

# This presentation premiered at WaterSmart Innovations

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# Implications of the Systematic Integration of Water Efficient Technology

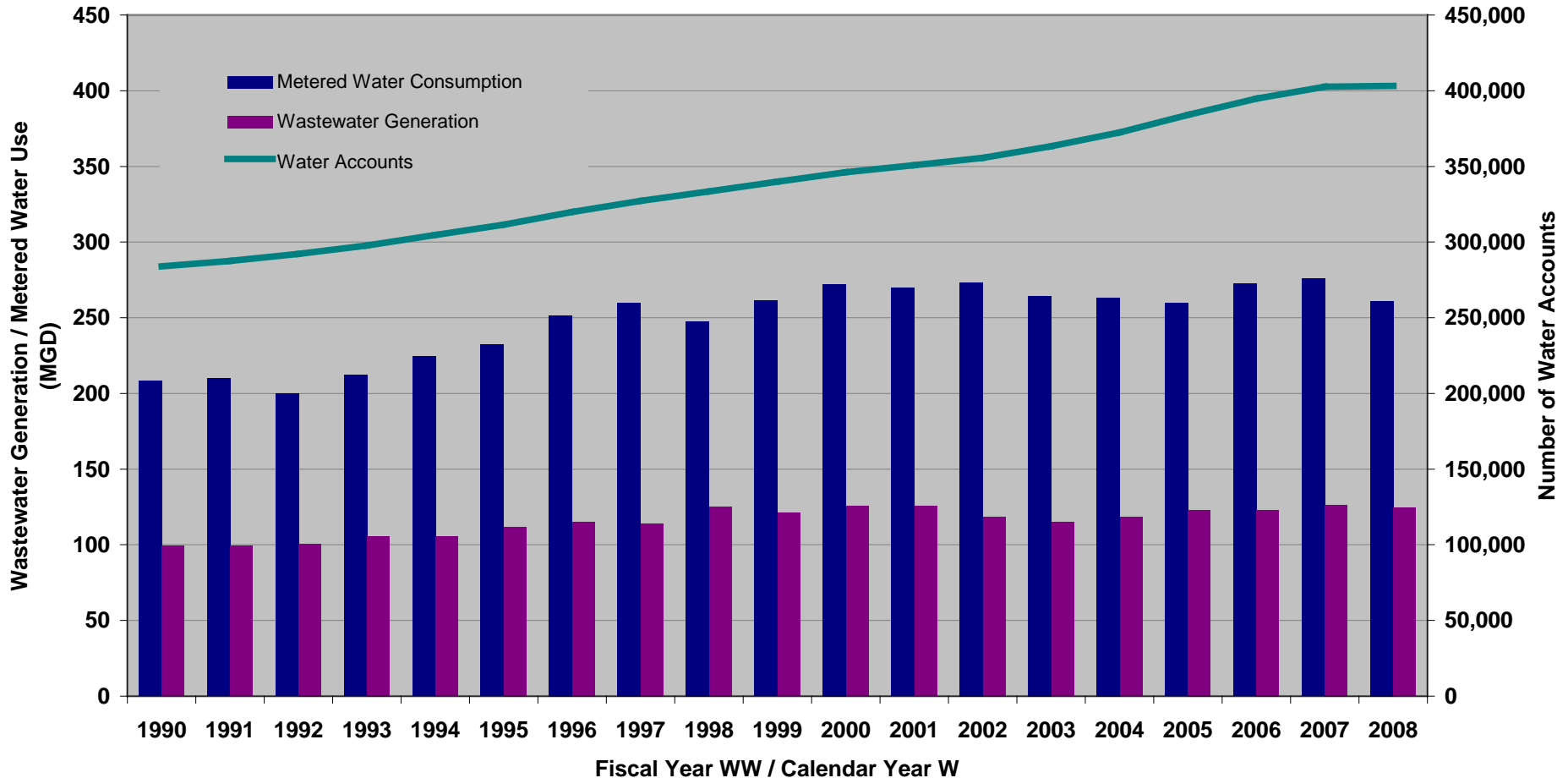
Jack C. Kiefer, Ph.D., Hazen and Sawyer, P.C.

