Unauthorized consumption	
		Real Losses	Leakage/overflow at service reservoirs	
			Leakage from trunk mains	
			Leakage from distribution mains	
			Leakage from service connections	

REAL LOSS REDUCTION

Understanding The Components of Real Losses



Background leakage

Un-reported and un-detectable using traditional accoustic equipment.

Tools

- Pressure reduction
- Main and service replacement
- Reduction in the number of joints and fittings

Un-reported leakage

Often does not surface but is detectable using traditional accoustic equipment.

Tools

- Pressure reduction
- Main and service replacement
- Reduction in the number of joints and fittings
- Proactive leak detection

Reported leakage

Often surfaces and is reported by the public or utility workers

Tools

- Pressure reduction
- Main and service replacement
- Optimized repair time

Deliverables

1. Tailored Water Balance Worksheet
   - Water Supplied
   - Authorized Consumption
   - Apparent Loss (Meters) Determination
   - Real Loss Determination
   - Component Analysis Summary
2. Data Collection Protocols and Training
3. Final Tech Memo
   - Results
   - Water Loss Control Recommendations

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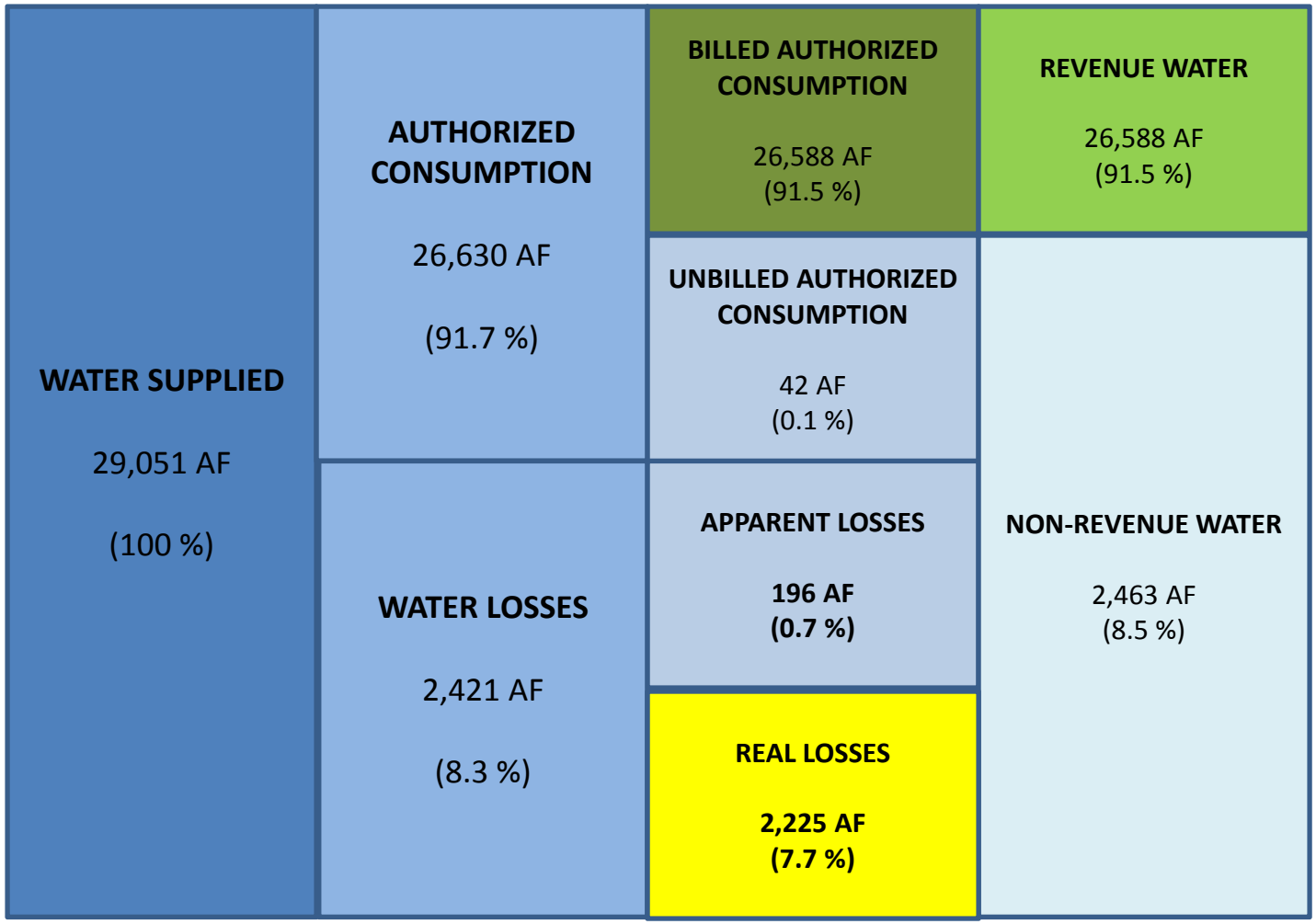
Water Balance Results – FY2014/15



