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Why do new homes use more water than existing homes even during recessions?

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Presentation Outline

1. Background on New Single Family Home Water Use
2. Methodology
3. Variables That Effect Home Water Use
4. Case Studies
5. Summary & Recommendations
6. Questions

Background on New Home Water Use: New Development Standards, Codes and Ordinances



- * Florida Water Star (2009)
 - * Certification program for new and existing homes that sets standards and guidelines for water efficiency are included for household appliances, plumbing fixtures, irrigation systems and landscapes.
- * CalGreen (2011)
 - * Mandatory Building code that sets targets for energy efficiency, water consumption, dual plumbing systems for potable and recyclable water, diversion of construction waste from landfills and use of environmentally sensitive materials in construction and design, including eco-friendly flooring, carpeting, paint, coatings, thermal insulation and acoustical wall and ceiling panels.
- * EPA WaterSense for New Homes (final standards 2011)
 - * WaterSense-labeled homes aim to use 20 percent less water than typical new homes by incorporating WaterSense labeled plumbing fixtures, efficient hot water systems, and water-conserving landscape design.



Methodology to Analyze Home Water Use

1. Start with only single family homes
2. Obtain annual water use data for the years 2000 to 2010
3. Analyze Data – We show 3 different ways to analyze the water use data:
 1. Split homes into two different categories:
 - * Homes built before 1995
 - * Homes built after 1995
 2. Organize homes into individual year of construction
 3. Analyze monthly water use data

Data Needed to Explain Water Use Trends

- * Total Number of single family homes, and number of homes built since 1995
- * Single Family Home Water Use
 - * (existing homes versus new homes built after 1995)
- * New single family home ordinances
- * Single family home square footages
 - * (existing homes versus new homes built after 1995)
- * Lot size square footages
- * Average house hold size
- * Typical water use profile of existing vs. new home water use
- * Price of Water
- * Economic Conditions – Foreclosures, Value of Homes, Unemployment
- * Types of conservation programs offered

Other Variables

- * Weather - Not important
 - * All homes in a service area typically have relatively the same weather
- * Detailed Home Data
 - * Pools, Irrigation System type, Number of occupants, Household income level, Work at home?
- * Federal or State Plumbing Code Ordinances
 - * The year the individual fixtures were mandated to be more water efficient
 - * For example – toilet water efficiency improves in new homes as they have 1.6 gpf toilets or 1.28 gpf toilets.

Case Studies

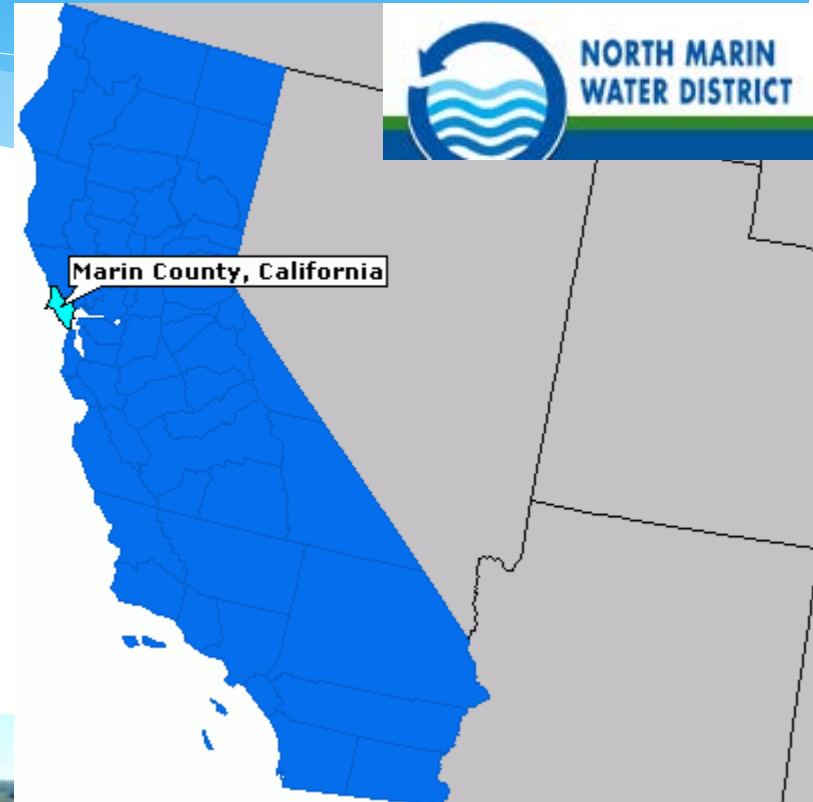
- * Four Case Studies:

