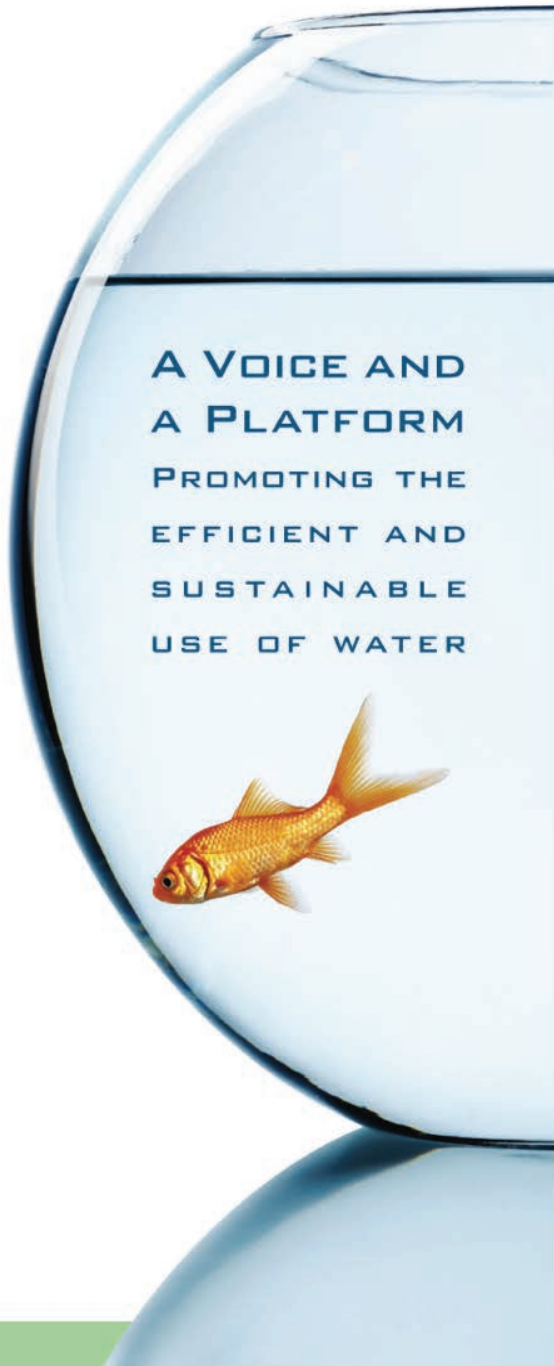
An Assessment of Increasing Water Use Efficiency on Demand Hardening

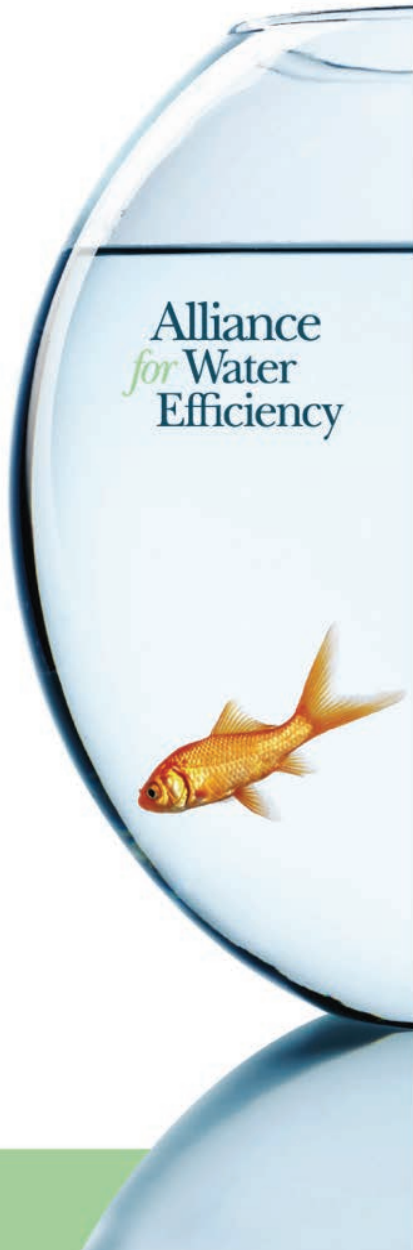
February 2, 2016



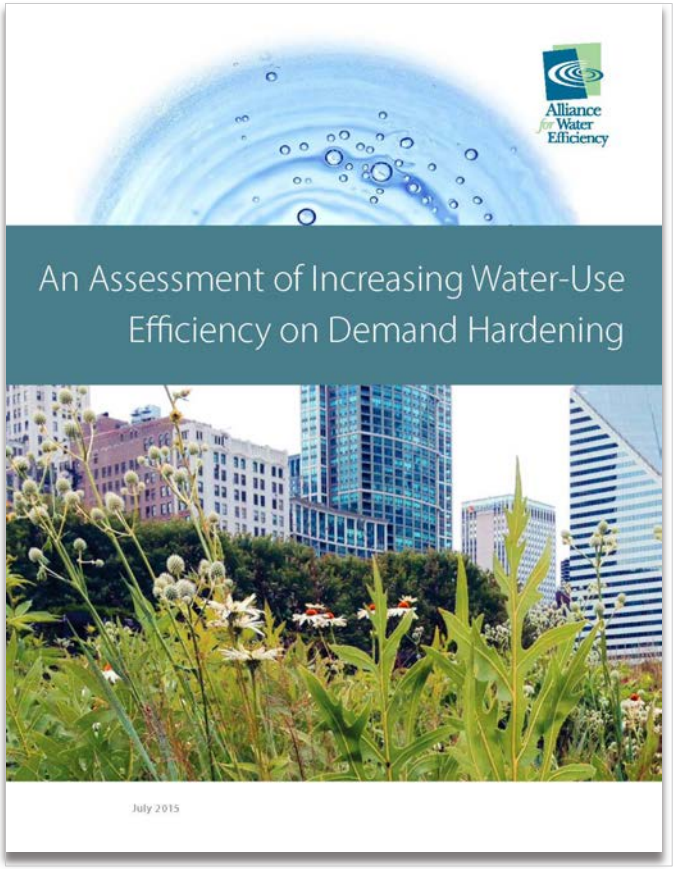
Alliance *for* Water Efficiency

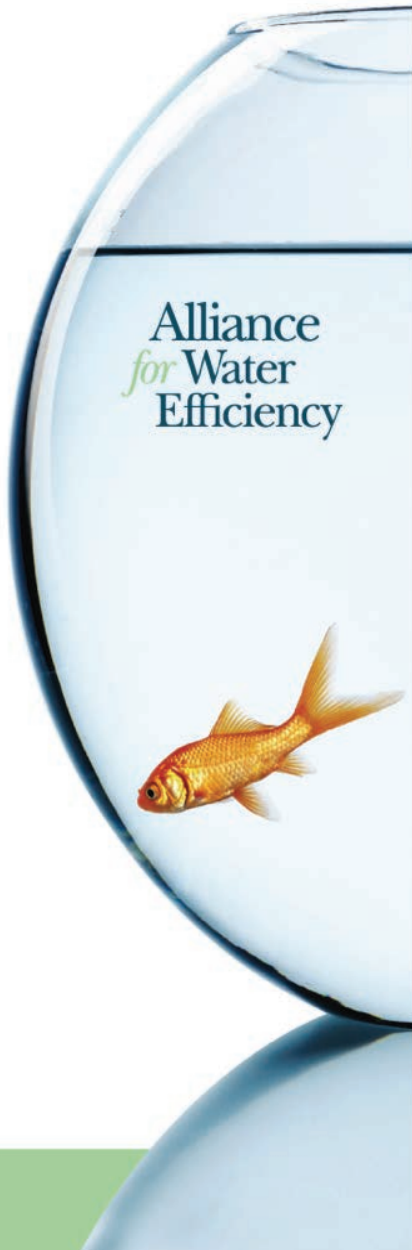
Goal of this Presentation

- Explain the phenomenon of demand hardening (Do long-term increases in water efficiency negatively impact an area's ability to cope with water shortages and further reduce demand?)
- Outline the concepts of the 2015 AWE study of seven case studies around the country
- Provide recommendations for how to avoid demand hardening in a water supplier service area