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Water Assessment Recommendations

1. Adoption of Current Industry Standards for Monitoring
2. Continue to Employ Water Data Collection Best Practices
3. Employ “Real Loss” Reduction Strategies
   - Develop and Implement a “Zonal” Leak Detection Pilot Program
   - Conduct Thorough Distribution System Pressure Study
   - Implement Districtwide and Ongoing Leak Detection Program
4. Continue to Collect Data and Monitor Water System Losses

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Questions?

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Research Partnership on Rebate Program Incentives

May 18, 2015

UC RIVERSIDE UNIVERSITY OF CALIFORNIA | School of Public Policy

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Outline

- Rebate Program Background
- Study Objectives
- Study Benefits to MNWD
- Demand Management Literature Overview
- UCR Past Water Agency Research Partnerships
- Proposal Overview
- Process & Outputs

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Rebate Program Background

- Approximately $5.5 M committed to date since Nov. 2011
- Main Rebates (>95% of Total Funding):
  - Turf Removal
  - Synthetic Turf
  - High Efficiency Toilets
  - High Efficiency Washing Machines
- Turf Removal Residential Participation ~ 1% of customer accounts

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Study Objectives

- Determine impact of key demand drivers at the account level:
  - Income
  - Education
  - Irrigation Area
  - Household Size
  - Weather

  External forces

  - Price of Water
  - Rebate Funding
  - Rebate Marketing

  Policy Levers to Impact Water Demand

- Determine funding & marketing level to get customers to participate in rebate programs

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Study Benefits to MNWD

- Understanding of rate structure impacts for District customers at individual account level
- Water savings of each program & cost/benefit based on District's unique customer base
- Optimize rebate participation & water savings at lowest cost for District customers
  - Incentive level to set each rebate program supported by independent institution (UC Riverside)
  - Recommendation on marketing strategy based on marketing research survey