- * 3 in California, 1 in Florida
- * Case studies include Small, Medium and Large Utilities
- * Service Area Population varies from 10,400 to 575,000
- * All case studies showed higher use in new homes during a recession
- * 3 individual graph styles to depict water use in the homes
- * Goal of different graph styles was to demonstrate different ways to view the data, but all reach the same conclusion

Note – other states and utilities are reporting same trend in higher water use for single family homes (Texas, New York)

Case Study #1: North Marin Water District, California

- Includes one main urban area, the City of Novato, and some rural areas
- 60,420 service area population in the year 2010
- 11.0 MGD in 2010
- 12.2 MGD in 2035



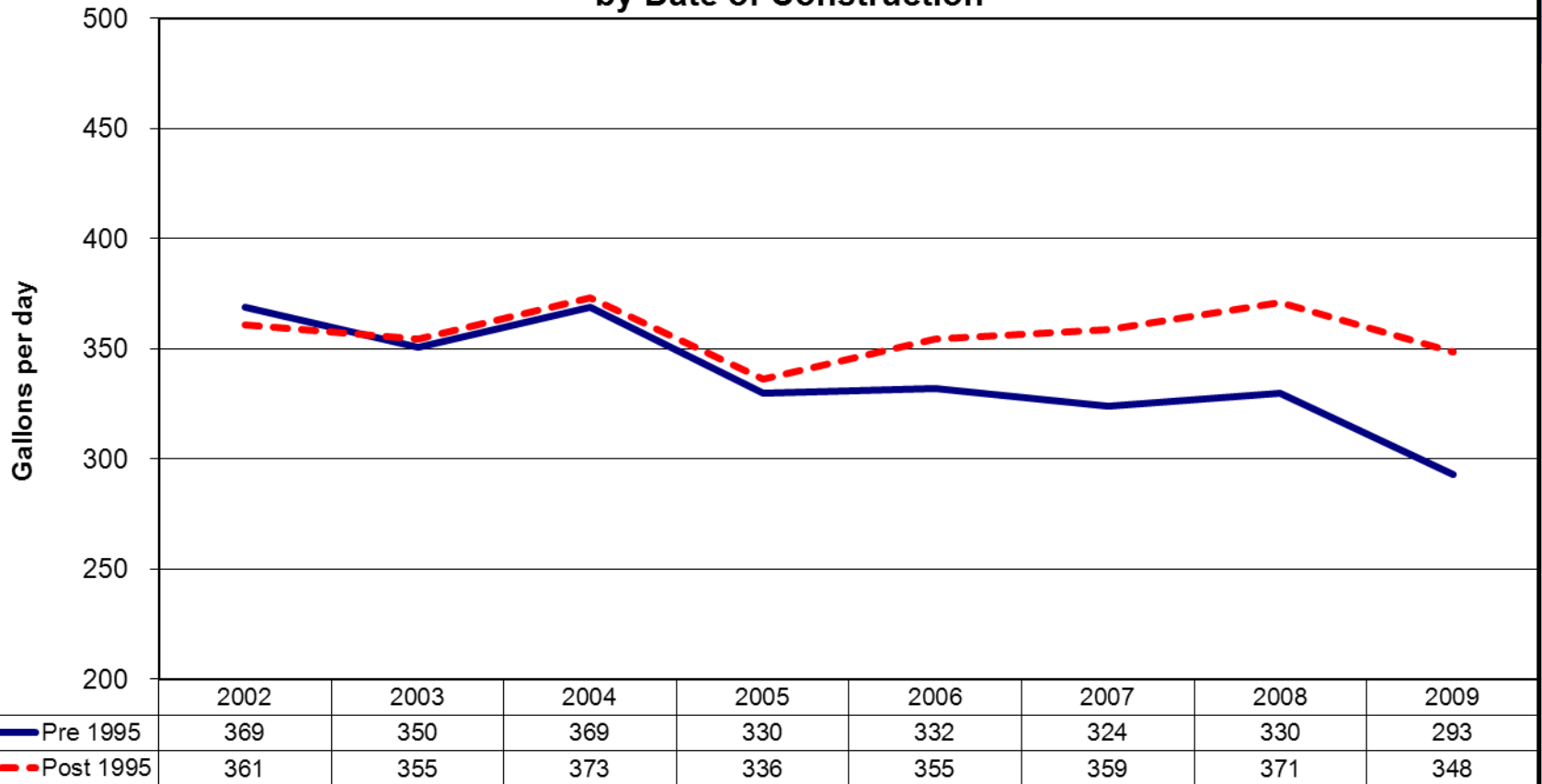
Case Study #1: North Marin Water District, California