Adam Q. Miller, Phoenix Water Services

# Overview

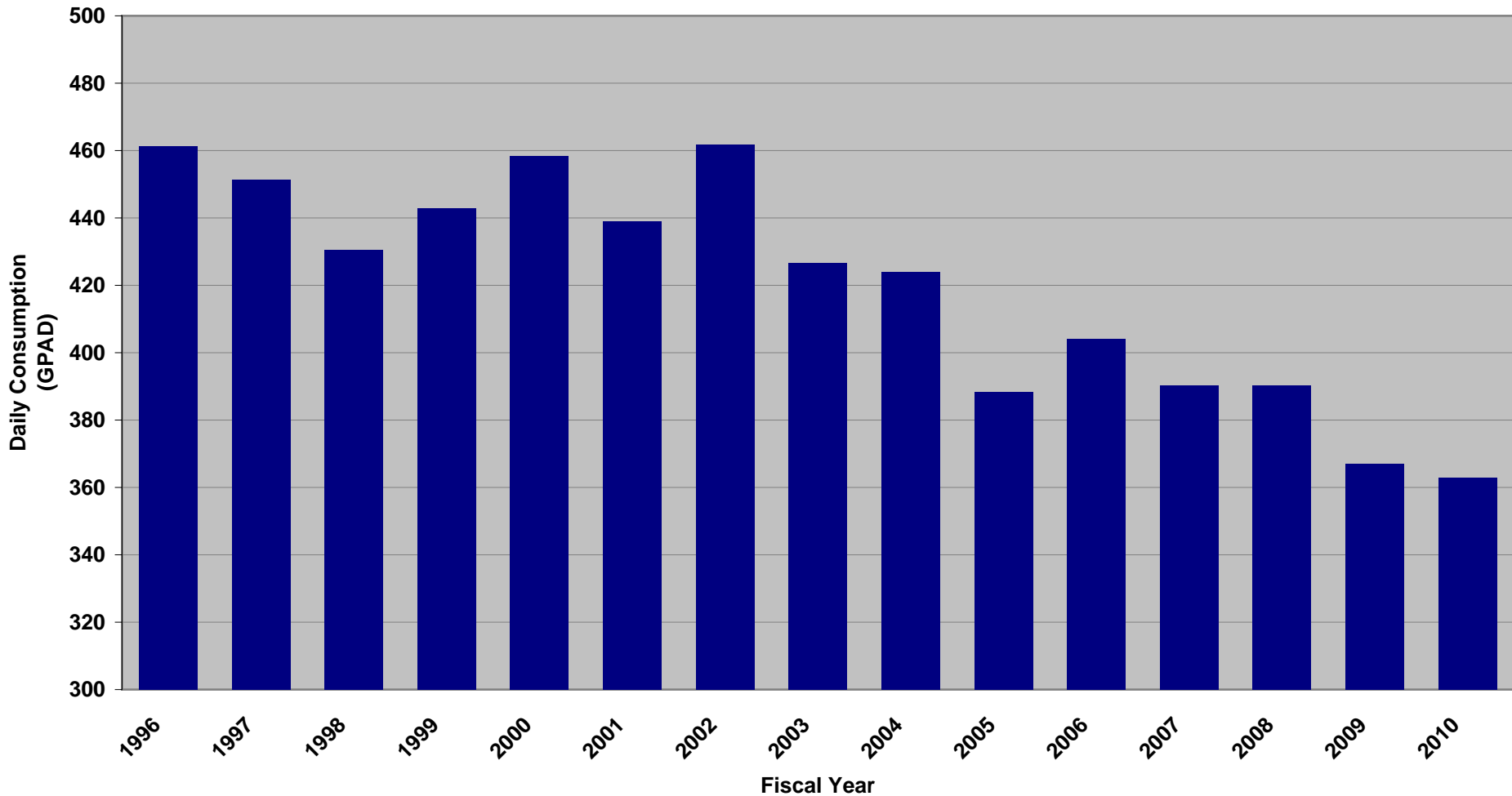
- Provide background on overall trends in water use in Phoenix
- Review identified drivers of demand trends
- Provide estimates of penetration of technology and other behaviors related to demand reductions
- Summarize implications for longer-term planning

# Historical Trends in Accounts, Consumption and Wastewater Generation



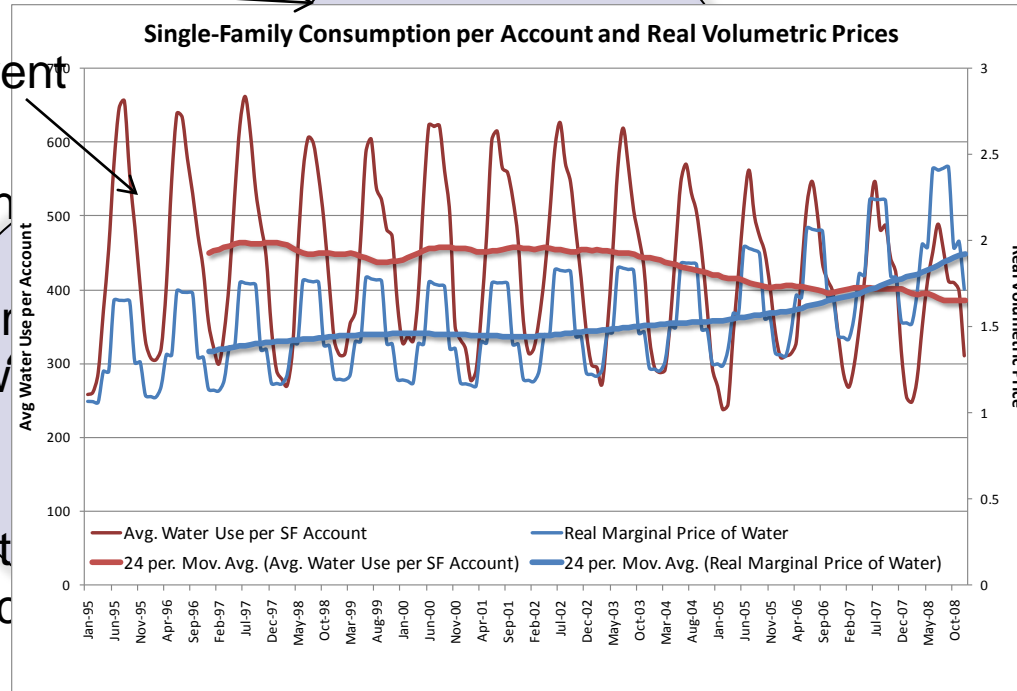
# Historic Trends in Household Water Use 1996-2010

## Average Daily Water Use per Single Family Account



# Recent and Future Demand Trends

- What is happening among older products?
- More efficient indoor and outdoor devices
- What is our current baseline?
- Larger homes on lots
- Lesser area for in plantings and swimming pools
- High vacancy rate
- Reduction in disc consumption
- Likely reduced commercial and industrial productivity



Higher  
Prices/Costs

Market Forces  
and  
Preferences

# Single-Family Field and End Use Surveys

- Two-pronged approach for further evaluation of trends in single-family water use
  - Field Survey: site inspections of water using technology and landscape characteristics
  - Data Logging: Re-logging of homes that participated in the Residential End Uses of Water Study (1999)—AquaCraft Inc.