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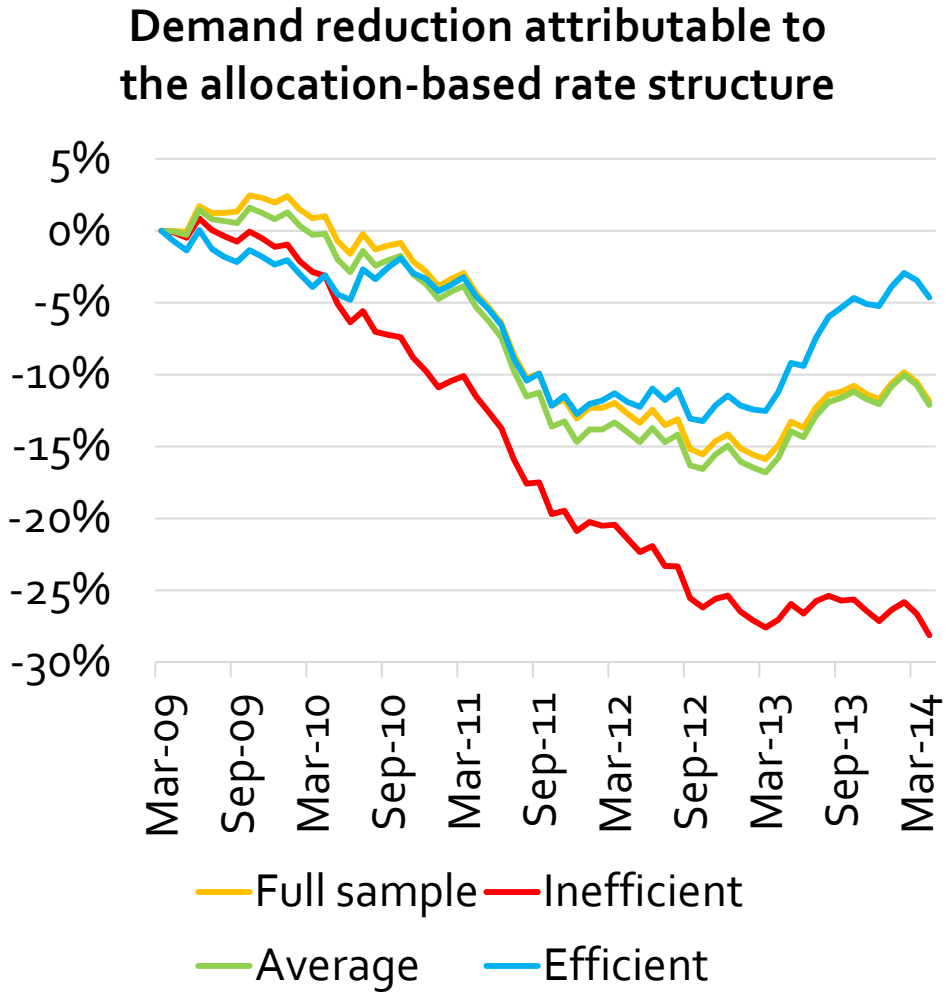
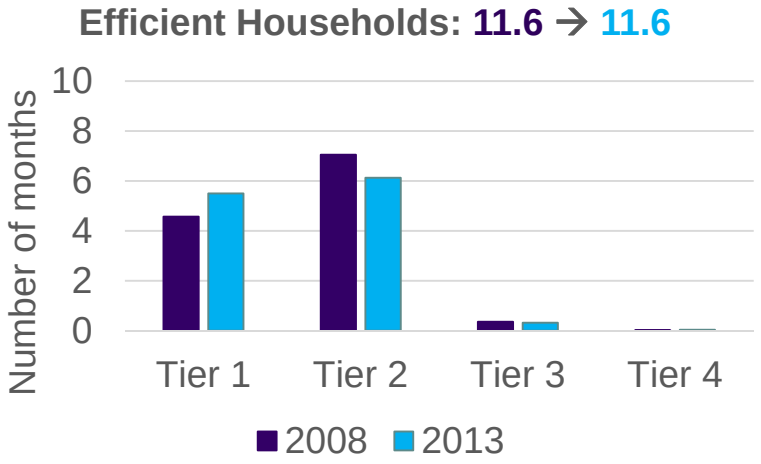
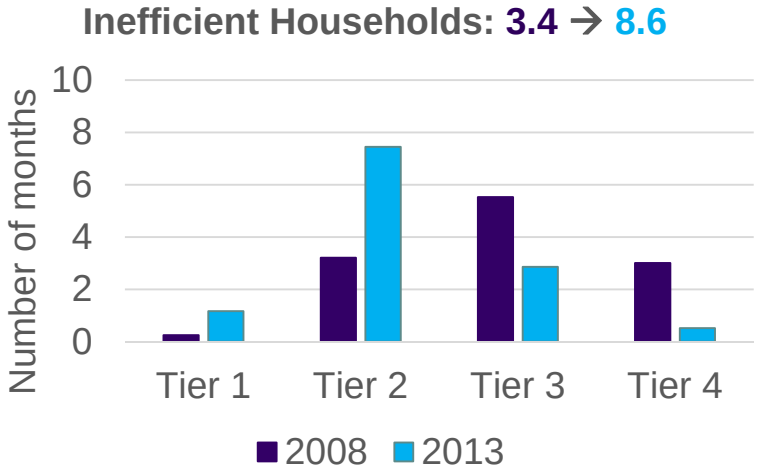
Pricing is an effective conservation tool

- Timmins (2003): 13 urban areas in California's Central Valley
  - ***Pricing almost always more cost-effective than mandatory low-flow appliance regulations***
- Mansur and Olmstead (2007): 11 urban areas in U.S. and Canada
  - ***Estimated cost of 2-day-per-week irrigation restrictions relative to a price-based approach: ~25% of a household's average water bill***
- Grafton and Ward (2008): Sydney, Australia
  - ***Estimated cost of mandatory water restrictions relative to a price-based approach: ~50% of a household's average water bill***
- Baerenklau, Schwabe, and Dinar (2014): Eastern MWD
  - ***Adoption of allocation-based rates reduced water use by 10-15% while raising the average price paid by only 3%***