Number of Single Family Homes in Service Area (Total)	~14,900
Number of Single Family Homes Built Since 1995	~2,700
Data Analysis Method	Split data into two groups: Homes built before 1995* Homes built after 1995*

* Homes built before the year 1995 would have had the older fixtures before the Federal Energy Policy Act of 1992 took effect

Compare Median Water Use of Homes Grouped by Pre 1995 and Post 1995

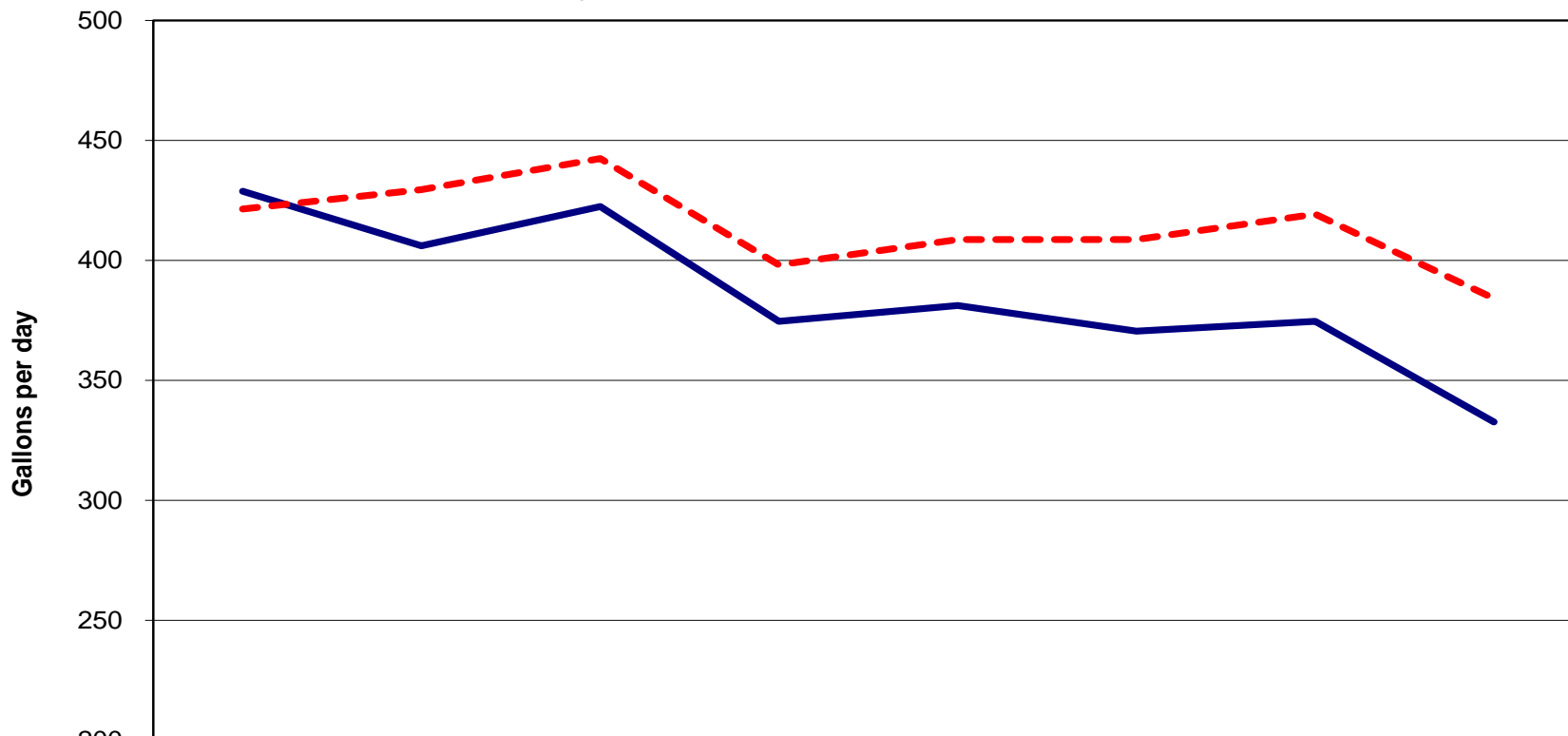
**Single Family Residential Median Water Use Comparison
by Date of Construction**