# Single-Family Field Survey

- Selected stratified random samples from 7 age of construction cohorts
  - Mail invitation
  - Telephone follow-up and appointments
  - Site visits averaging ~ 1 hour

## Sample Cohorts

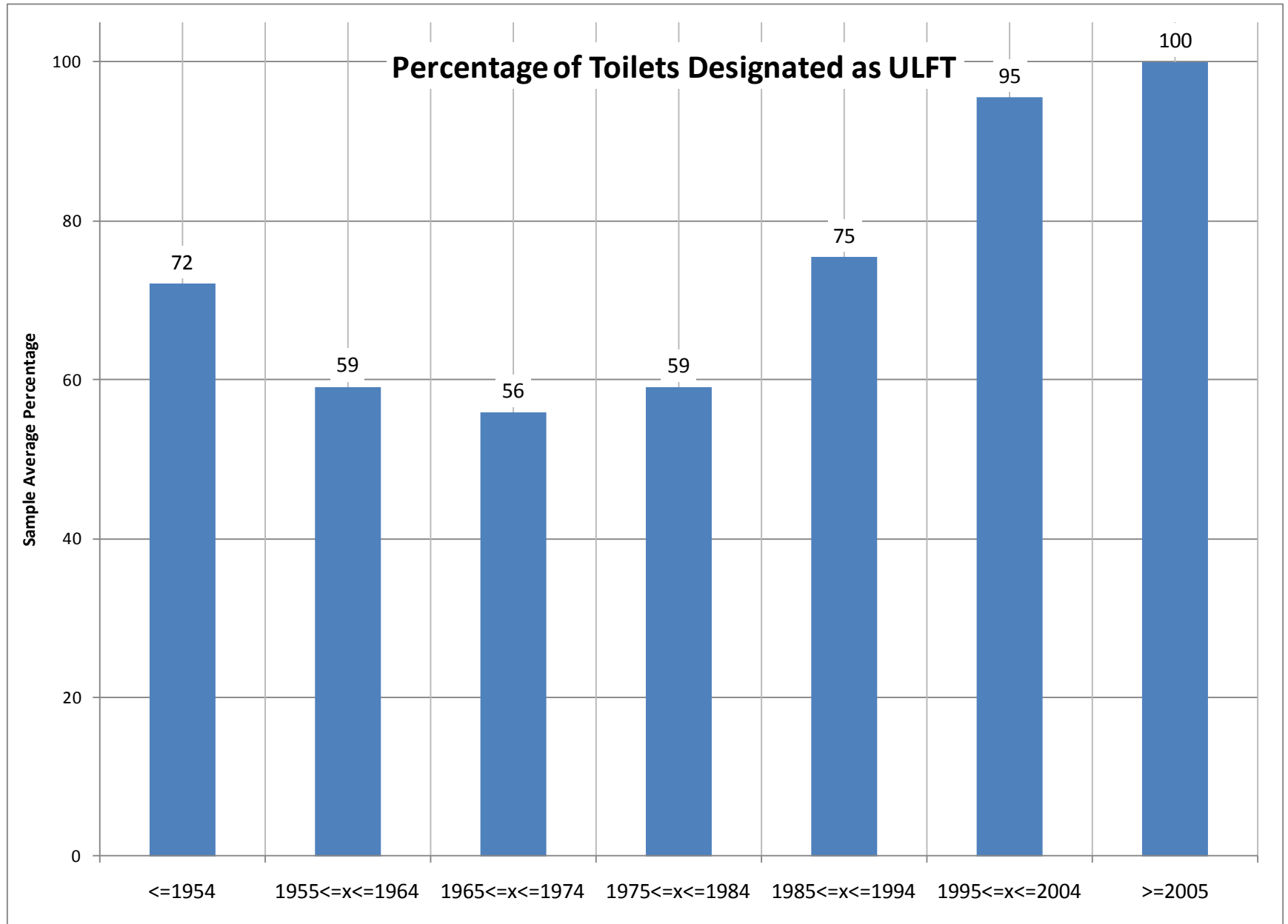
- Pre-1955
- $1955 \leq x \leq 1964$
- $1965 \leq x \leq 1974$
- $1975 \leq x \leq 1984$
- $1985 \leq x \leq 1994$
- $1995 \leq x \leq 2004$
- Post-2004