UCR study of Eastern's allocation-based rates







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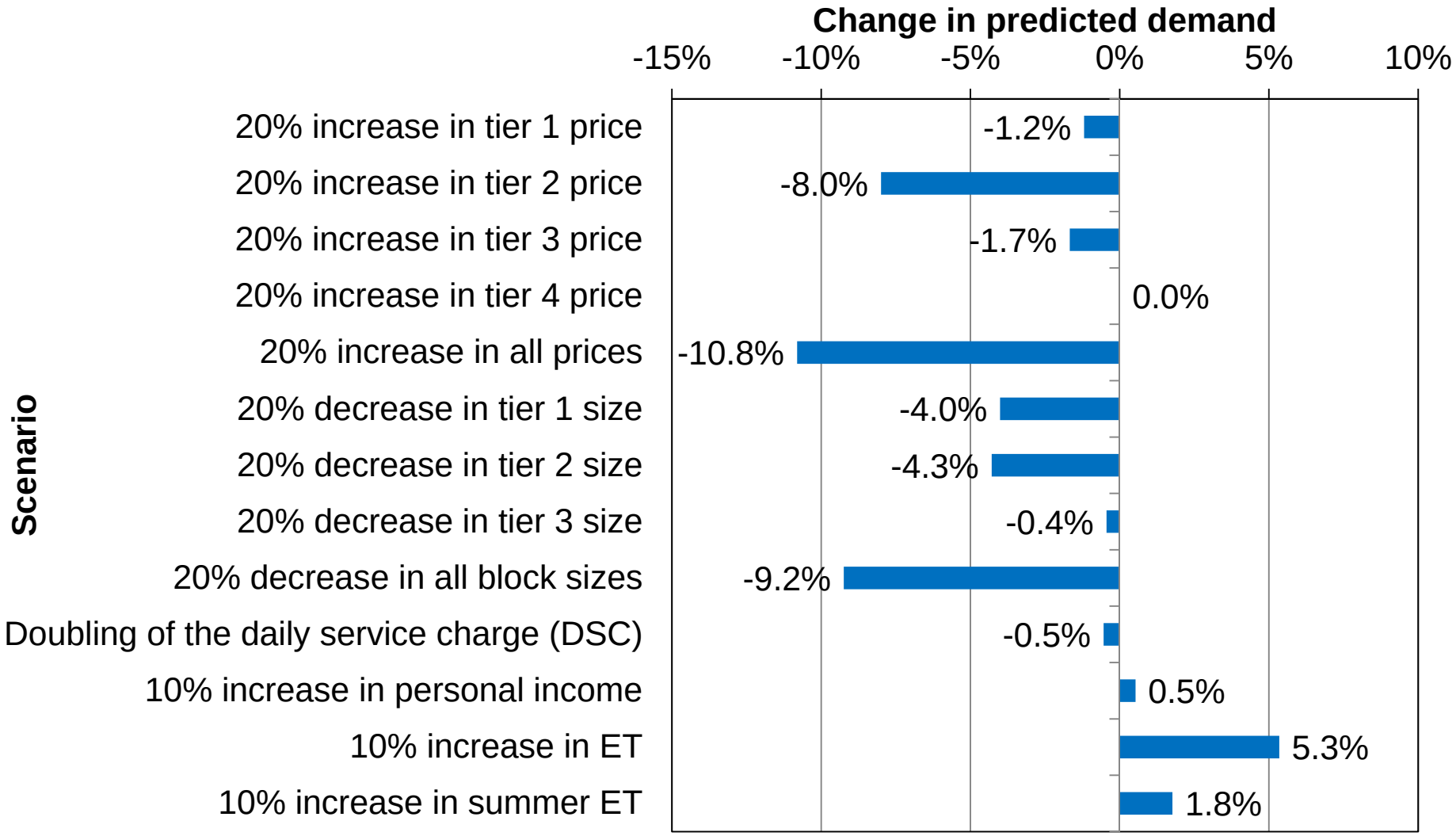


Pricing is not without inherent drawbacks

- Increased costs are particularly challenging for disadvantaged households and local businesses
- Higher prices hurt customer perceptions and strain customer relationships

Solution: Couple pricing with conservation rebate programs

- Rebate programs make it easier for customers to reduce water use and exposure to high water bills
- Conservation programs are an important complement to pricing

Conservation programs have unpredictable results

Observation: Savings are highly variable and usually less than expected

Examples: Low flow showerheads, low-flush toilets, front load washers,… (Mayer et al. 1998; Olmstead & Stavins 2007; Schwabe et al. 2014)