Year

Compare Average Water Use of Homes Grouped by Pre 1995 and Post 1995

**Single Family Residential Average Use Comparison
by Date of Construction**

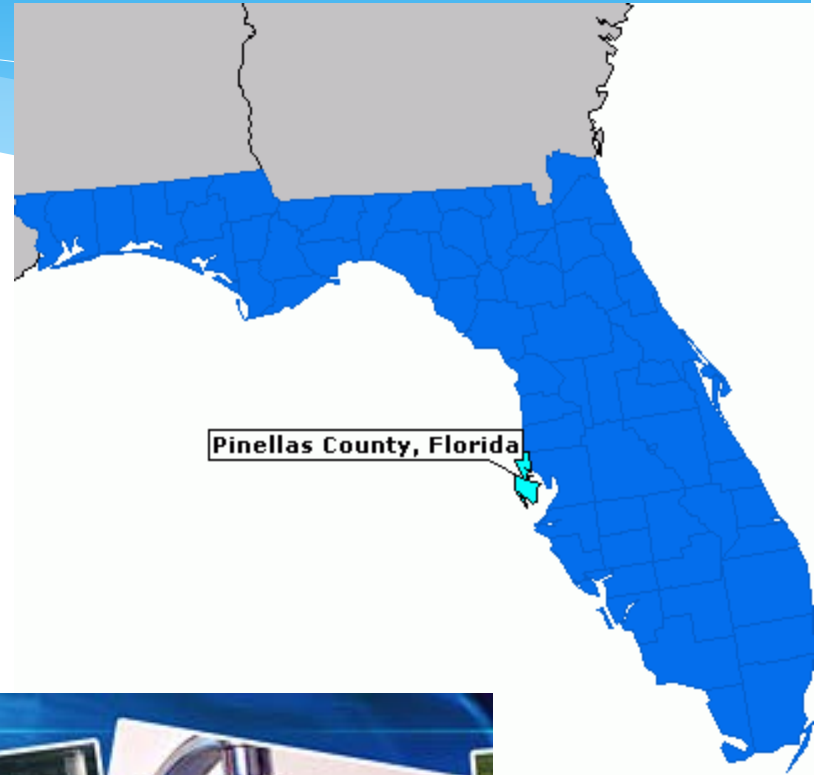


— Pre 1995	429	406	422	375	381	371	375	333
- - - Post 1995	421	429	442	398	409	409	419	384

Year

Case Study #2: Pinellas County Utilities, Florida

- Large Coastal and Retirement Community w/ Seasonal Visitors
- Not a high growth area
- 575,000 service area population in the year 2010
- 33 MGD in 2010
- 45 MGD in 2035