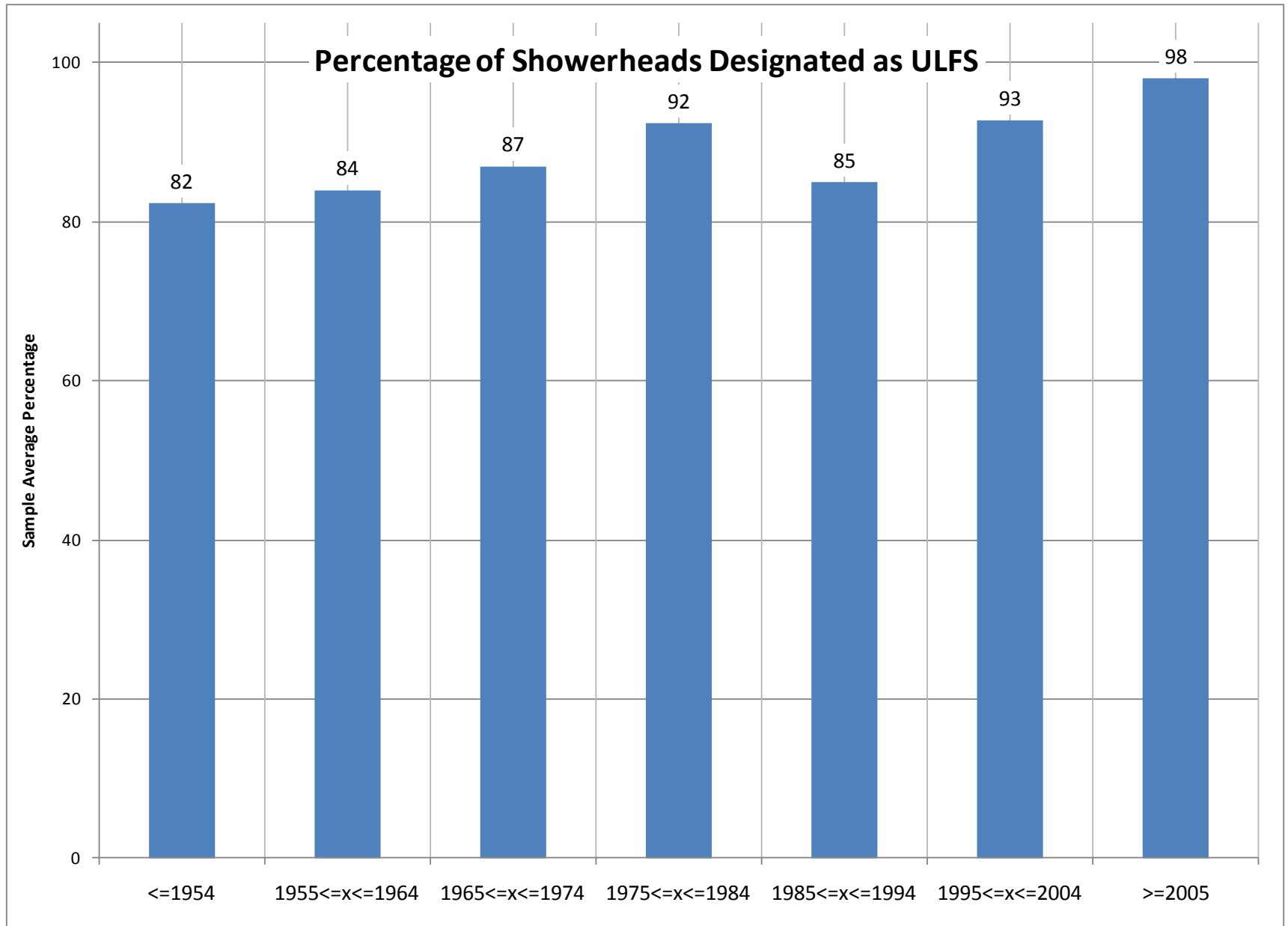
# Breakdown of Sample by Age Cohort

Year of Construction	Number of Homes	Percent of Total Sample	Cumulative Frequency	Cumulative Percent
<=1954	79	15.49	79	15.49
1955<=x<=1964	81	15.88	160	31.37
1965<=x<=1974	72	14.12	232	45.49
1975<=x<=1984	76	14.90	308	60.39
1985<=x<=1994	80	15.69	388	76.08
1995<=x<=2004	61	11.96	449	88.04
>=2005	61	11.96	<b>510</b>	100.00