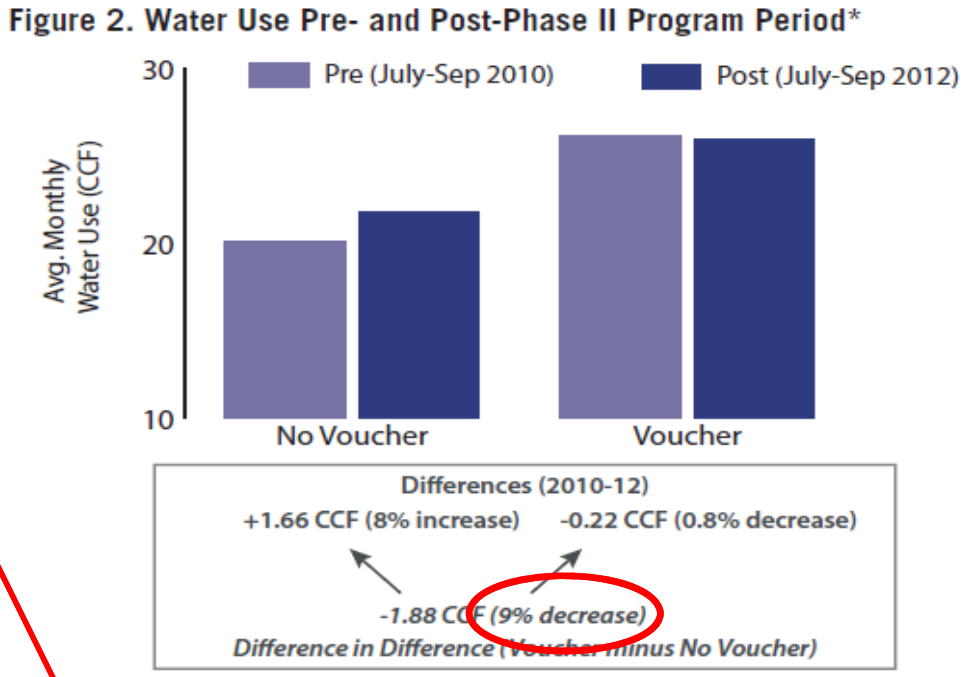
Reasons:

- Behavioral response to incentives is hard to predict
- Engineering calculations typically do not consider behavior

Consequences:

- Rebates fail to produce high participation rates
- Customers do not use technologies as anticipated
- Cost per unit of water saved is higher than expected

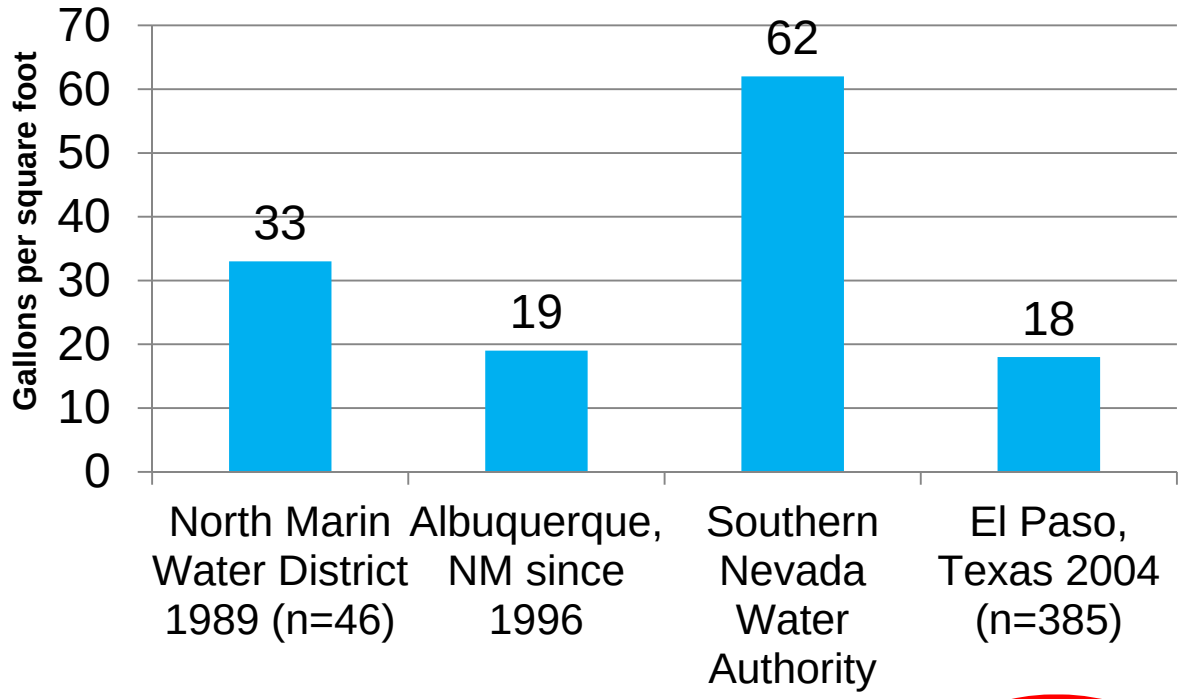
UCR study of high-efficiency sprinkler nozzle give-away



1/3 of potential efficiency when installed

Recent study of turf removal programs

Estimated Water Savings and Costs
(Addink 2014)



Cost/AF:	***$512***	***$718***	***$532***	***$1834***

Did not require irrigation improvements

Proposal

Develop more informed, targeted, and cost-effective conservation programs through a systematic analysis of:

- Factors that determine participation in conservation programs
- Factors that influence residential water demand
- Effectiveness of price and non-price conservation programs
- Revenue and cost implications of alternative conservation options
- Possible synergistic effects across conservation programs
- Agency-level revenues, costs, and water use

Phase I: Identification of drivers of program participation & water use

Questions addressed:

- What factors determine if a household participates in a conservation program?
- What factors influence residential household water use?