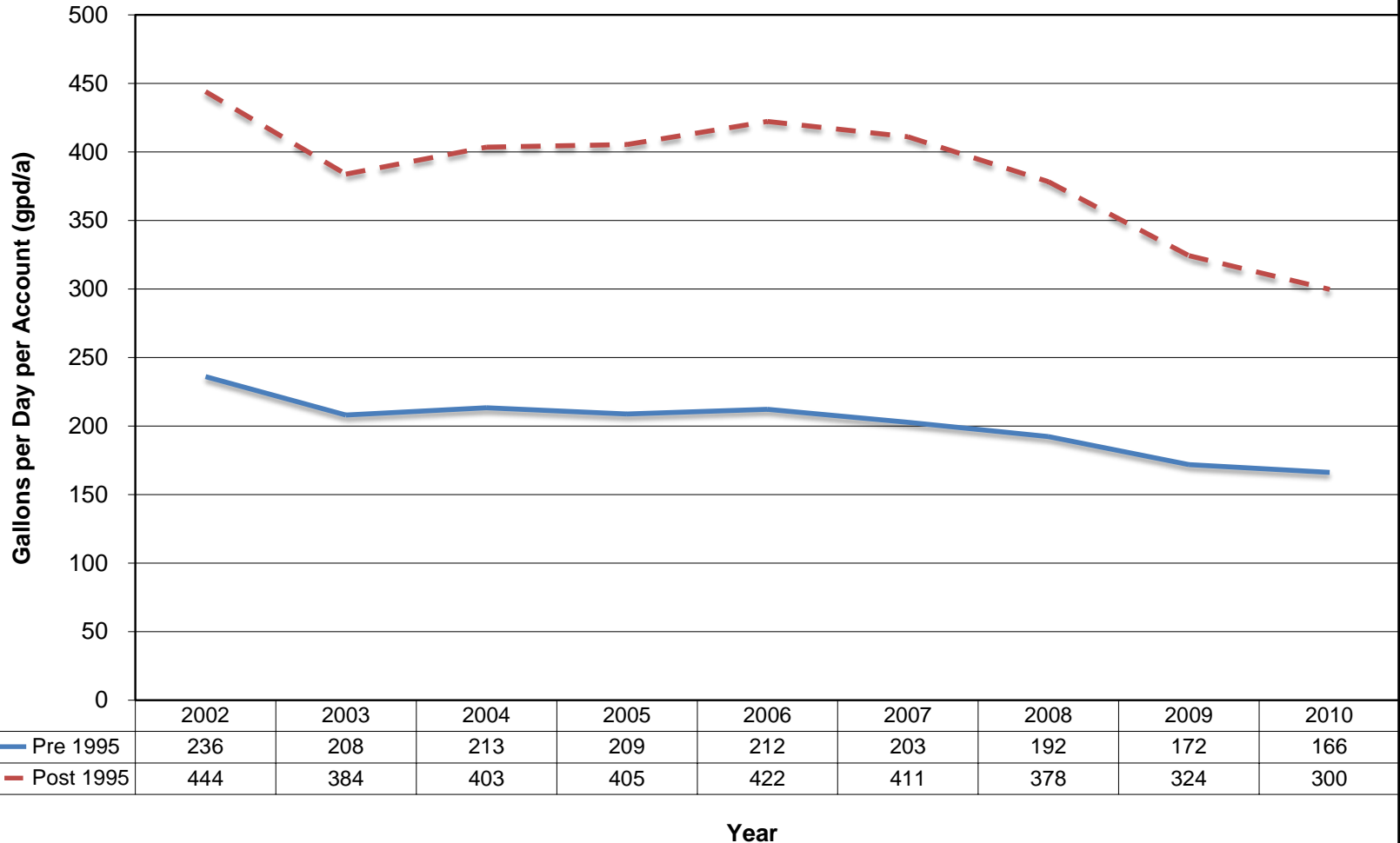
Case Study #2: Pinellas County Utilities, Florida

Number of Single Family Homes in Service Area	245,310 (from US Census data)
Number of Single Family Homes Built Since 1995	89,500 (from US Census data)
Average persons per household*	2.13
Data Analysis Method (Large Utility)	Split data into two groups: Homes built before 1995 Homes built after 1995

*Population and person per household is decreasing (population density decreasing)
More expensive and lower employment, so people are moving to other areas such as Pasco and Hillsborough Counties have more jobs and cheaper homes