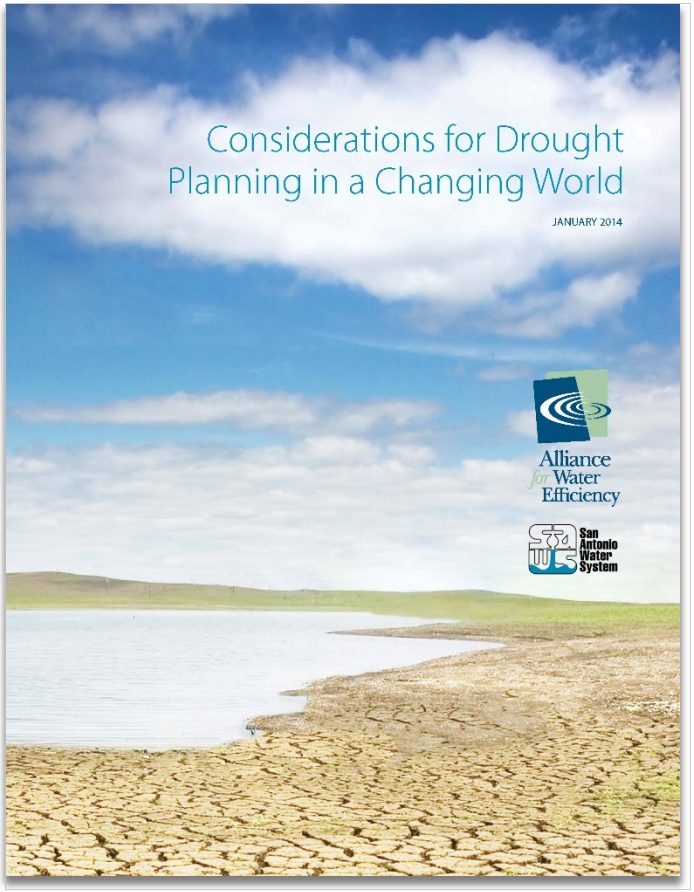


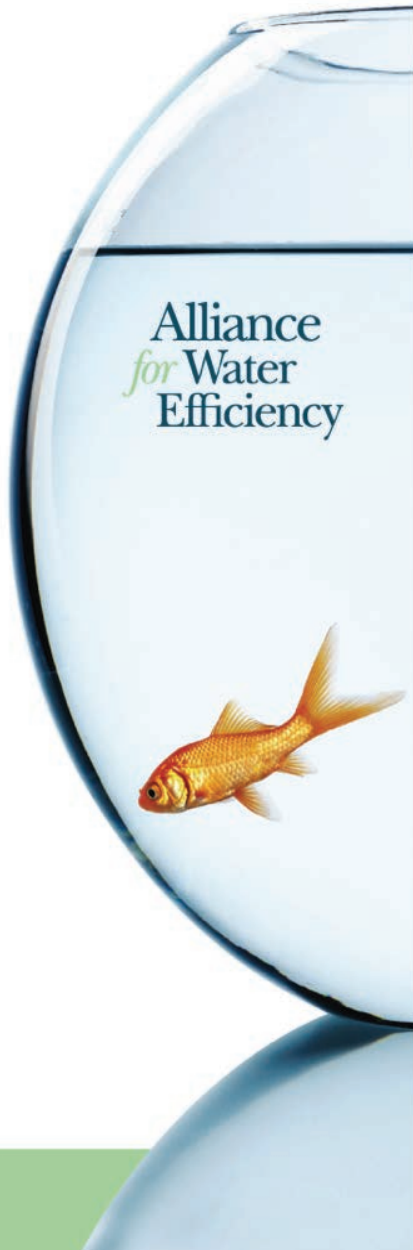
Detailed 2015 Report





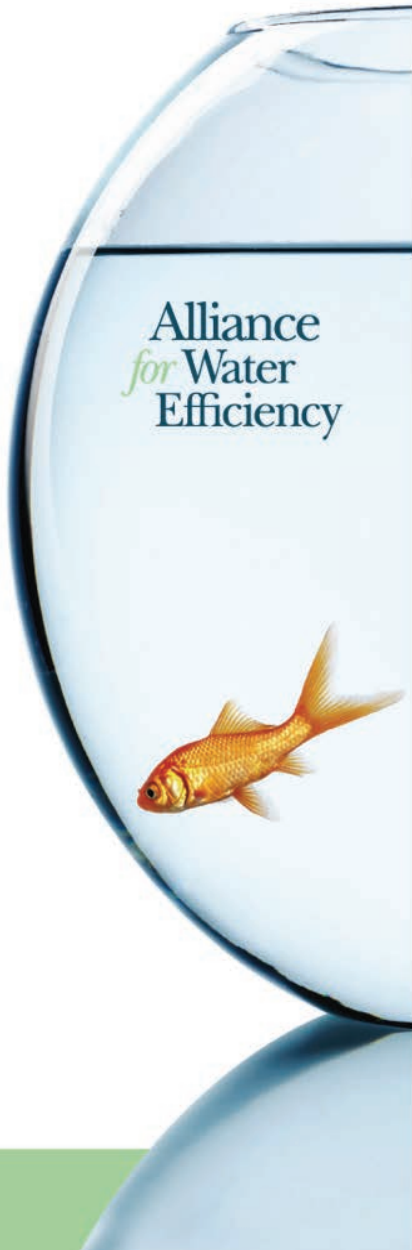
Recommended Compendium





What Does Demand Hardening Mean?

- Long term investments in water use efficiency may make adaptations to extended shortages more difficult
- Savings from future conservation programs may cost more *(because low hanging fruit has been plucked)*
- Future price elasticity may be lower *(because discretionary uses will be more efficient)*



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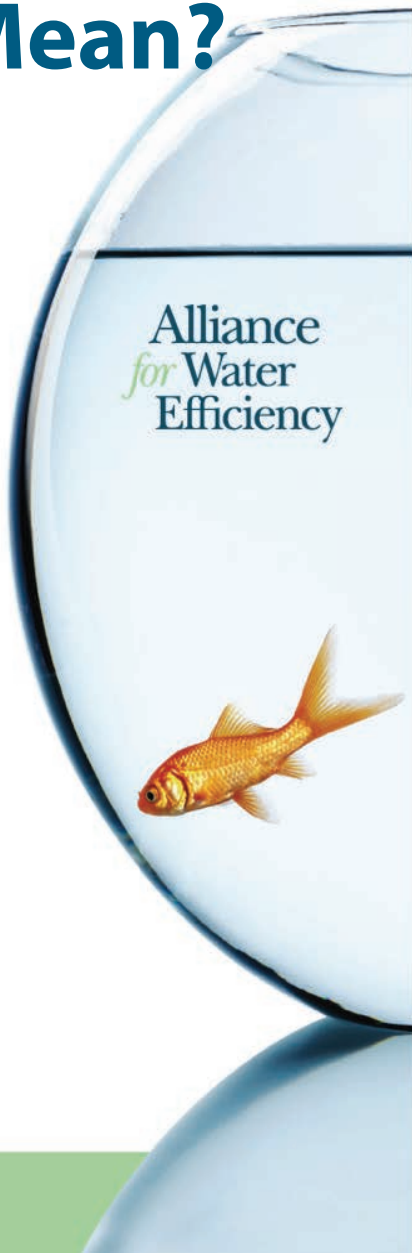
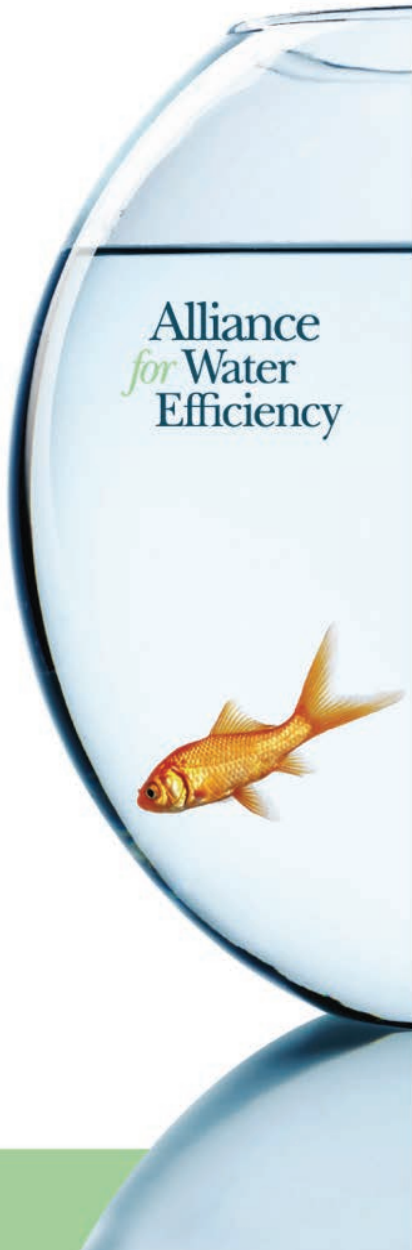


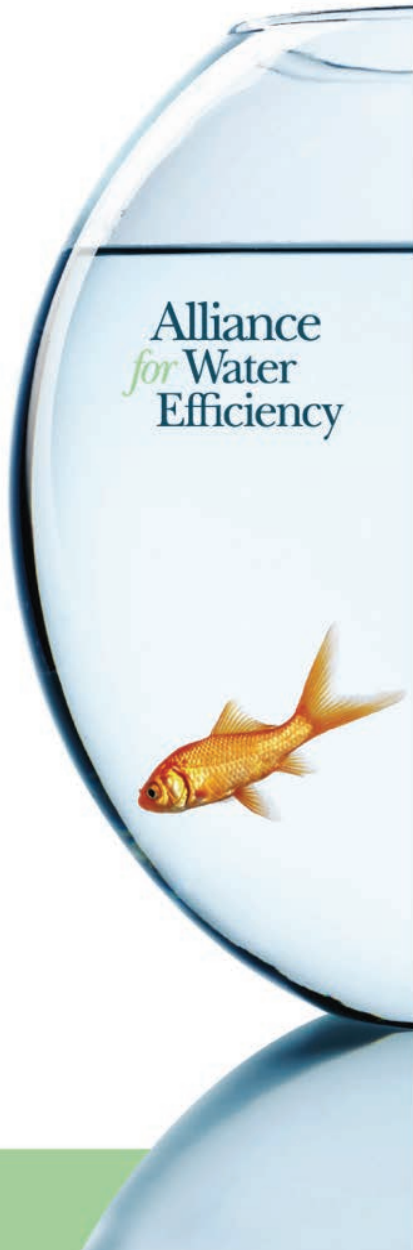
"Efficient Customers Will Have Less Room to Save During a Shortage"

- "Less Room" is vague and simplistic
  - ✓ *Does it refer to "ability" or "willingness" to conserve?*
- Shouldn't we also think about savings generated by pre-shortage WUE programs?
  - ✓ *Banked and used to improve system reliability?*
    - no demand hardening by definition
  - ✓ *Used to supply new growth?*
    - per-capita short term adjustment may be less, but total adjustment, not necessarily



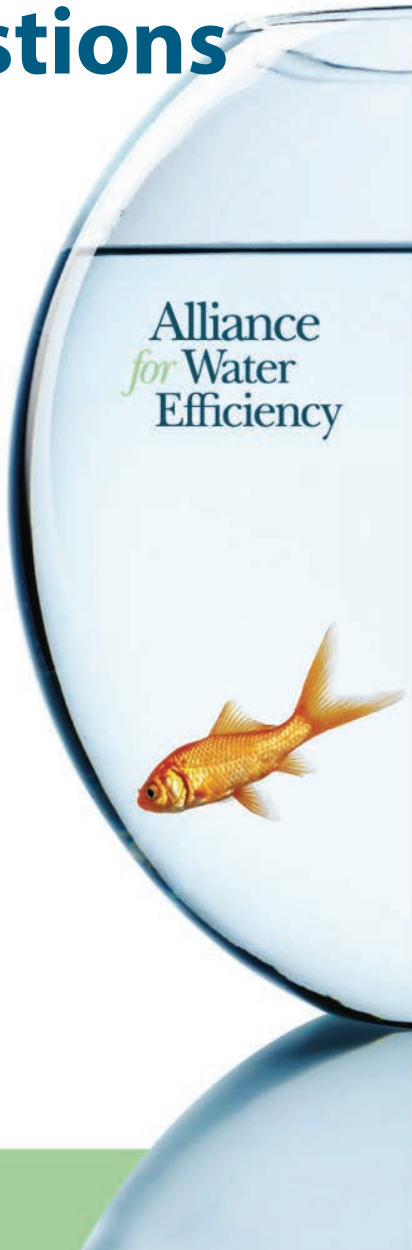
Why Undertake This Detailed Study?

- Demand hardening has been a long-running concern which remains unresolved
  - ✓ *Because of little prior research on the topic*
- The meaning of demand hardening is sometimes misunderstood
- How water suppliers try to deal with the issue is sometimes misguided



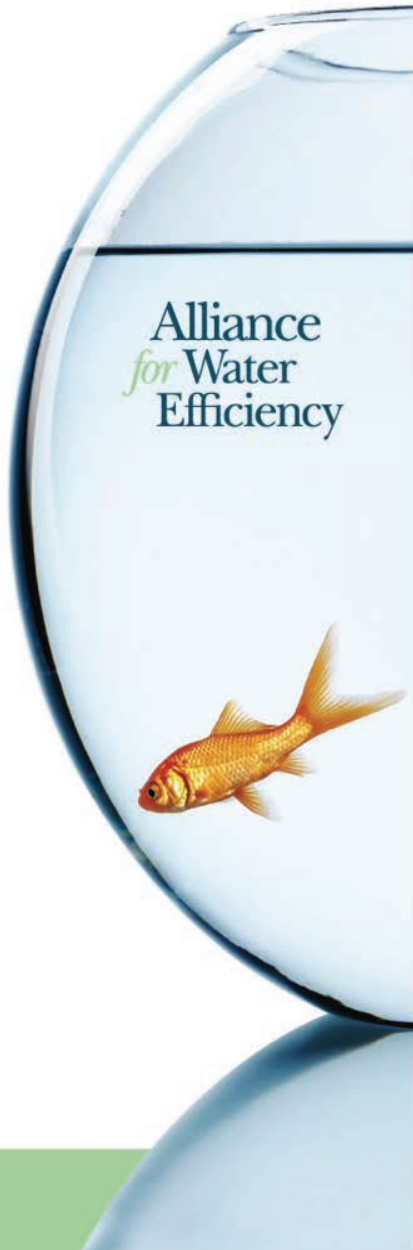
Operationalizing Key Study Questions

- Do long-term investments in water use efficiency (WUE) reduce
  - ✓ *"ability" to conserve, or*
  - ✓ *"willingness" to conserve during shortages?*
- Does shortage adaptability vary by customer class?
- How should one go about mitigating demand hardening?