Available Data: Agency, Household (Census), Community, Biophysical Factors

Deliverables (December 2015):

- Identification of role of agency, household-level, community factors
- Impact of alternative pricing structures on water demand
- Impact of conservation programs on household water bills & agency revenue and costs

Phase II: Survey of Consumer Preferences and Actions

Questions Addressed:

- **What are the full range of conservation actions households have adopted?**
- **How do customers feel about MNWD actions/strategies, state actions/strategies, and what are their water-related attitudes?**
- **What is the relative importance of different attributes of a conservation program (e.g., service, rebate levels, water savings)?**
- **Which outreach / media strategies seem most effective at reaching customers?**

Data Collection: Residential Household-level Survey and Choice Experiment

Deliverables (September 2016):

- **Summary of customer attitudes toward water use, MNWD, and conservation programs**
- **Summary of customer actions and participation in water conservation programs**
- **Comparison of survey data with MNWD customer records of program participation**

Phase III: Analysis of Water Conservation Drivers and Water Use

Questions Addressed:

- What are the main customer, agency, community, and environmental factors that influence conservation program participation and water use?
- How do different conservation programs compare in terms of cost effectiveness

Data Collection: Combining Phase I and Phase II data and analyses

Deliverables (March 2017):

- Analysis of how different program attributes (e.g. rebate levels, marketing, water rates) impact water conservation program participation and savings
- Analysis of cost-effectiveness of each program and extent of "additionality"
- Statistical analysis of the drivers of water demand accounting for conservation actions
- Comparison of conservation program revenue effects and operating costs

Thank you!

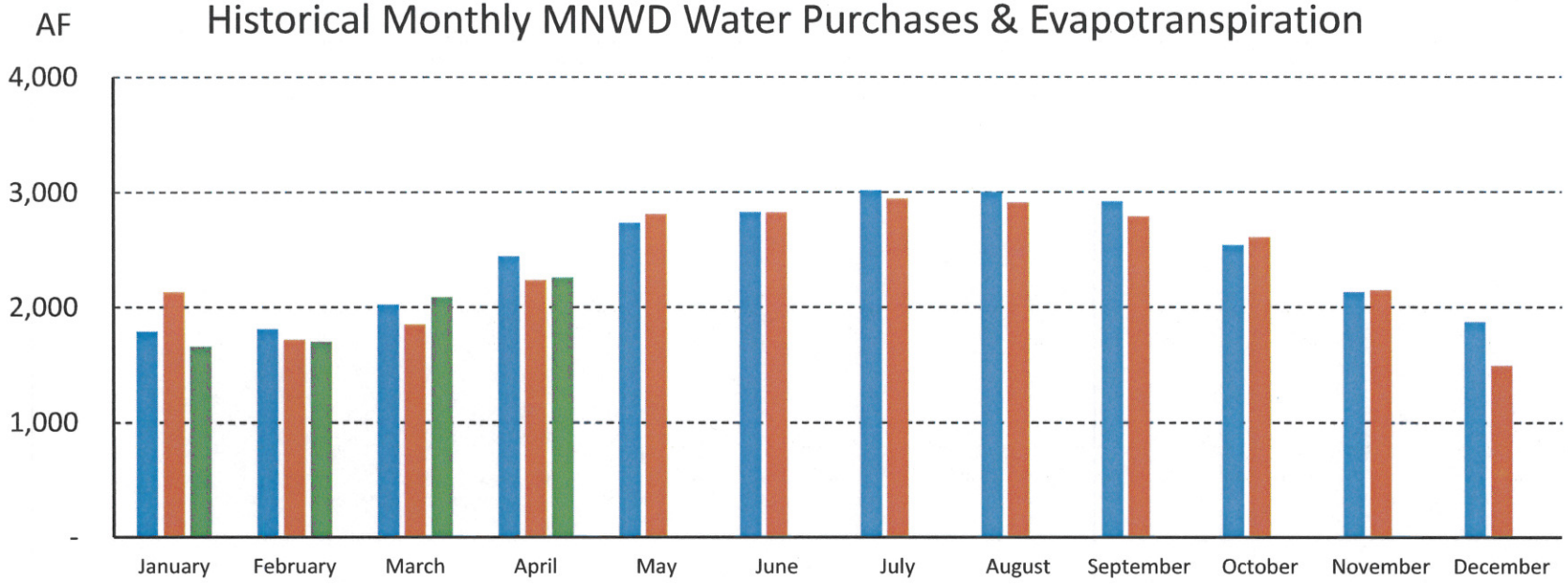
AGORA PROGRAM

	Leasable SF
GRAND PLAZA	
• Restaurants	121,000
• Retail	77,000
• Offices	14,000
• Kiosks	4,500
THE COMMONS	
• Restaurants	9,000
• Retail	11,000
• Office/classrooms	3,000
ELEMENT SQUARE	
• Restaurants	9,000
• Retail	11,000
• Event Space	3,000
PROVENANCE SQUARE	
• Restaurants	10,000
• Retail	1,000
• Event Space	6,000
• Residential Villas	200 units
• Opt. Boutique Hotel	