Compare homes by construction year

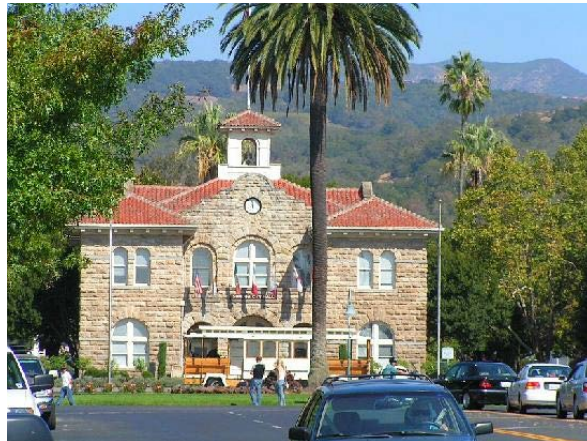
Pinellas County Utilities, Florida
Single Family Residential Average Water Use
Comparison of Pre vs. Post 1995 Date of Construction



Data courtesy of Tampa Bay Water and Hazen and Sawyer

Case Study #3: City of Sonoma, California

- Small town with high level of tourism (local wineries)
- 10,840 service area population in the year 2010
- 2.1 MGD in 2010
- 2.5 MGD in 2035



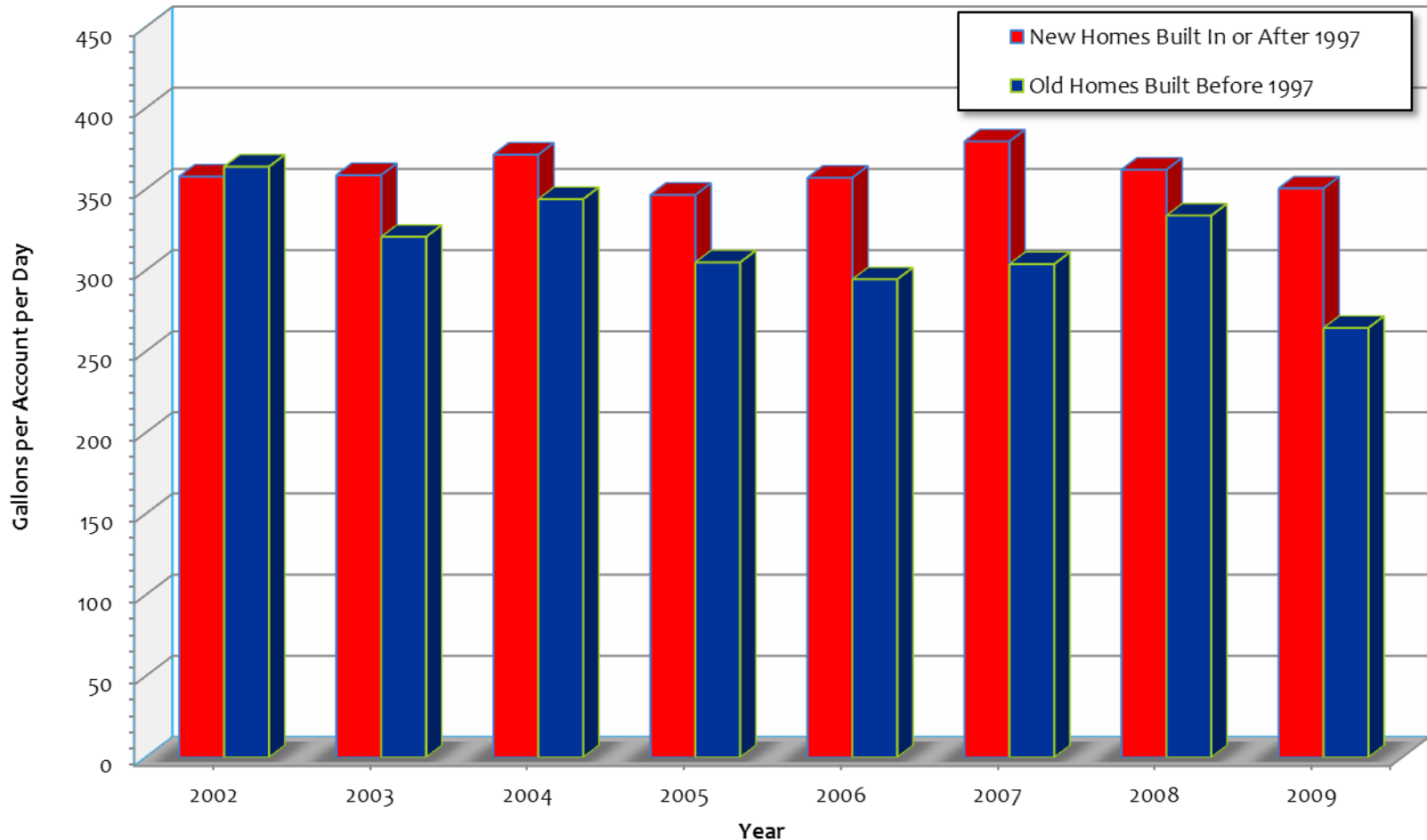
Case Study #3: City of Sonoma, California