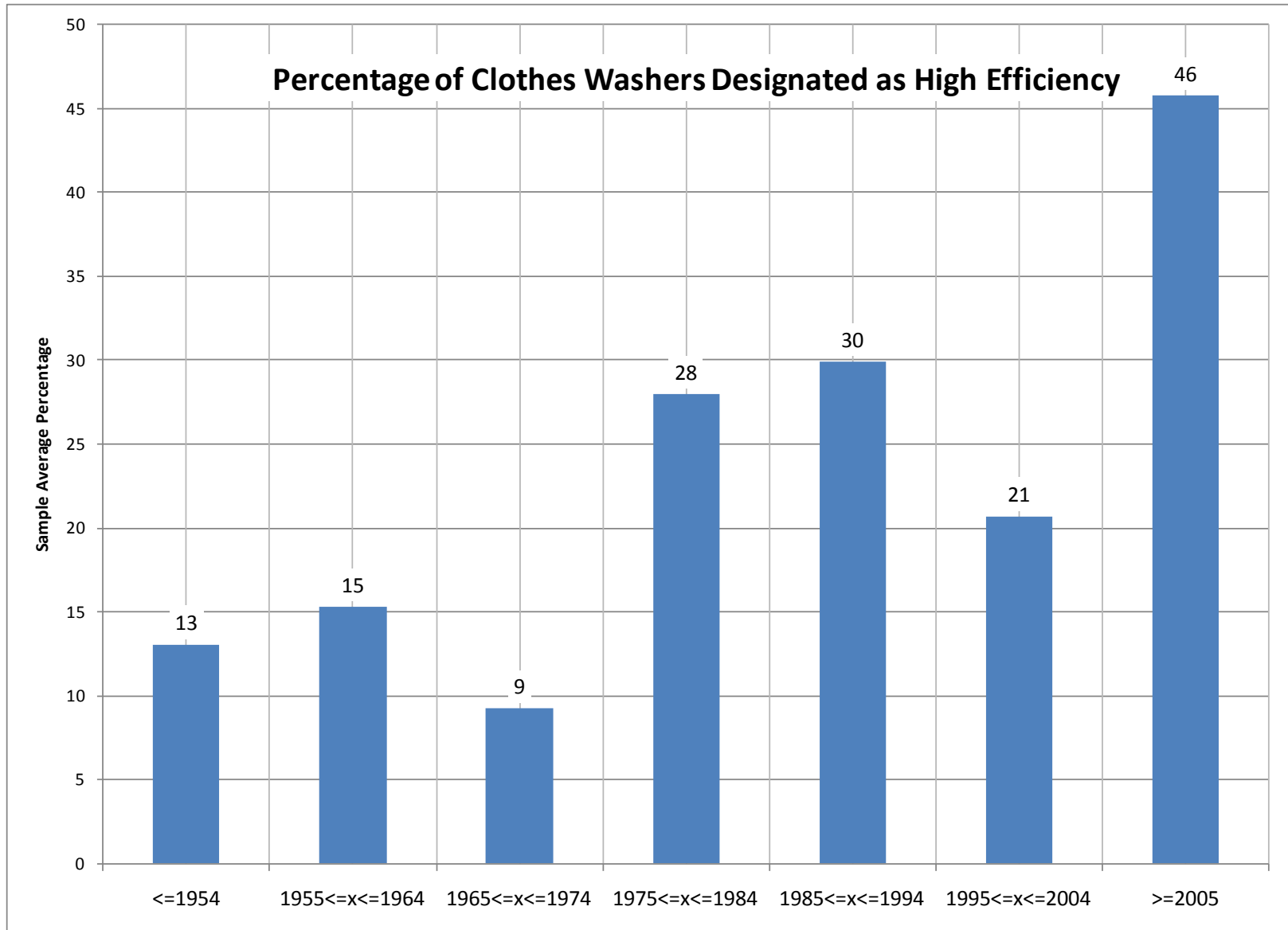
# Presence of ULF Toilets



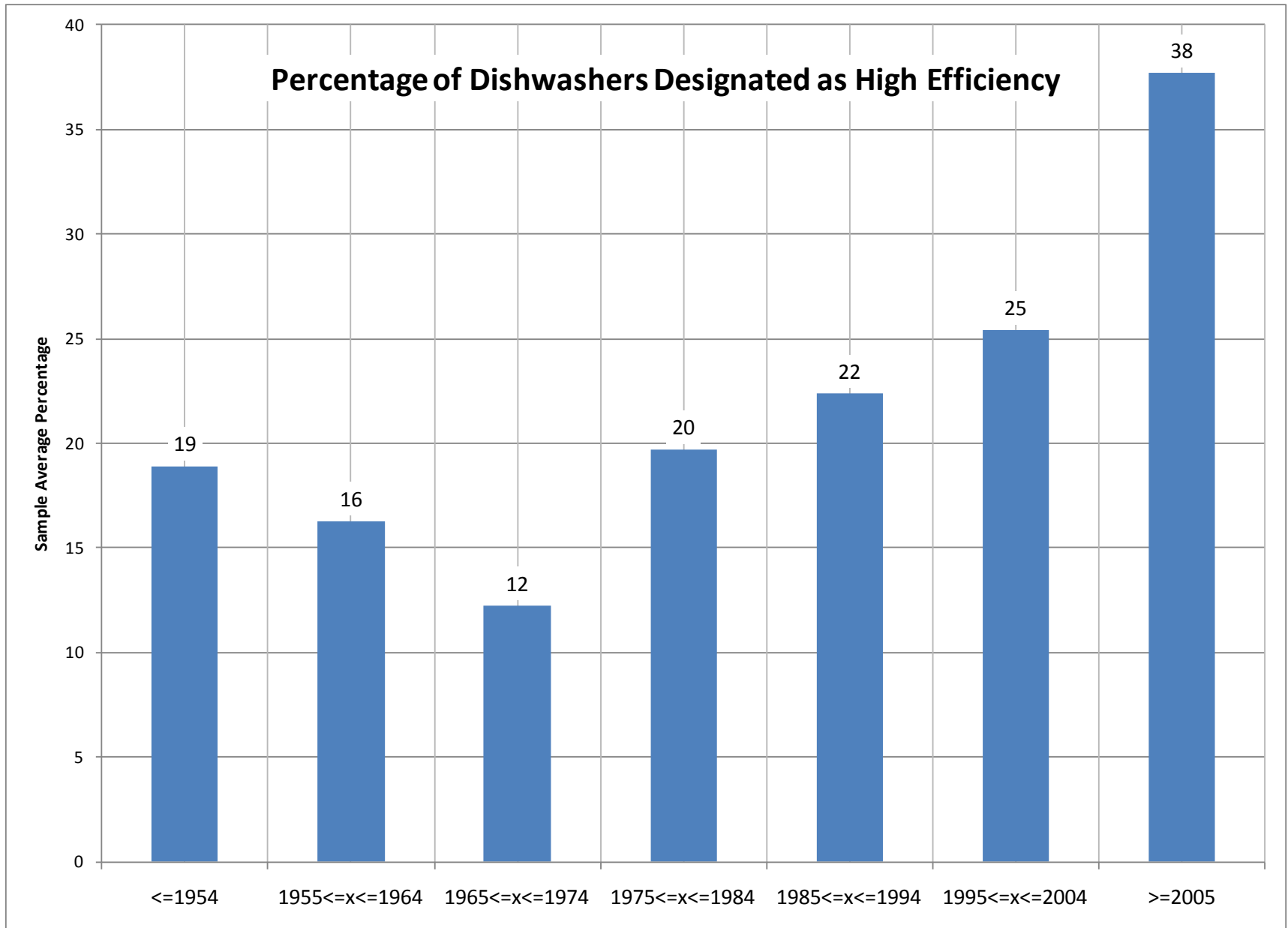
# Presence of ULF Showerheads



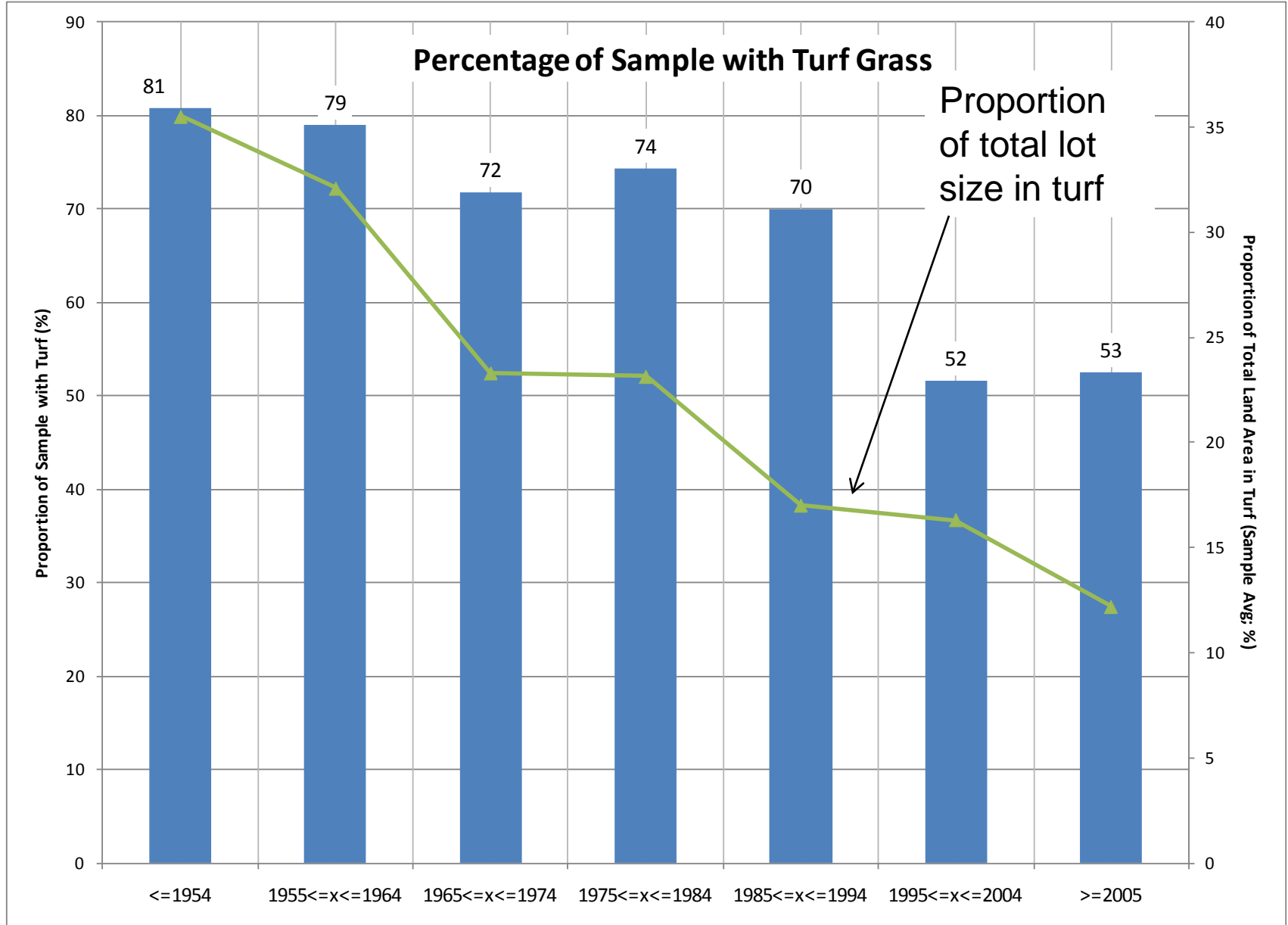
# Presence of High Efficiency Clothes Washers