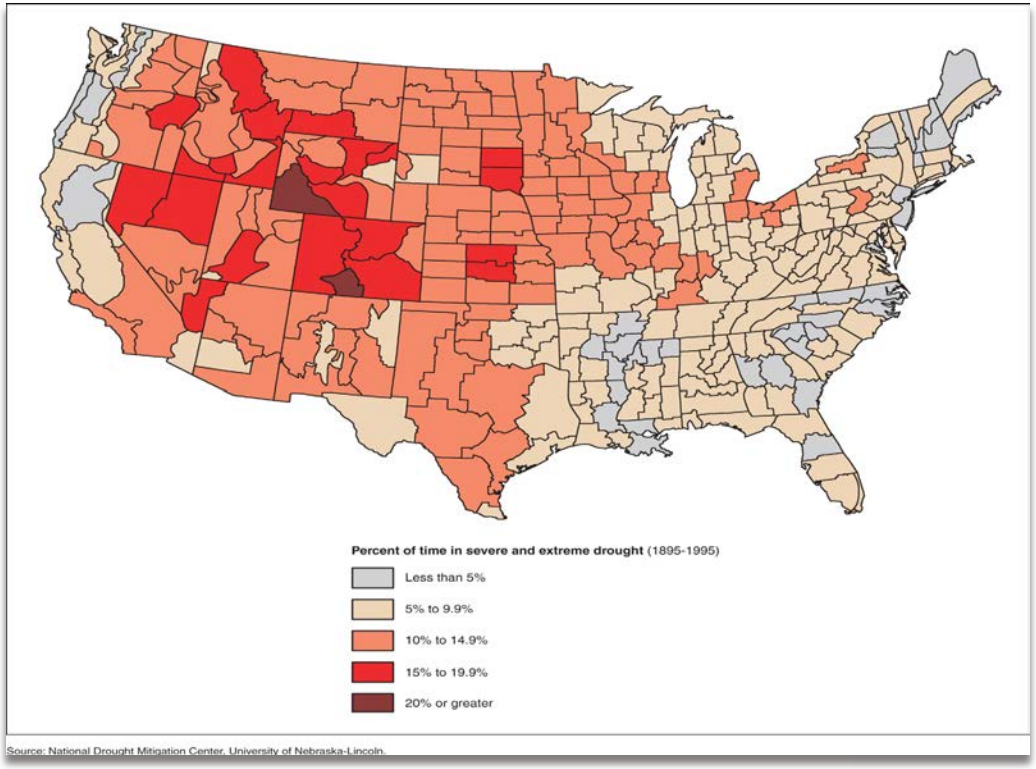


Study Approach

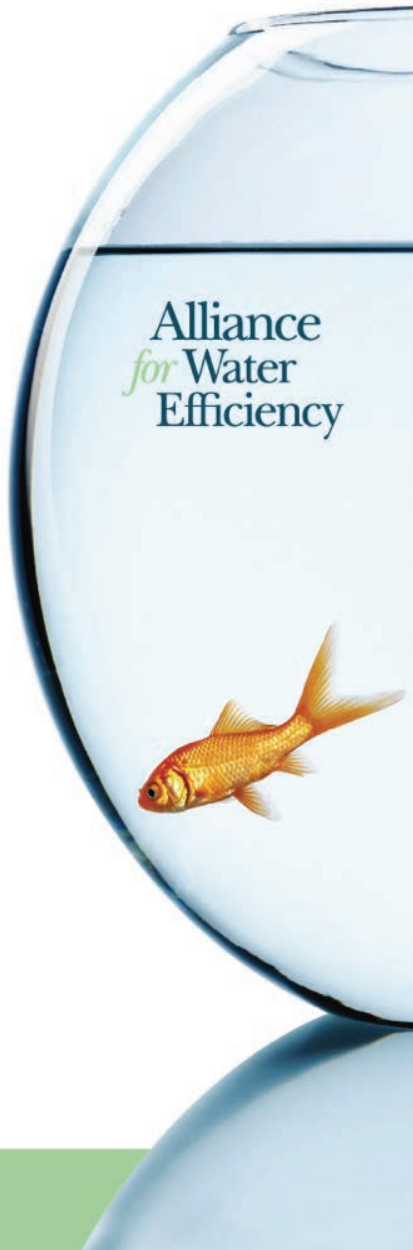
- Shed light on the "ability" and "willingness" questions through
  - ✓ *Review of end-use metering studies and macro indicators*
  - ✓ *Analysis of shortage histories spanning over 40 years (1970-2014) across 7 suppliers (case studies)*
  - ✓ *Telephone survey of (case study) SF customers, and review of other published opinion survey research*



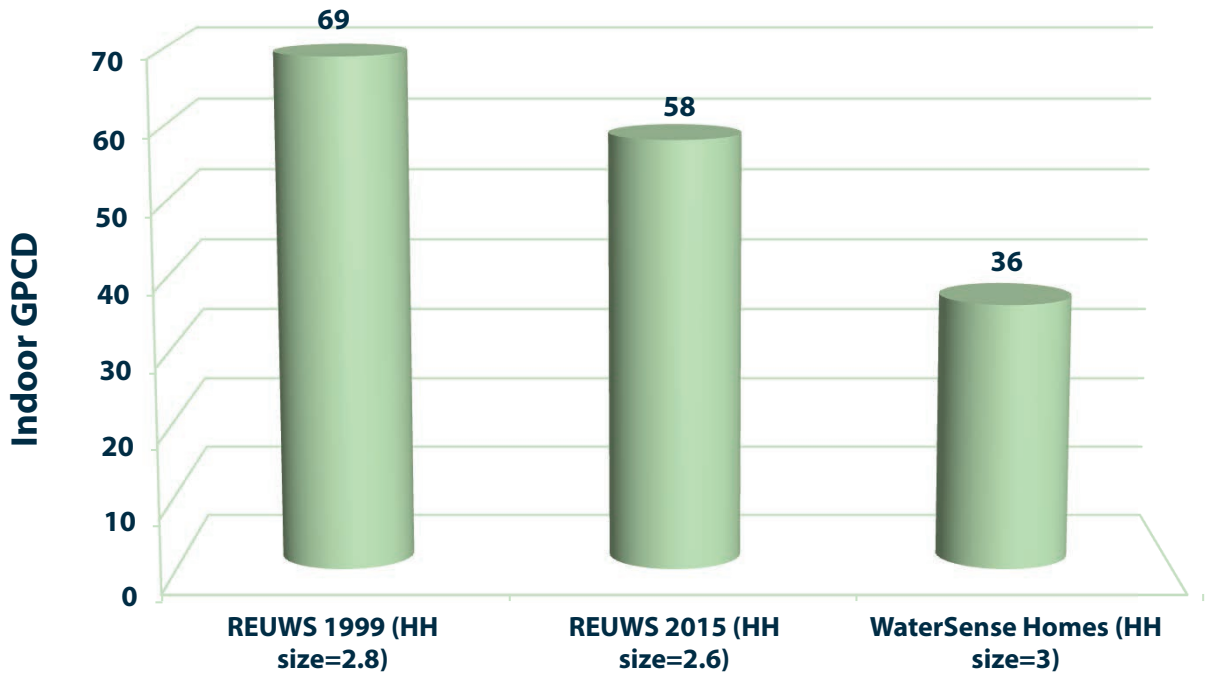
7 Case Studies Are…

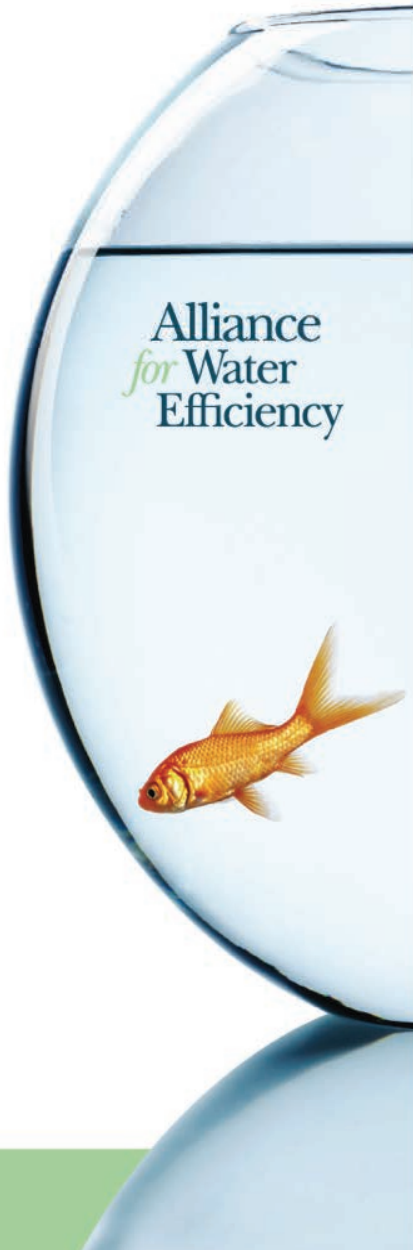


- Boulder, CO
- Irvine Ranch WD, CA
- Monte Vista WD, CA
- Petaluma, CA
- San Antonio, TX
- Santa Fe, NM
- Santa Rosa, CA