Number of Single Family Homes in Service Area (Total)	~3,500
Number of Single Family Homes Built Since 1995	~800
Average Household size	2.10
Data Analysis Method	Split data into two groups: Homes built before 1997* Homes built after 1997*

*Data was not available for the year 1995, so the year 1997 was used instead.

Compare Homes by Construction Year

Water Use in New vs Old Homes
City of Sonoma, California



Case Study #4: Valley of the Moon, California

- Small town
- 23,475 service area population in 2010
- 3.2 MGD in 2010
- 3.3 MGD in 2035
w/o Conservation



Case Study #4: Valley of the Moon Water District, California

Number of Single Family Homes in Service Area (Total accounts)	~6,310
Number of Single Family Homes Built Since 1997-2000	~121
Average house hold size	2.5
Data Analysis Method	Analyze small number of homes in detail (a) Use monthly water billing data rather than annual data (b) Obtain information on home square footages, demographics, price of water, etc. (c) Remove homes that show zero water use (vacancy or foreclosure)

Compare homes with monthly data

New Homes Constructed 1997 to 2000 (121 Homes)

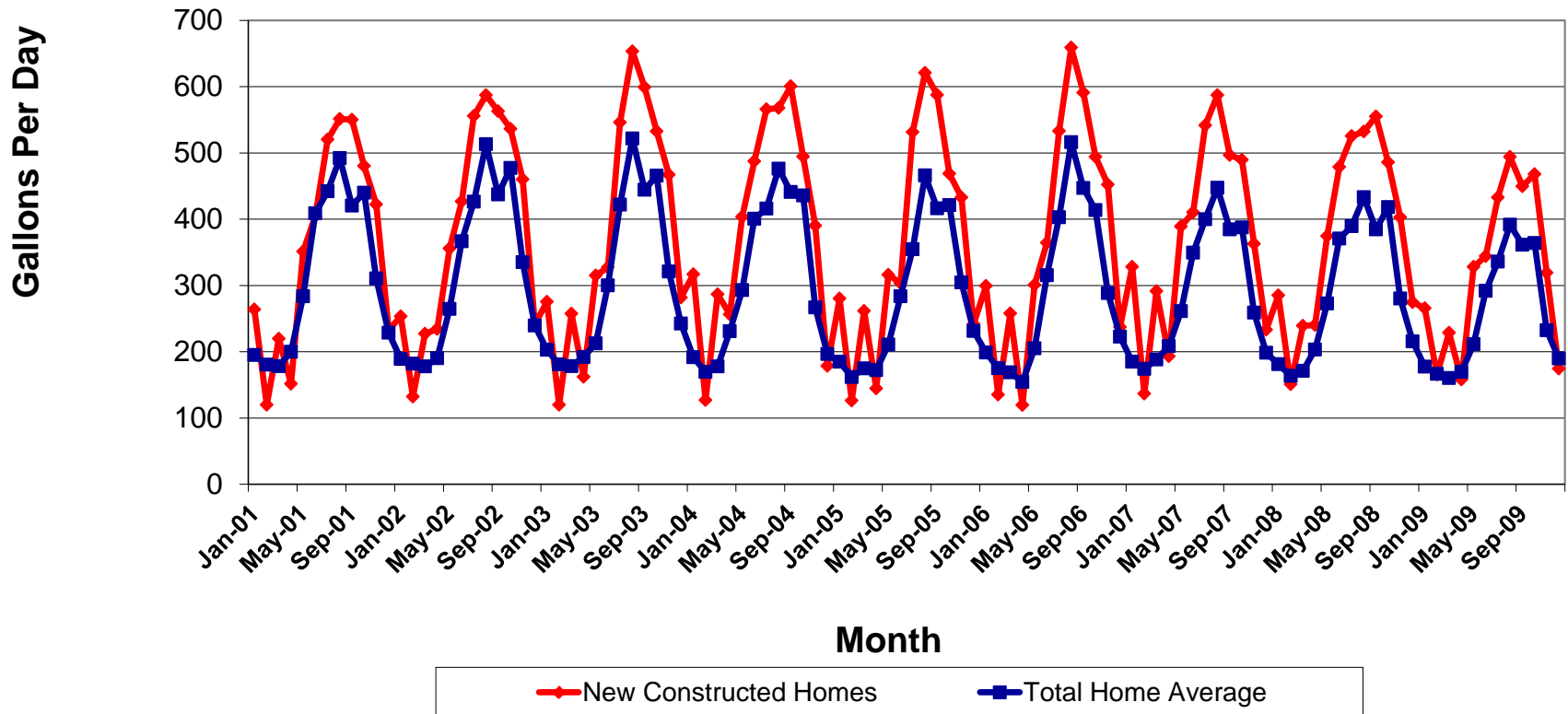
vs.