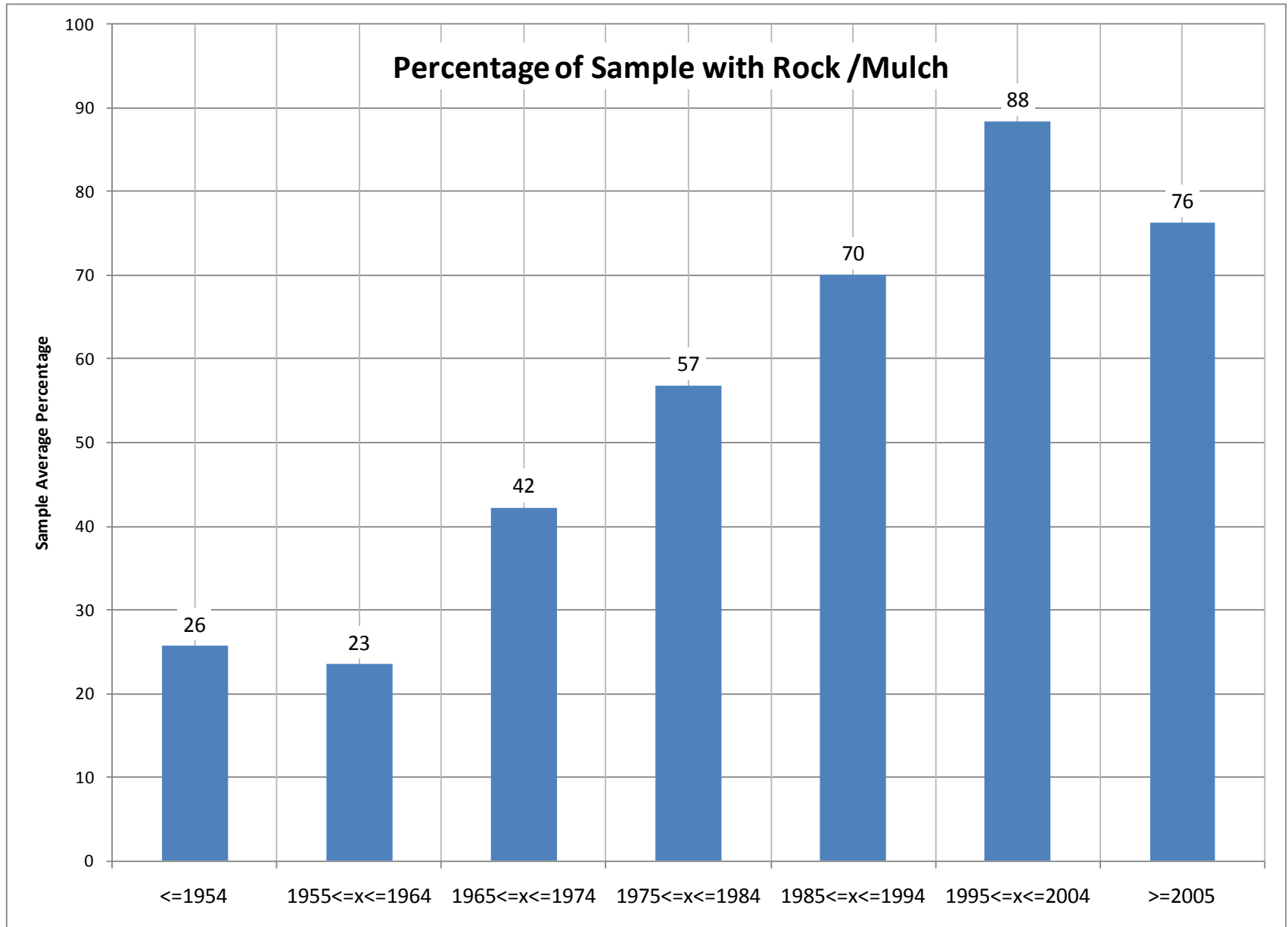
# Presence of High Efficiency Dishwashers