Program based on conceptual level site plan selected by County. Modifications between areas and uses may occur as plans are developed in subsequent site planning refinement with the City.

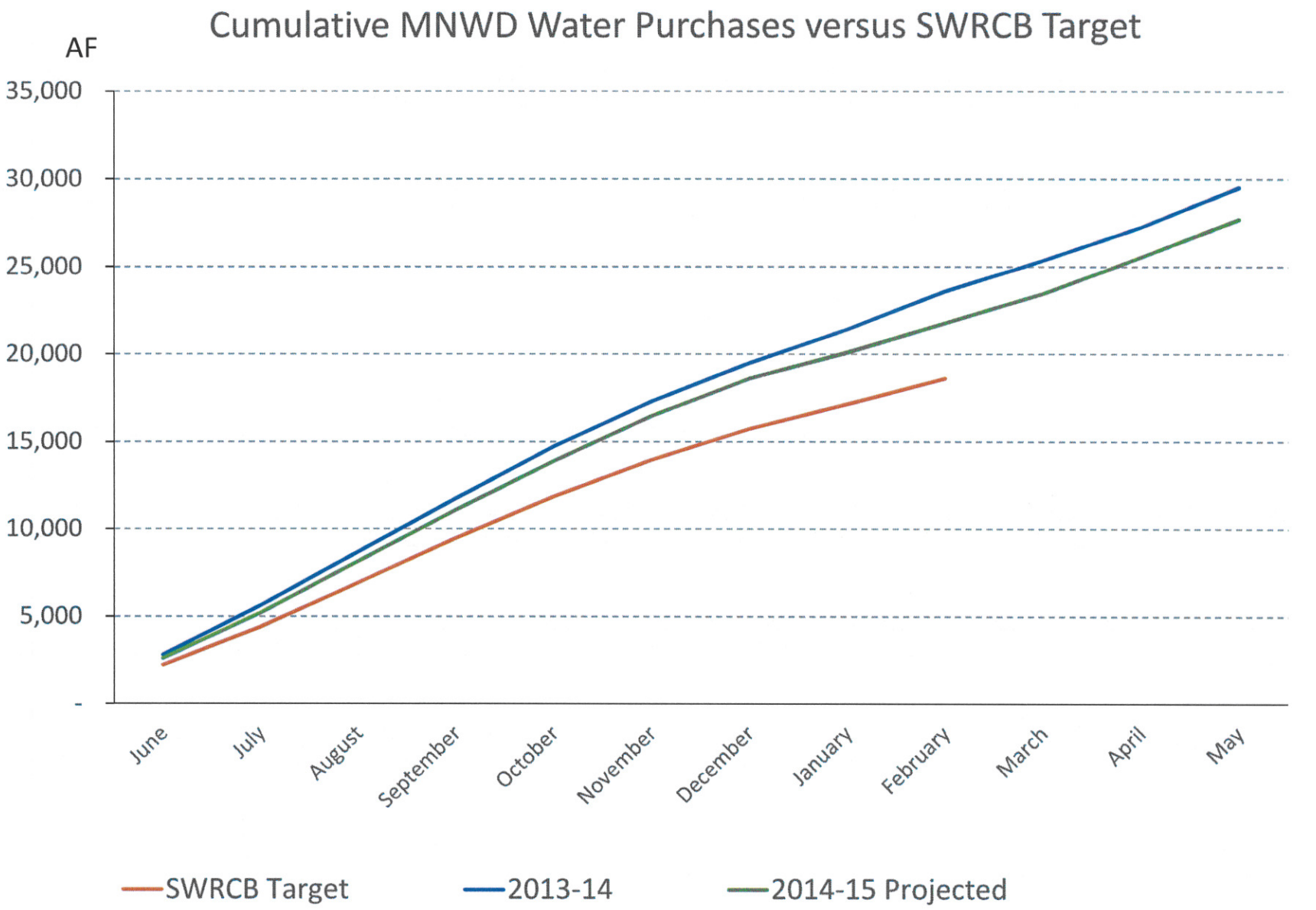

GRAND PLAZA
Residential
Villas
PROVENANCE
Event Center
ELEMENT
Health & Wellness
COMMONS
Arts & Education