Average of All Single Family Homes (6,310 Homes)

Valley of the Moon, California

NEW HOME AVERAGE = 362

TOTAL HOMES AVERAGE = 302



Key Questions

- * What is happening in new single family homes that is not occurring in existing homes?
- * Are new development ordinances and new water efficient technologies effective?
- * Are new homes less sensitive to the price of water (possibly higher disposable income & more stable income)?
- * Are there any new ideas we can use to counteract this trend?
- * How will this discovery impact water needs for your utility?
 - * Account for these trend in future demand projections
 - * Create a conservation programs to counteract higher use

Possible Explanations

- * What is happening in new single family homes during a recession that is not occurring in existing homes?
 - * Economic Recession:
 - * Unemployment increases / Consolidation of households – families moving in together if they get laid off, lose a home, or can't get a job after college
 - * Residents of New homes may have different amount of income and more stable income.
 - * To save money, businesses have Increasing trend toward telecommuting or mandating employees working part time (furlough days), so people spend more time at home rather than at work
 - * Disposable income may decrease
 - * Focus on water bill and discovery of leaks due to desire to decrease bills
 - * Less money available for travel, so less tourism and visits to vacation homes

Possible Explanations (Cont.)

- * What other factors make new homes different than existing homes?
 - * Construction Style:
 - * New homes tend to have a larger number of bathrooms so possibility increases for number of leaks.
 - * Old homes tend to be 3 bedroom / 2 bath or 4 bedroom / 2 bath homes.
 - * New homes tend to have one bath per bedroom
 - * New homes may have multiple shower heads
 - * New homes typically have automatic irrigation systems
 - * Valley of the Moon case study shows, lower use in the winter, much higher use in the summer.
 - * Overall water use higher as automatic irrigation more than offsets benefits of mandated low use fixtures

Possible Explanations (Cont.)

- * What other factors make new homes different than existing homes?
 - * Demographics:
 - * Household size (during non recession times)
 - * New homes may have a different demographic (families with small children?) vs. existing homes which may have elderly residents which tend to use less water.
 - * Elderly people tend to shower less and get outside to water the garden less.
 - * Families with small children tend to do more laundry, take more baths/showers and have less time and money to fix leaks

Next Steps & Call to Other Utilities and Professionals for Analysis of this trend

- * Continue to gather new home data for recession years 2011, and 2012
- * Need further analysis of this apparent trend
 - * Regression Analysis using variables such as price of water, home value, home square footage, rate of unemployment, seasonal population / tourism fluctuations
- * Need more utilities included in the study in different geographic regions
- * Develop ideas on what could be done about this higher water use trend?

Summary and Recommendations

1. Our data appears to show different water use patterns between “new homes” and “older homes”
2. 4 different data analysis methods were used for 4 different service areas, all showed same trend for new homes
3. Utilities should consider looking into their own new home single family water use by year of construction to determine if there is a variance in water use

Discussion – Q&A



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