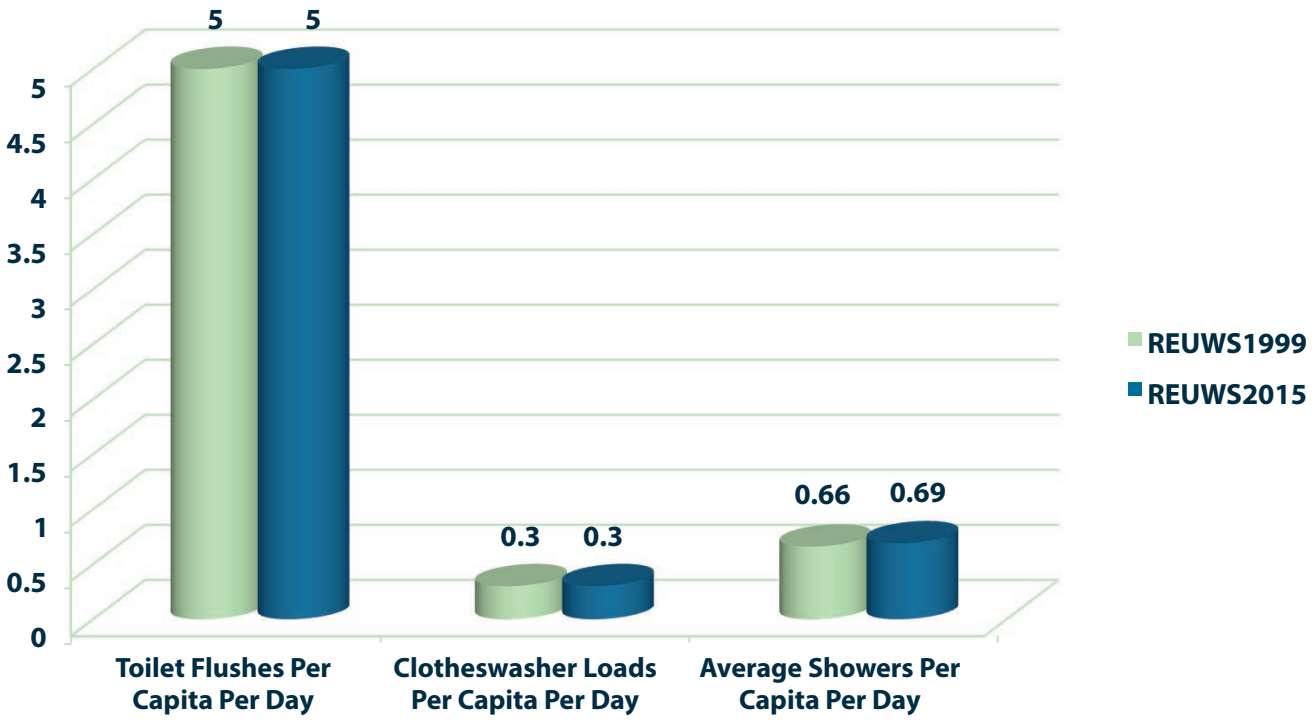


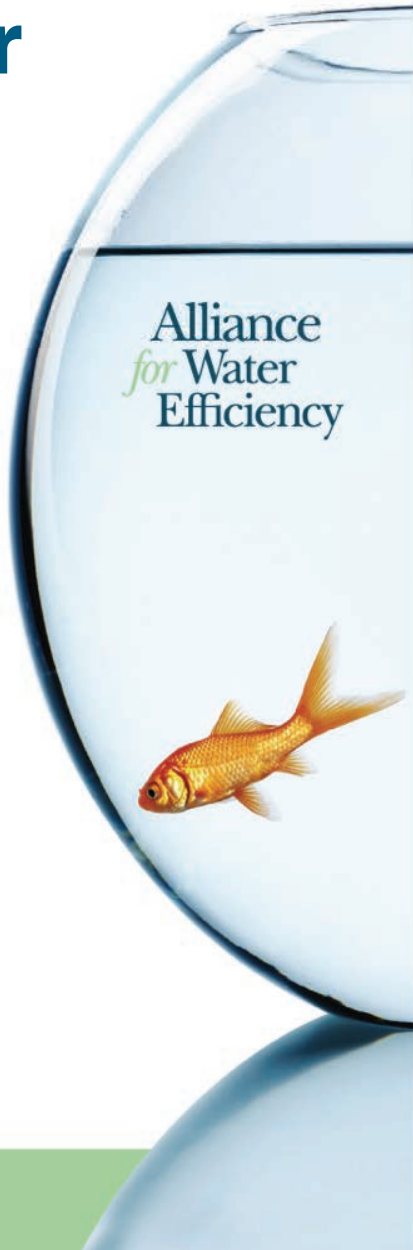
End Use Studies: Indoor GPCD



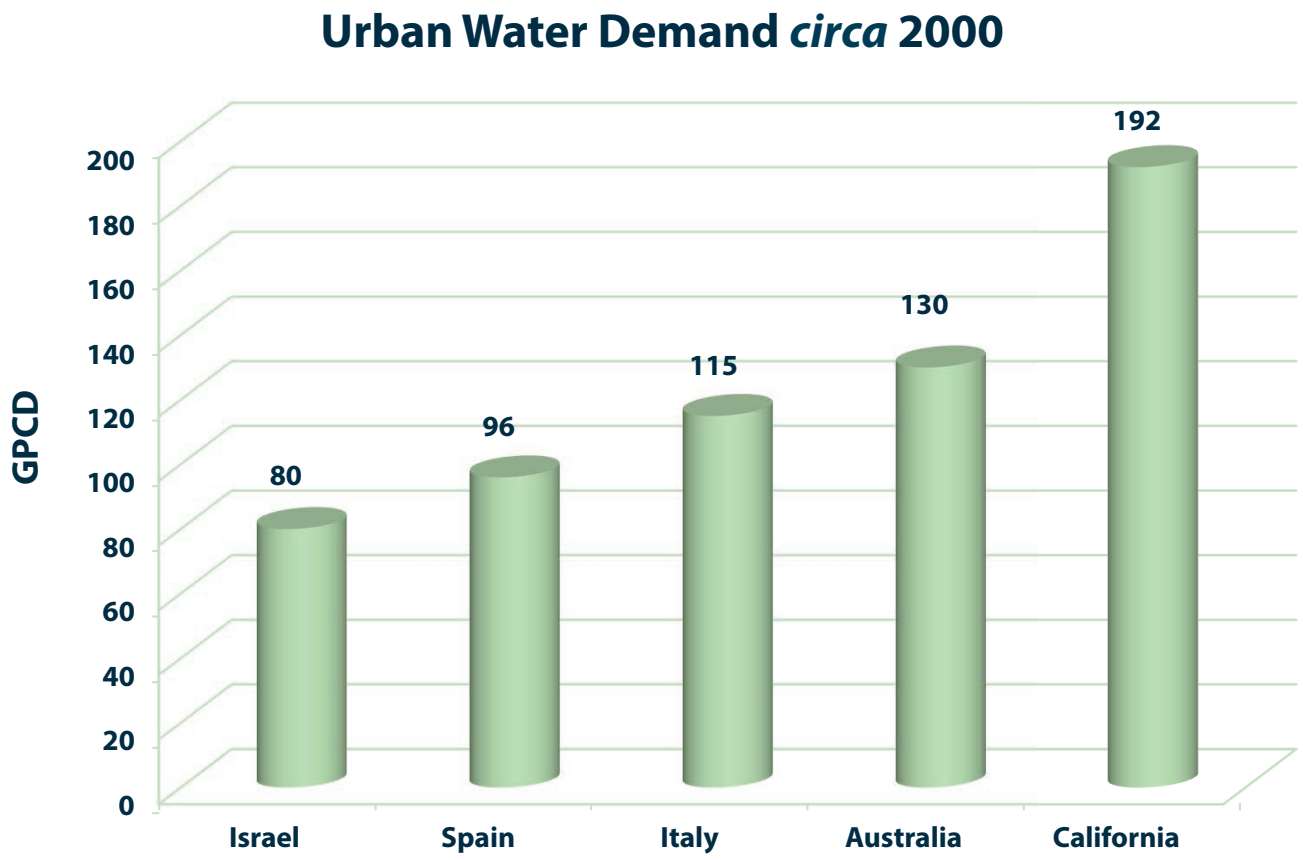


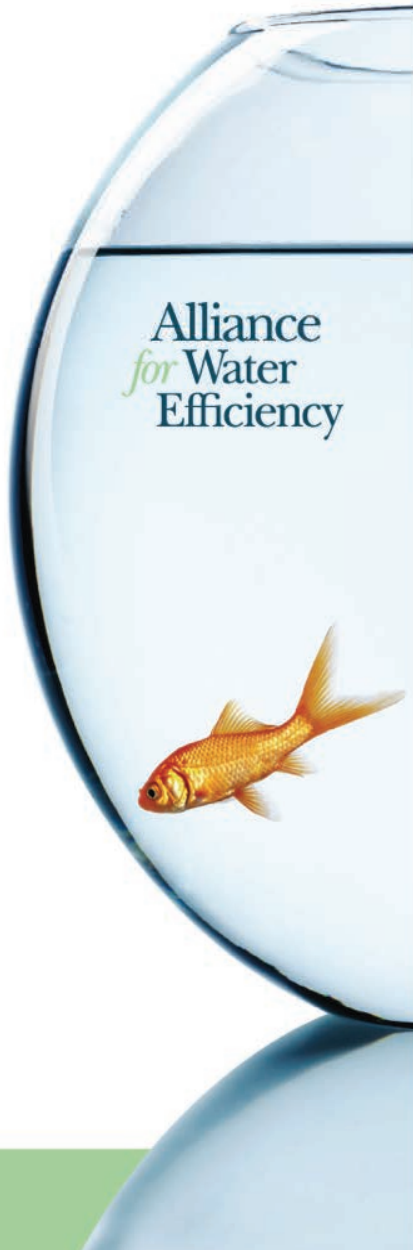
End Use Studies: Indoor Behavior



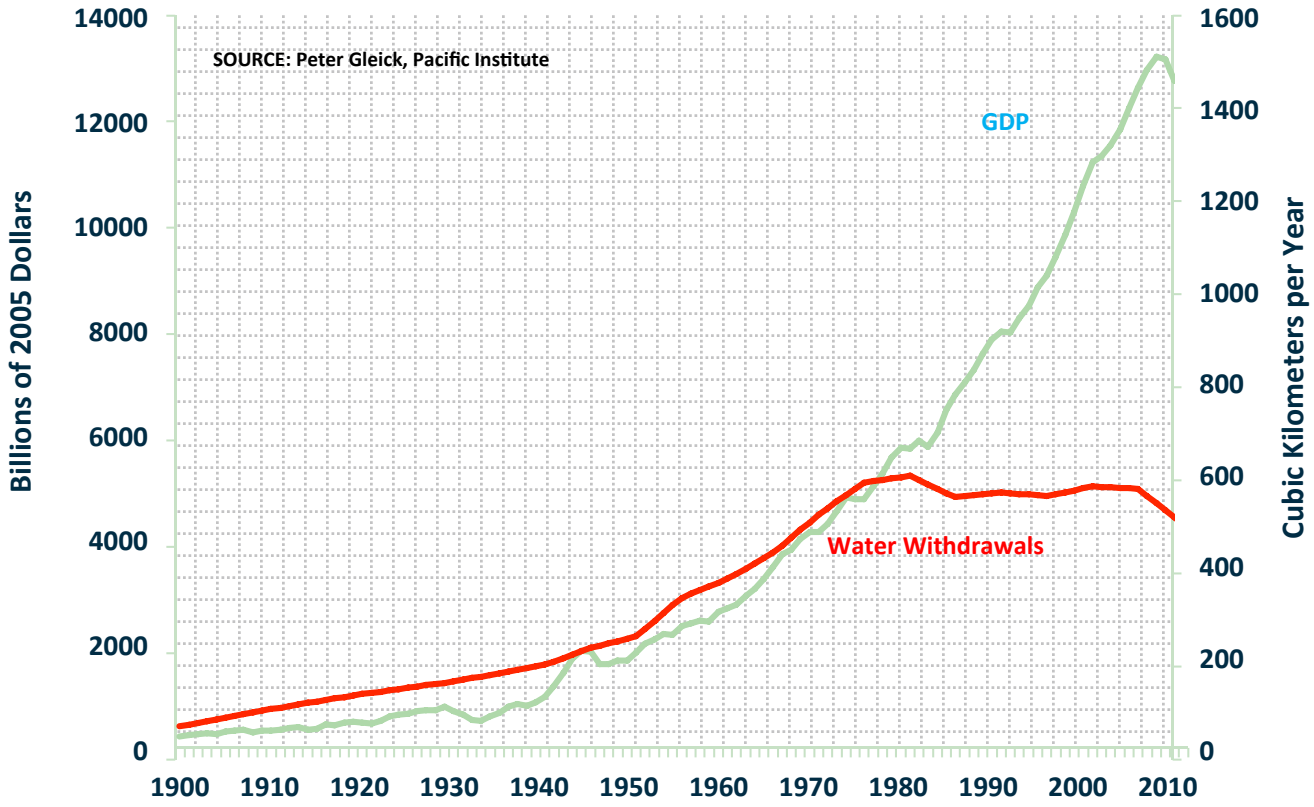