Historical Monthly MNWD Water Purchases & Evapotranspiration



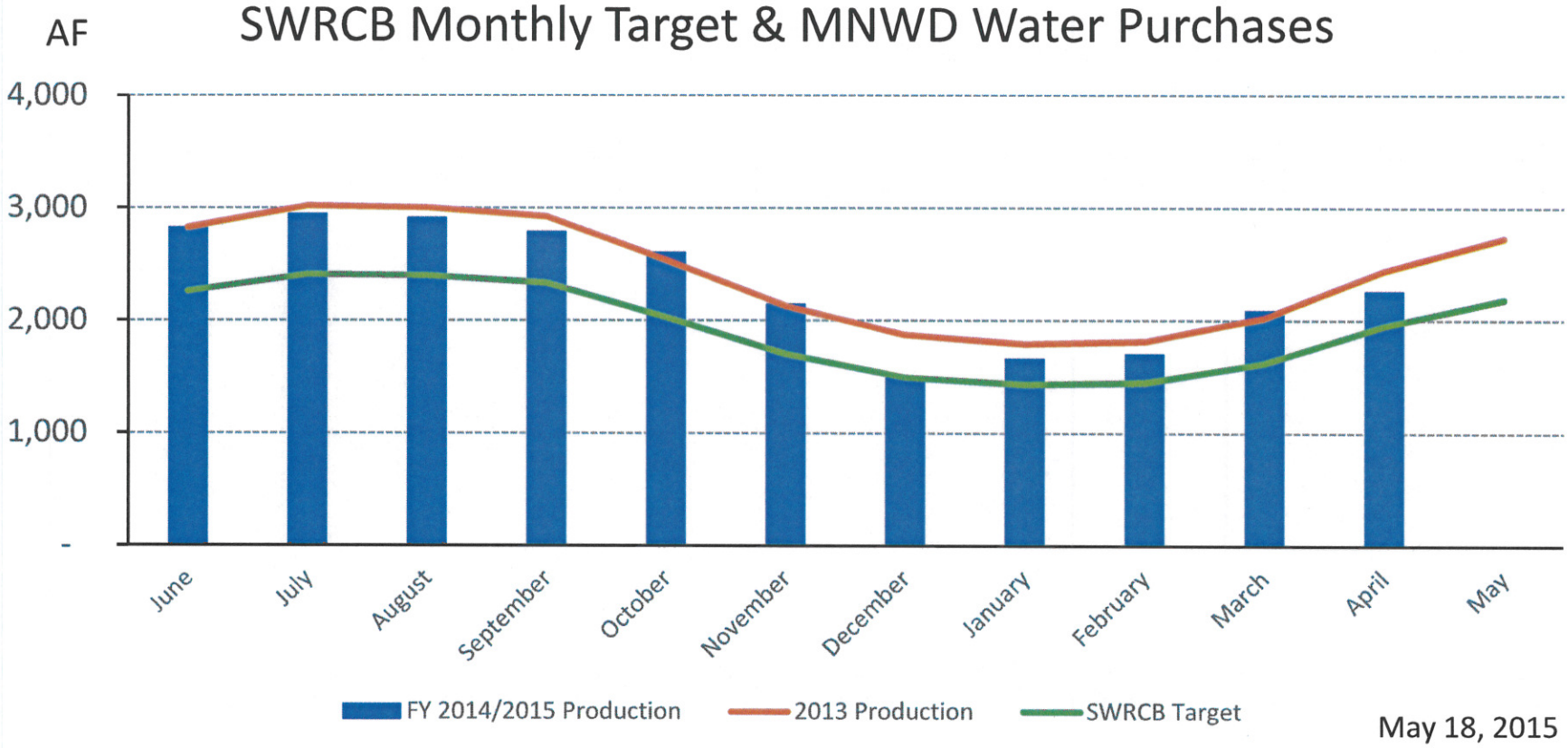
Year	ET (Inches)											
2013	2.54	2.88	4.08	4.79	5.99	6.07	5.81	6.53	5.26	3.92	2.52	2.49
2014	2.82	2.64	4.09	5.54	6.39	6.45	6.54	6.23	5.21	3.94	3.16	1.91
2015	2.52	3.02	4.96	5.31								

May 18, 2015


Cumulative MNWD Water Purchases versus SWRCB Target
AF
35,000
30,000
25,000
20,000
15,000
10,000
5,000
-
June
July
August
September
October
November
December
January
February
March
April
May
SWRCB Target
2013-14
2014-15 Projected

May 18, 2015

SWRCB Monthly Target & MNWD Water Purchases



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