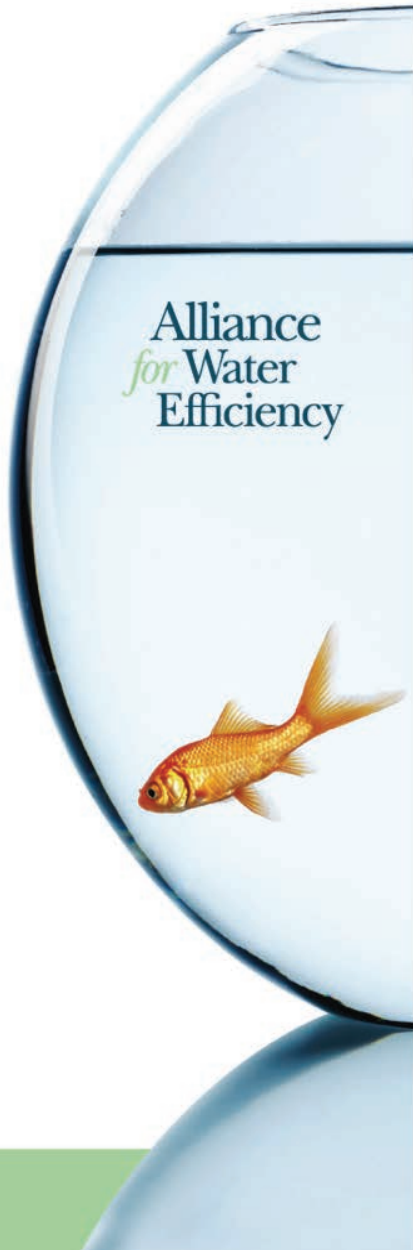
International Comparisons





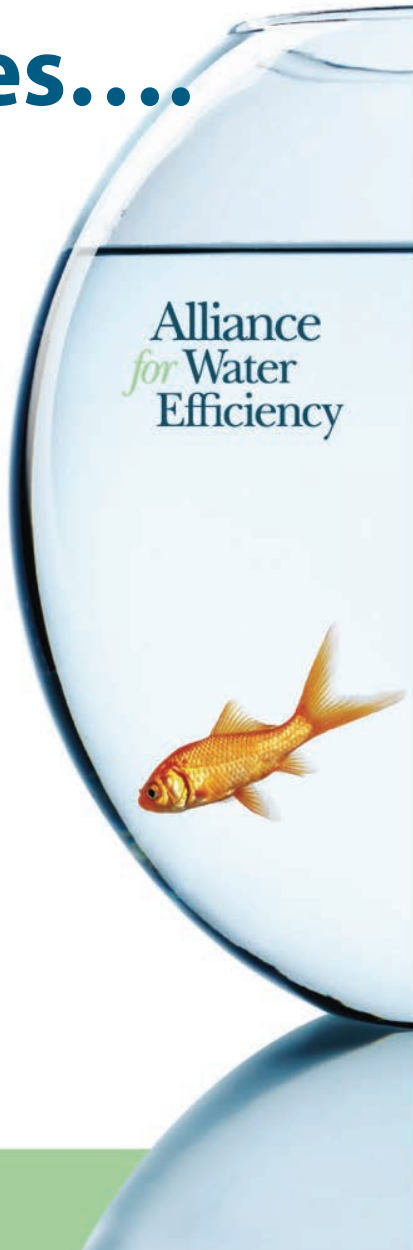
US Water Demand & Economic Growth



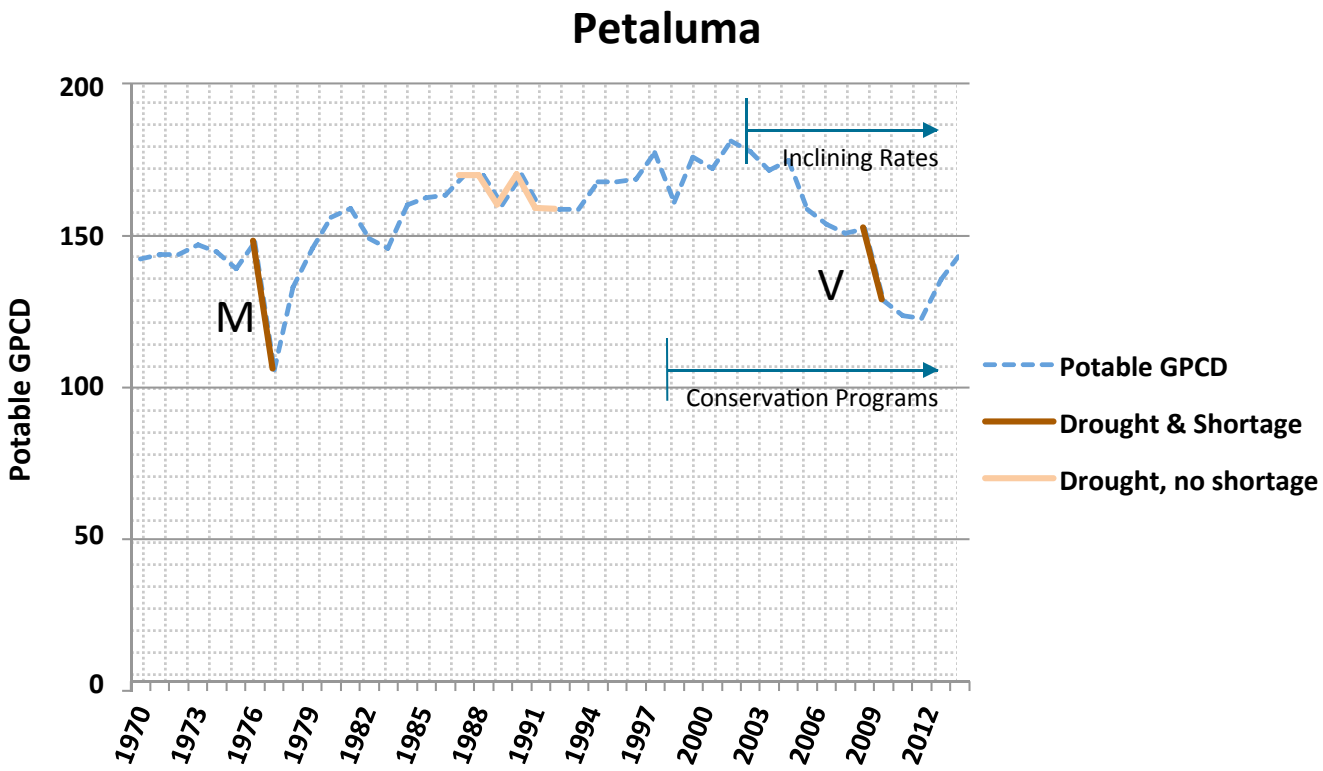


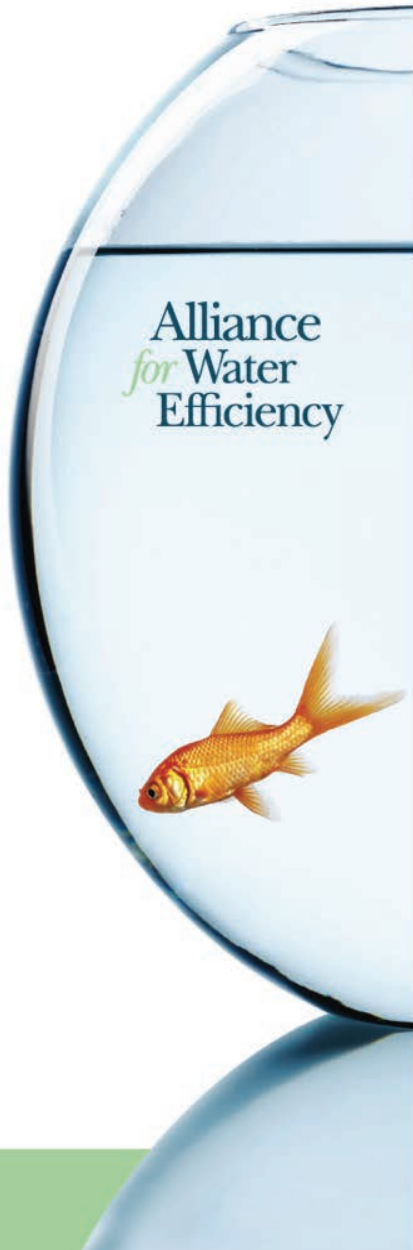
Turning Now To the Case Studies….

- What can we learn from their shortage history?

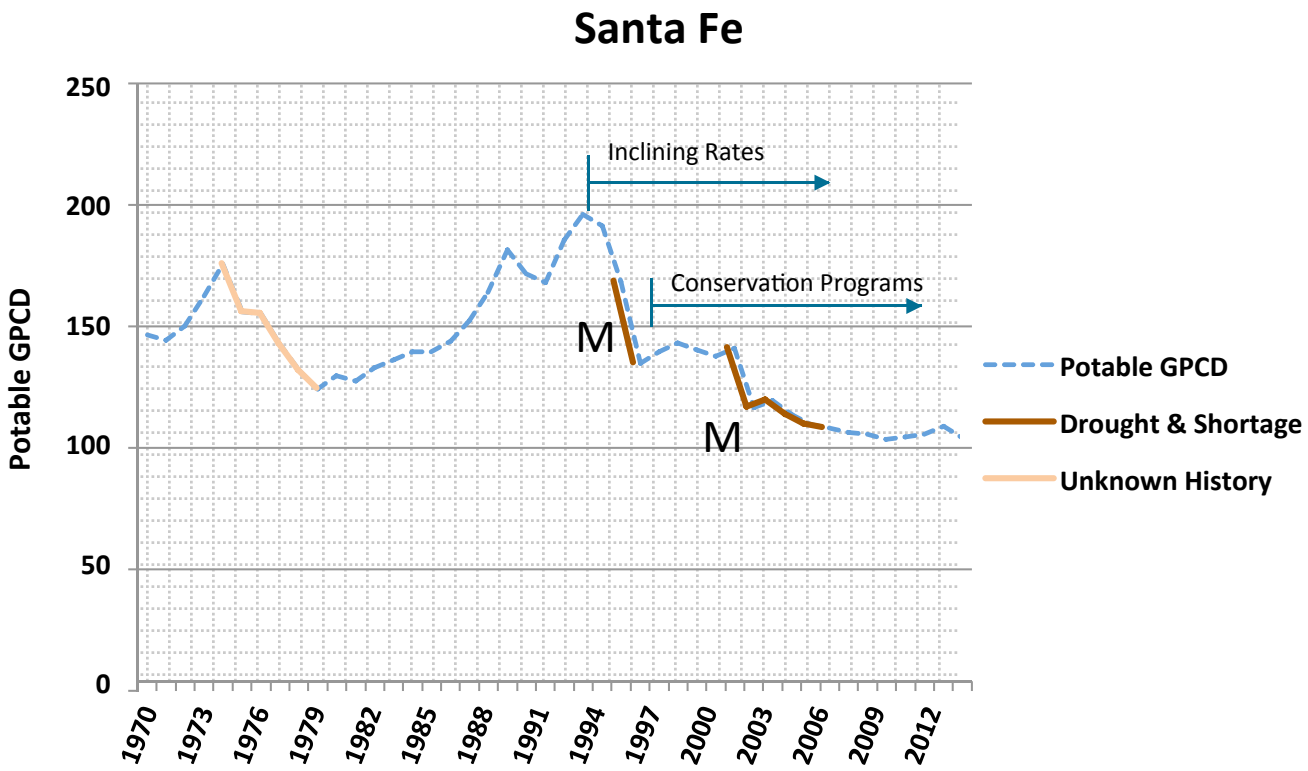


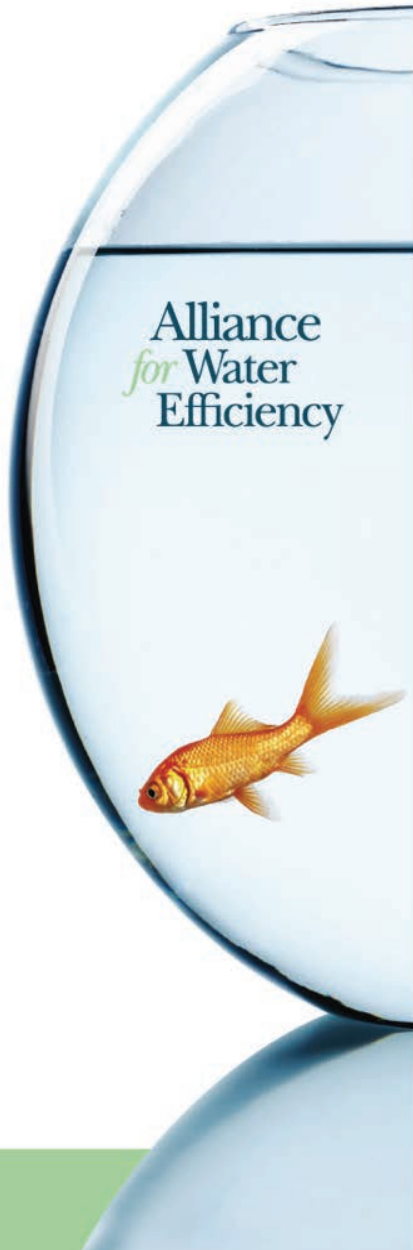
Production History: Petaluma, CA





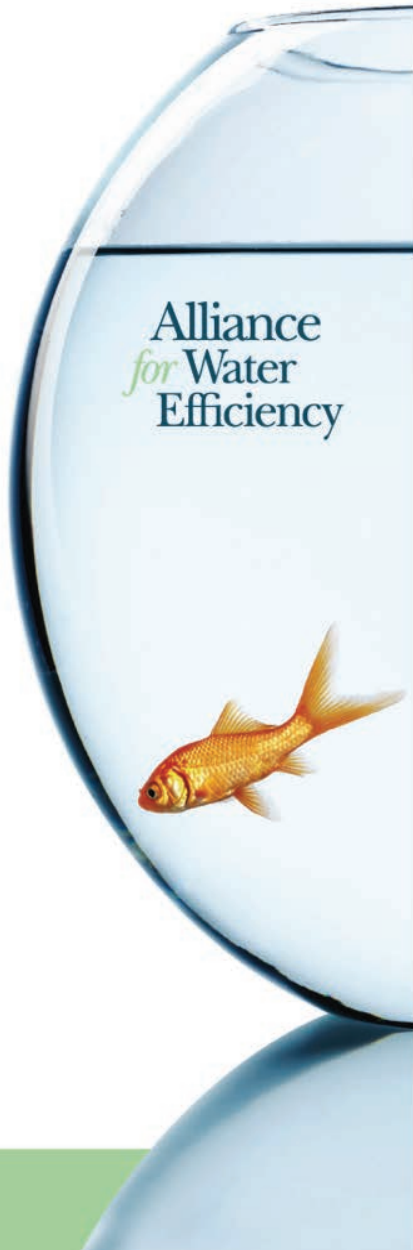
Production History: Santa Fe, NM



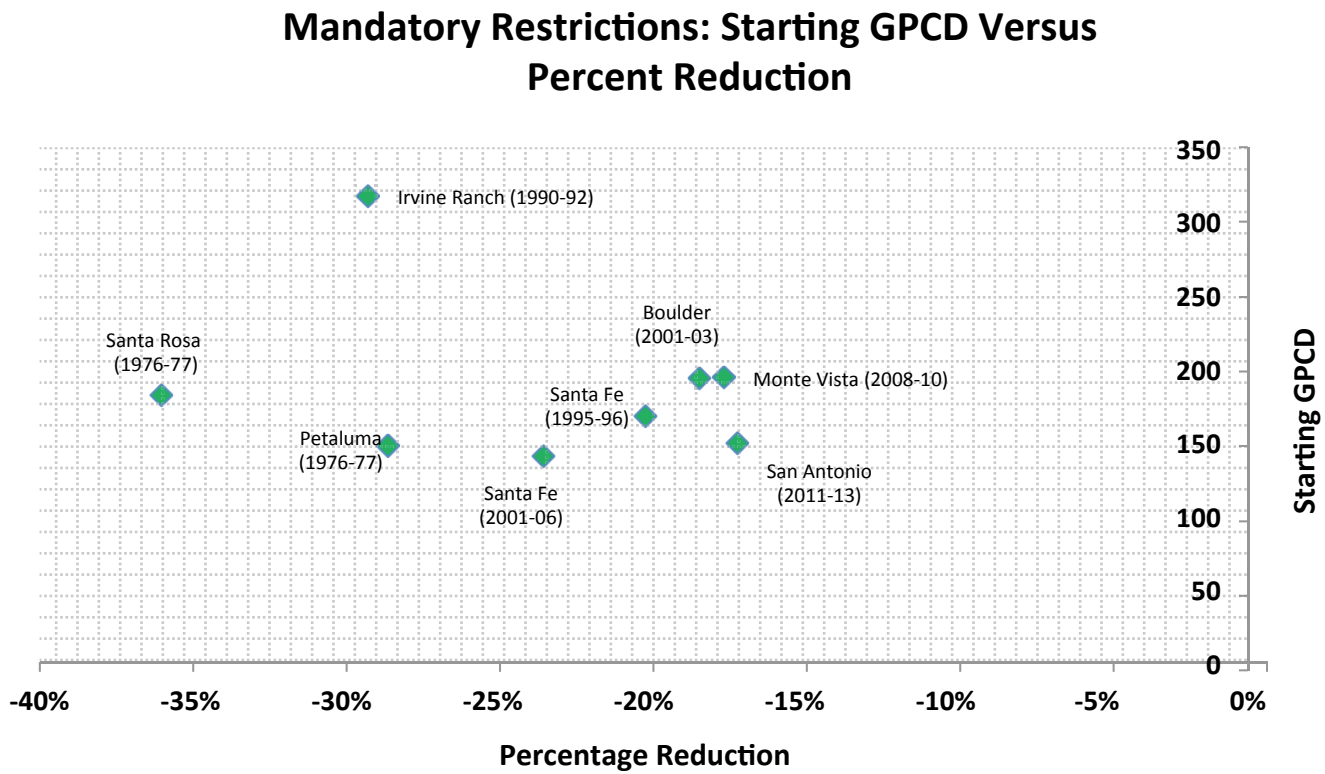


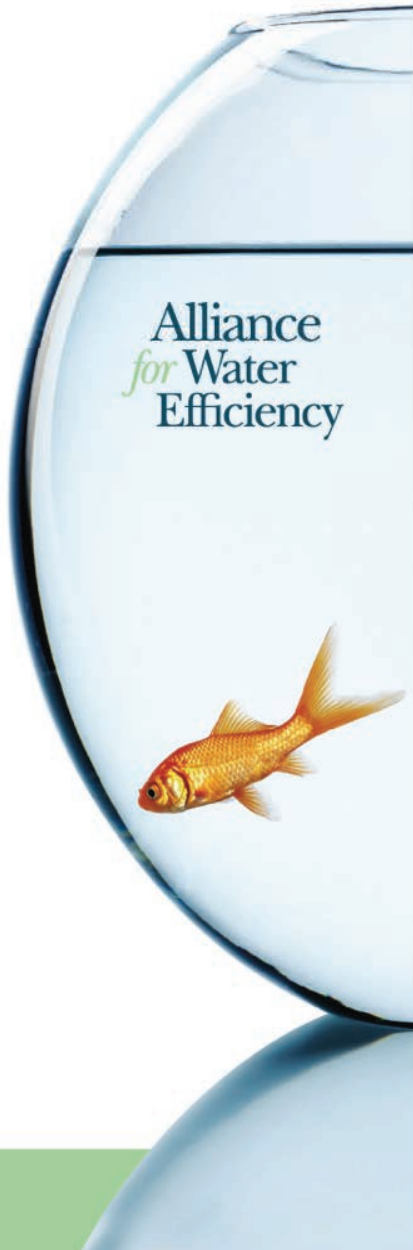
What Do These Production Histories Tell Us?

- Granular information about each shortage event is necessary to determine its severity and draw lessons
- Voluntary restrictions generate less impact than mandatory restrictions
- Impact of mandatory restrictions does not seem to be correlated to pre-shortage GPCD



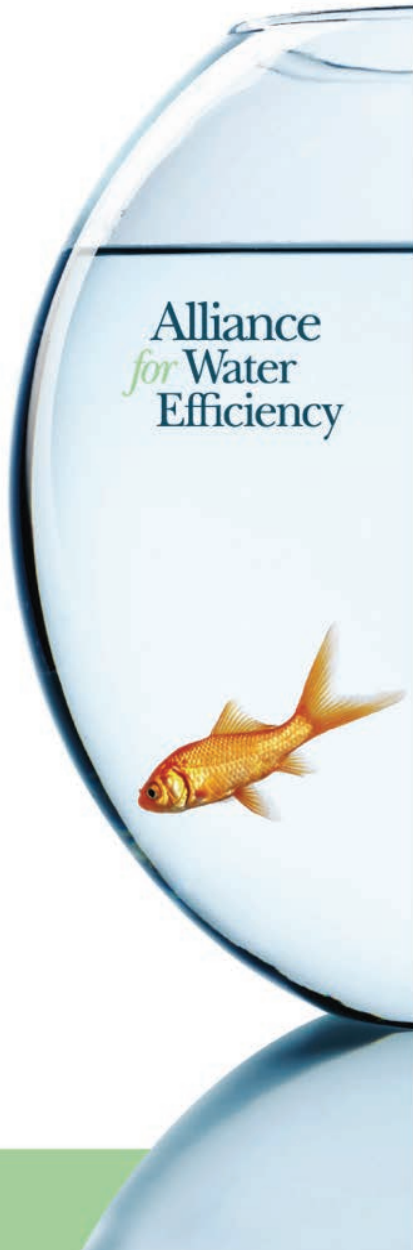
Do High GPCD Suppliers Save More?





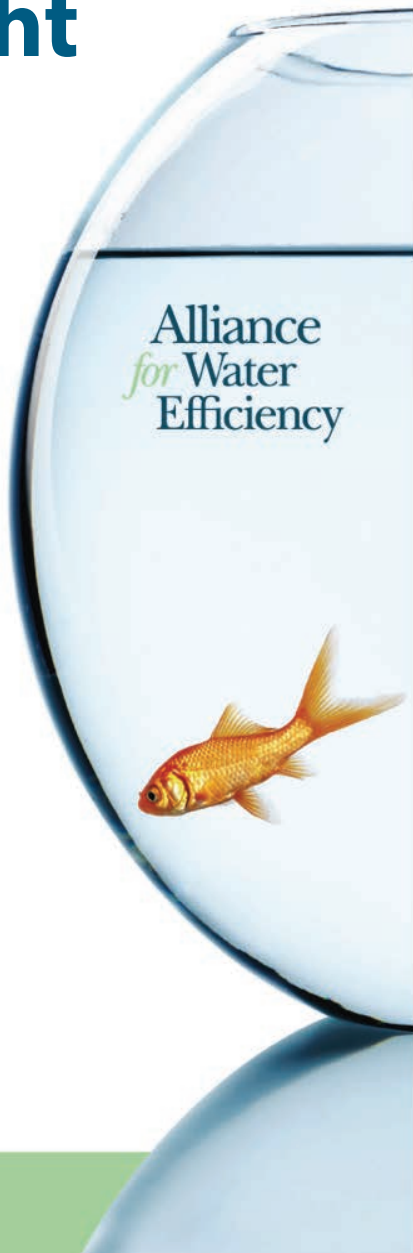
Telephone Survey Results

- Only key results are highlighted here
- Detailed tabulations for each of the seven (7) participating case studies are available in the report



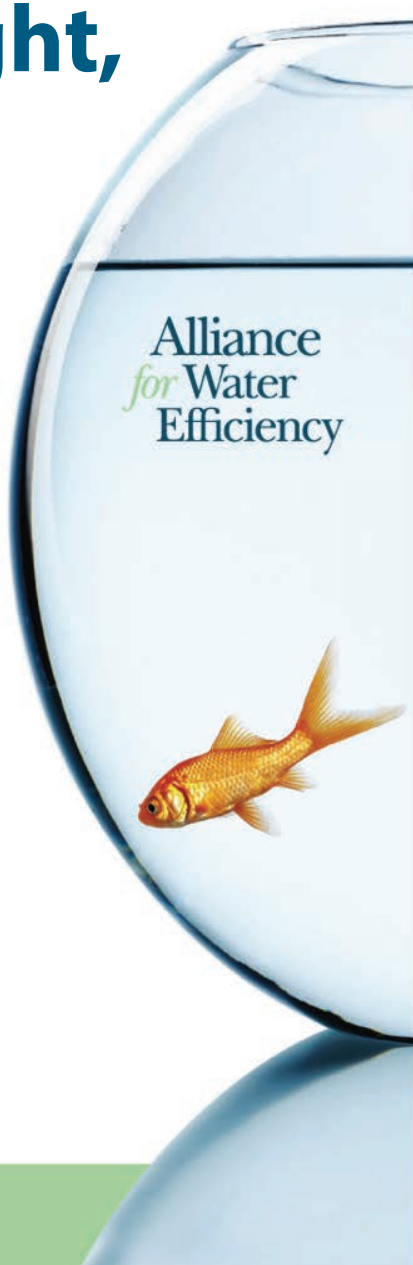
Ability to Save In a Future Drought Compared to a Previous One?

- 62% thought they had reduced their demand by up to 30% during the previous drought
- 74% reported they would be able to repeat this performance in a future drought
- While only perceptions, these results do not indicate declining willingness



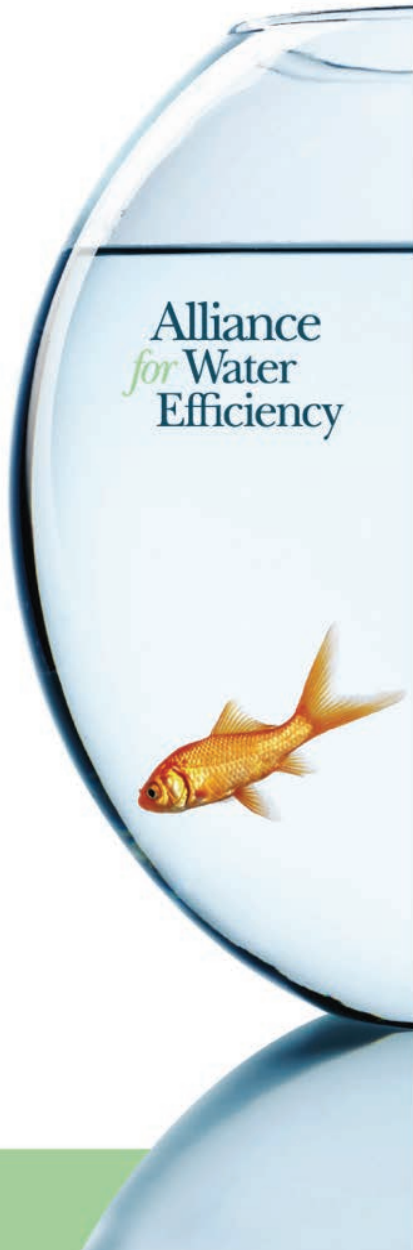
Actions Taken During Past Drought, New Actions Available in Future

- Almost 90% reduced irrigation or were already practicing deficit irrigation
- Majority already have or will consider:
  - ✓ *Replacing existing landscape with drought-tolerant plant material*
  - ✓ *Reusing greywater for irrigation*
  - ✓ *Replacing inefficient toilets and clothes washers*
  - ✓ *Altering behavior (shorter showers)*



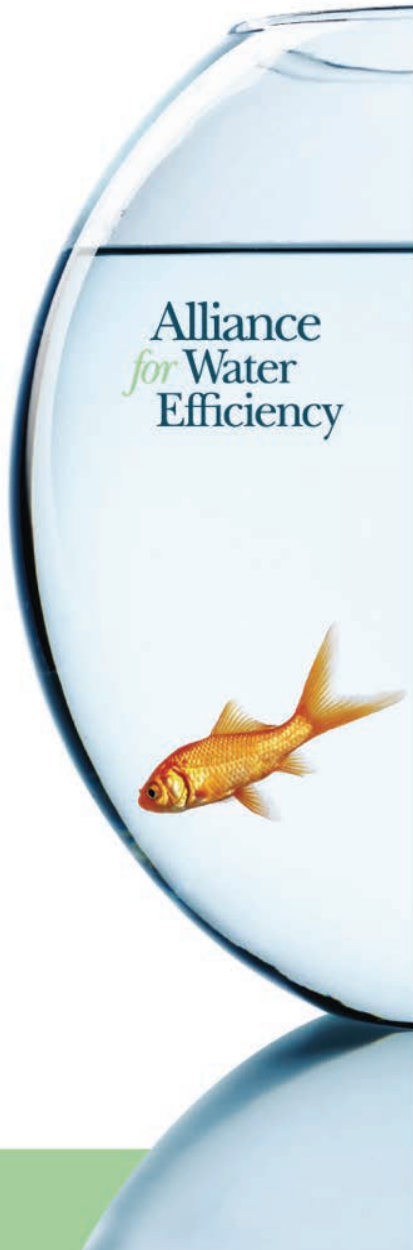
Appetite for Shortage Risk

- Water rates have risen considerably over the last few years
  - ✓ *More than doubling between 1995-2012 in some case studies*
- Over two-thirds of respondents expressed readiness to deal with occasional shortages than pay high water bills
- Similar to previous opinion research conducted in San Diego and San Antonio



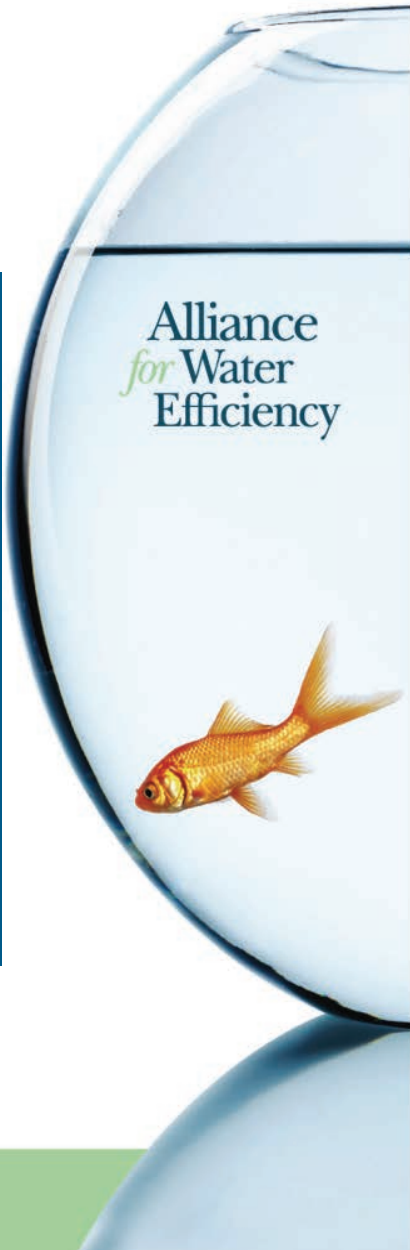
Where Does the Evidence Lead?

- "Ability" to curtail demand during shortages has not bottomed out
- Evidence also indicates considerable "willingness" to adapt, but this requires proper incentives
- So, is demand hardening a problem or not?
  - ✓ *Well, it depends…*
  - ✓ *How is the shortage contingency plan configured?*
  - ✓ *How robust are the enforcement mechanisms?*



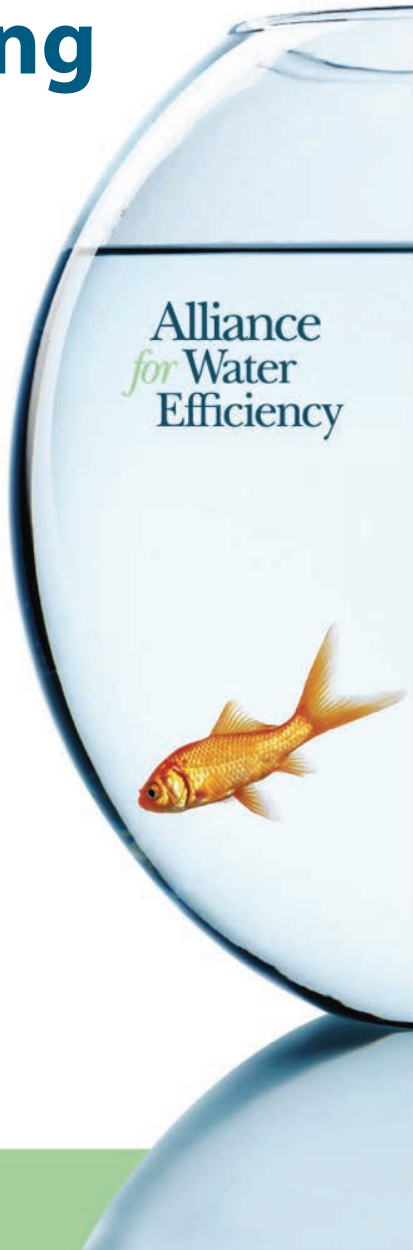
Estimated Residential Outdoor Use

Case Study	Percent of Total Residential Use in 2013
Boulder, CO	29%
Irvine Ranch, CA	36%
Monte Vista, CA	48%
Petaluma, CA	39%
San Antonio, TX	33%
Santa Fe, NM	17%
Santa Rosa, CA	28%



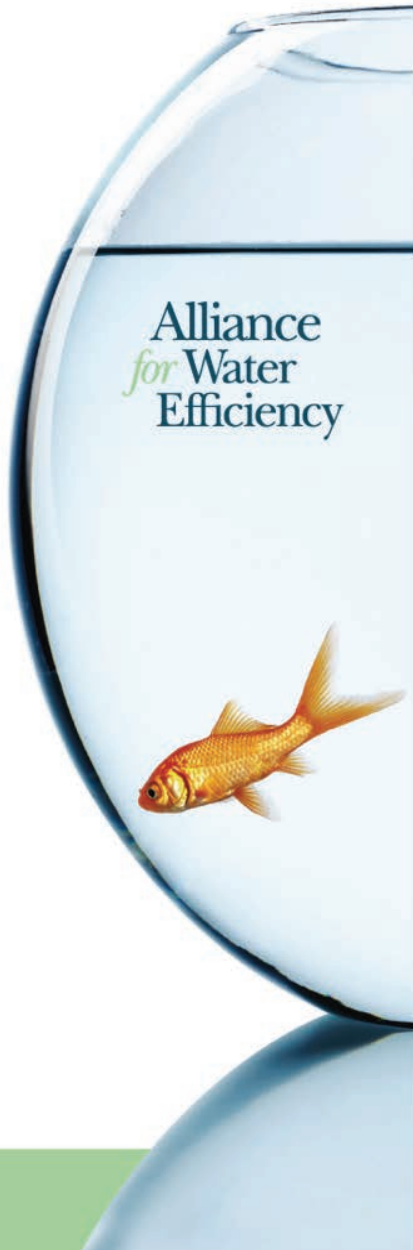
Implications for Shortage Planning

- Santa Fe has something to teach us
  - ✓ *Only two stages in their drought contingency plan*
  - ✓ *Second stage outright bans all residential irrigation*
- Implication: Falling outdoor use may force suppliers to target indoor uses sooner in a future shortage
  - ✓ May require a different enforcement strategy



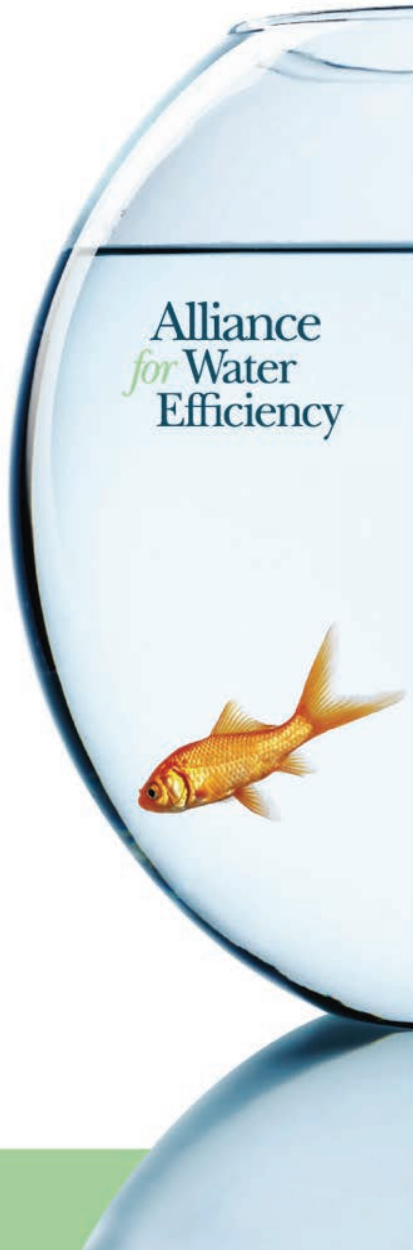
Learning From California in 2015

- January, 2014: Urban water suppliers asked to reduce their demand by 20%
- April 2015: Mandatory statewide restrictions go into effect with goal of saving 25%
- By November 2015, urban suppliers had achieved 26% savings compared to similar time period in 2013
- The key was enforcement and conservation

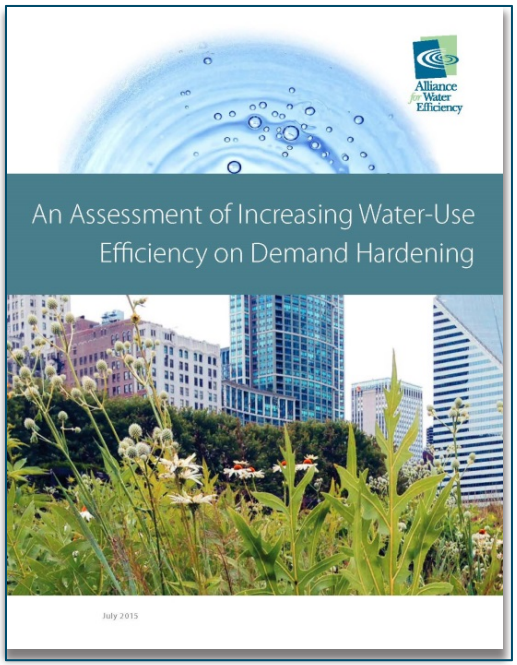


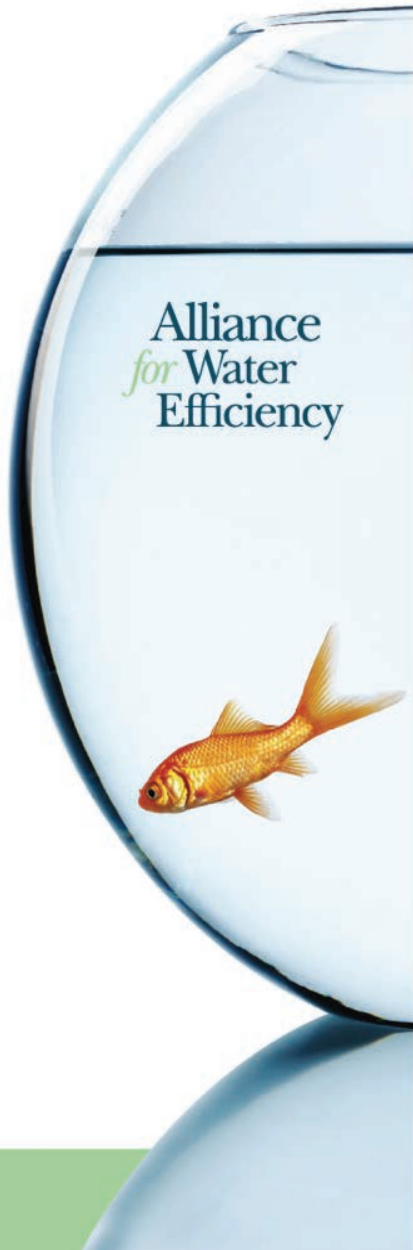
Key Conclusions

- Demand hardening concerns should not deter long-term investments in WUE
- Shortage contingency plans must be evaluated and updated to reflect changing water use patterns, within and across customer classes
- Enforcement mechanisms must be thought through and built into contingency plans



Report and Fact Sheet





Download at:

www.a4we.org/DHreport.aspx

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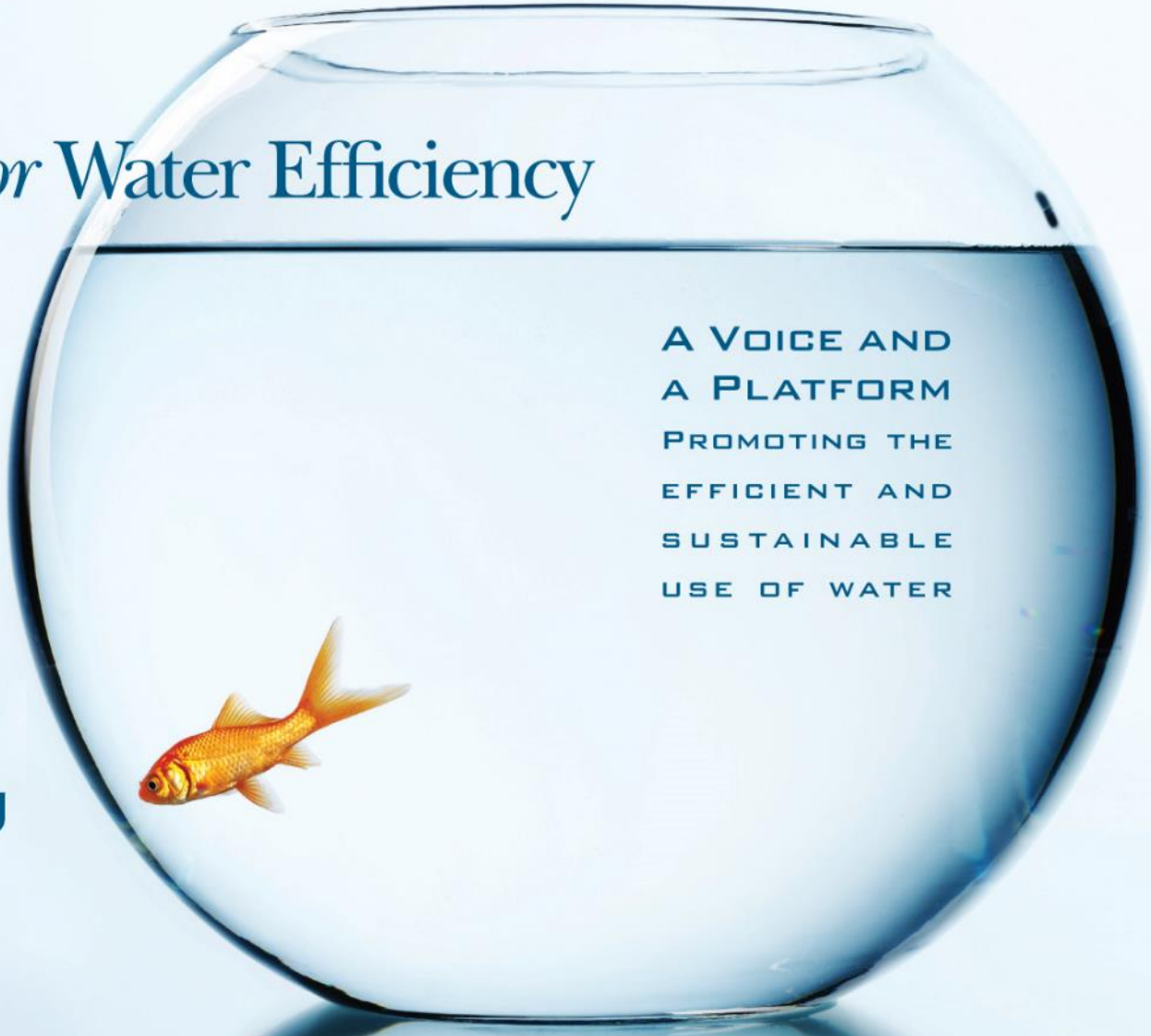

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