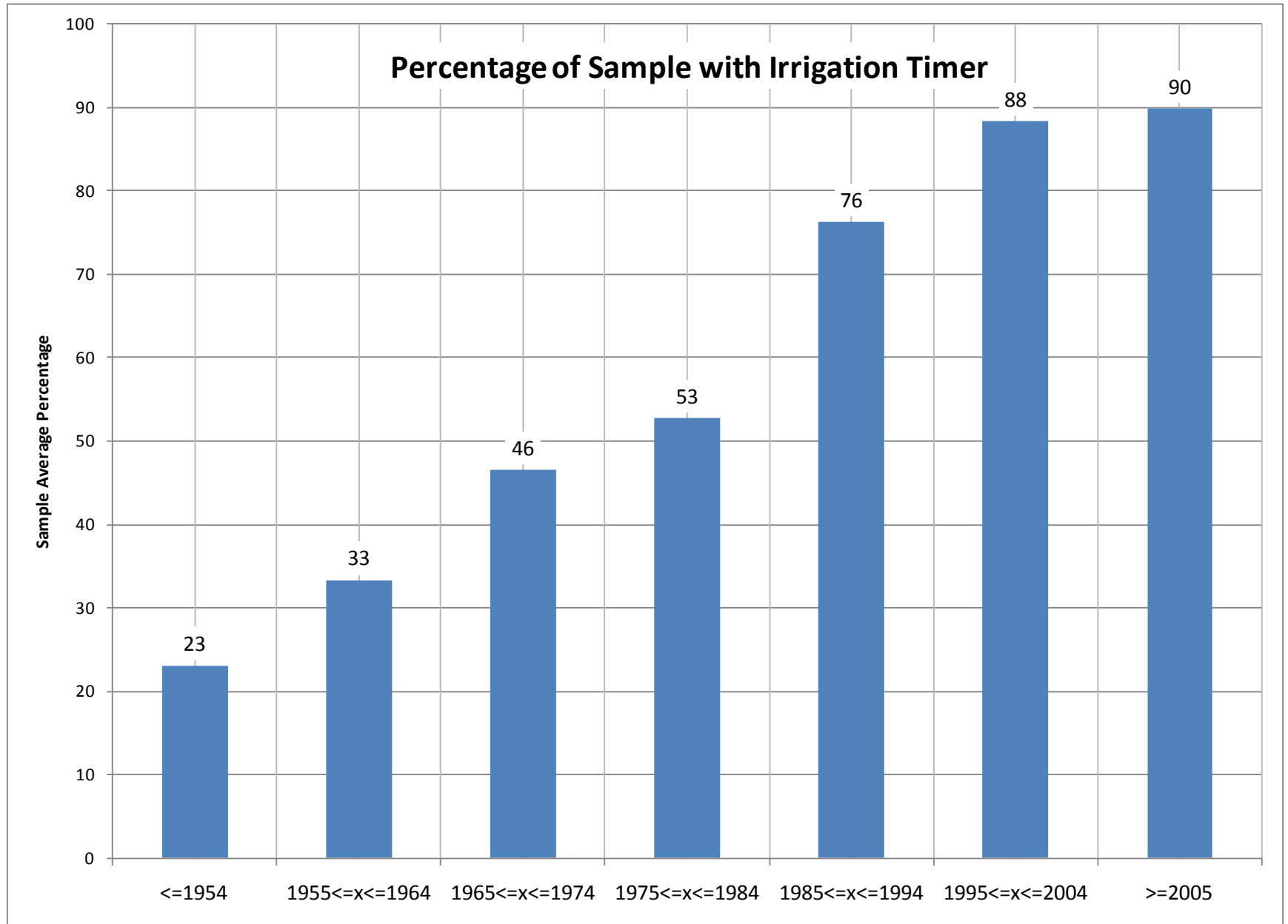
# Presence of Turf Grass



# Integration of Rock/Mulch

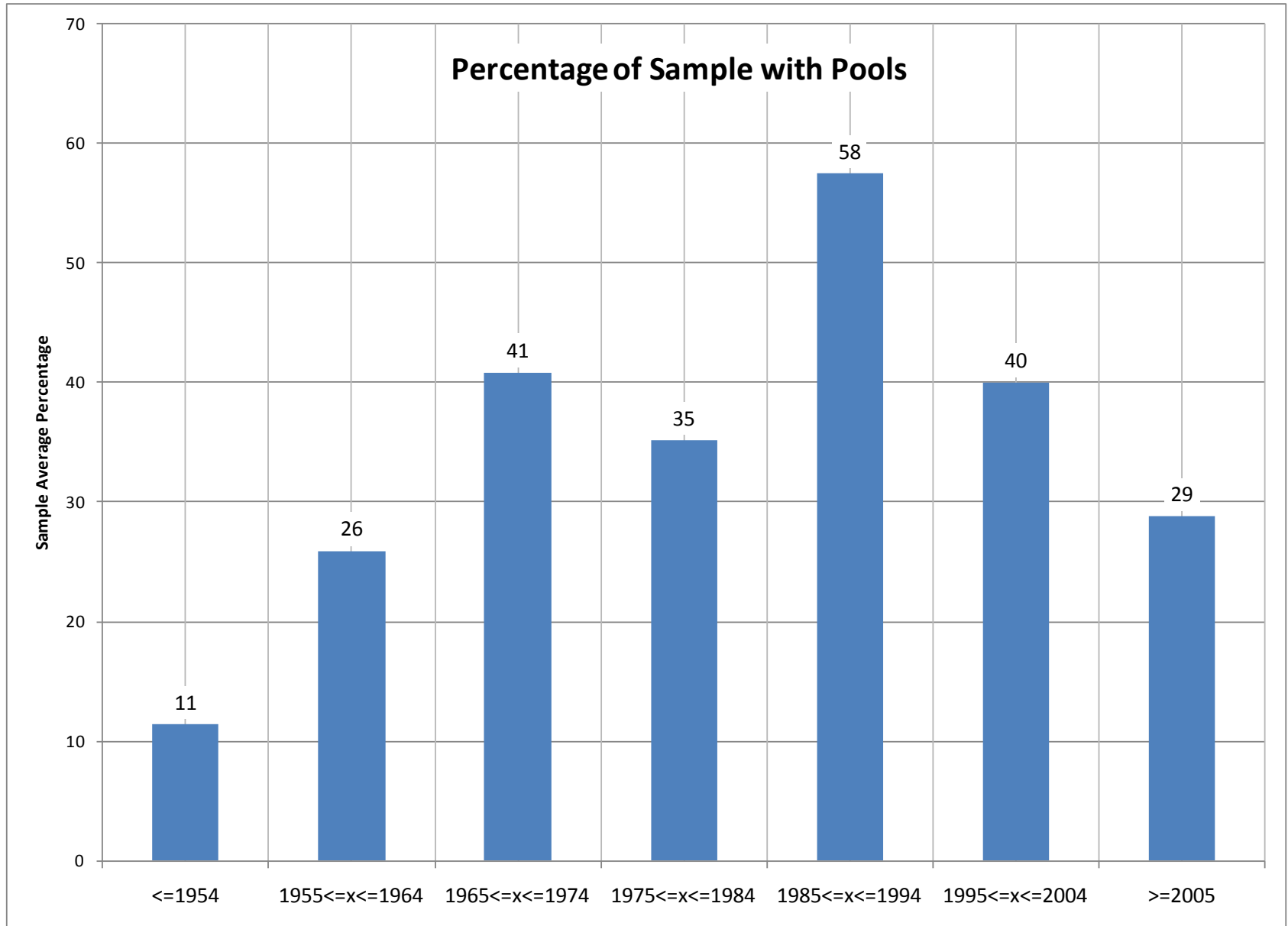


# Presence of Irrigation Timers

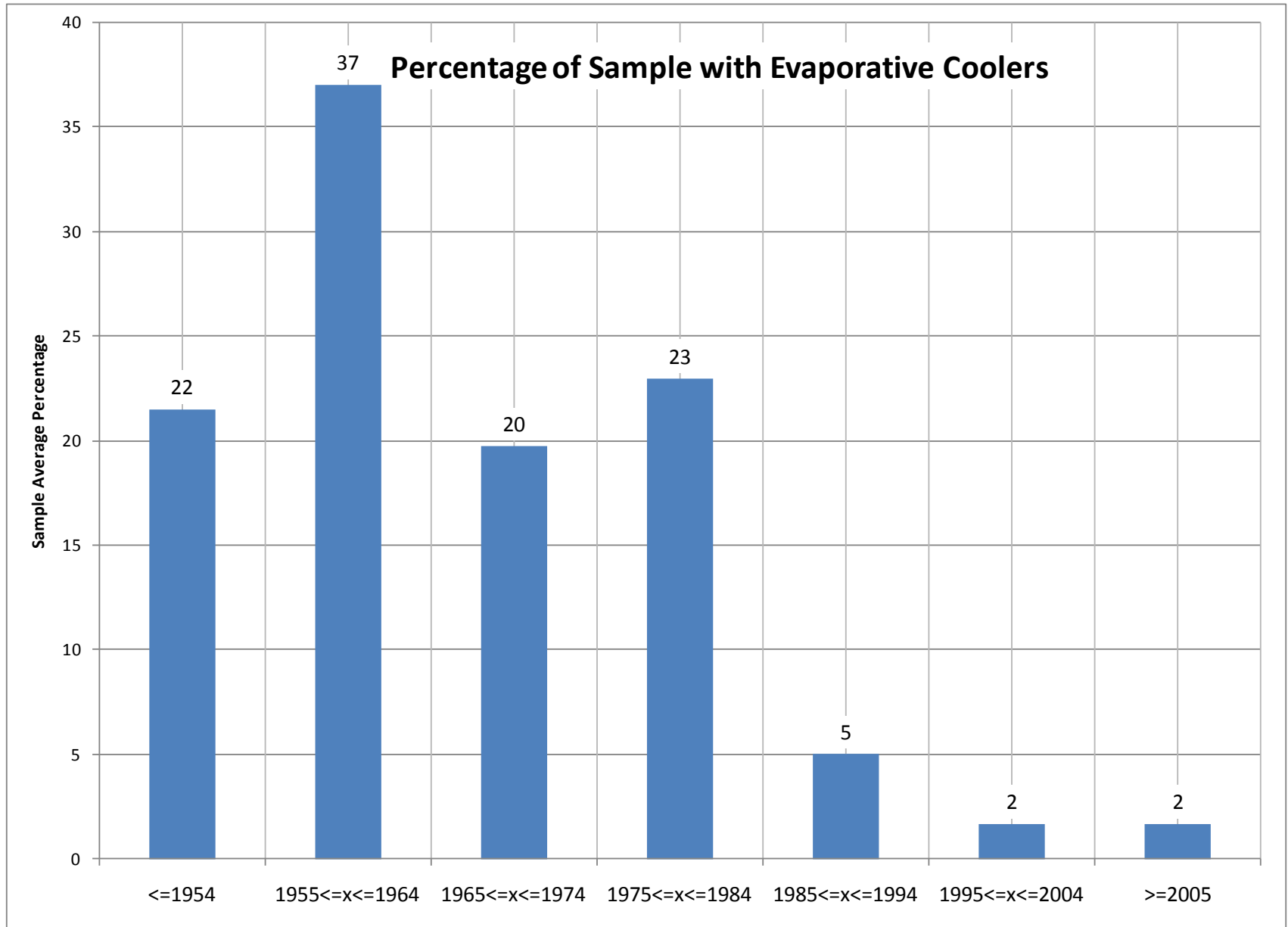




# Presence of Swimming Pools



# Presence of Evaporative Coolers



# Baseline Summary

Percentage of Total Sample Having End Use or Feature	
End Use or Feature	Percent Presence
Low Flow Showerheads (<=2.5 gpm)	88.7
Low Flow Toilets (<=1.6 gpf)	74.2
Low Flow Faucets (<=2.2 gpm)	58.3
HET Clothes Washers	22.9
HET Dishwashers	22.3
<hr/>	
Turf Grass	70.0
Irrigation Timer	56.6
Rock/Mulch	52.7
Swimming Pools	34.1
Evaporative Coolers	16.5

Estimate and Comparison of Flows <sup>2</sup>				
Device	Number of Devices	Average Rated Flow (gpf or gpm)	Federal Standard	HET Standard
Toilets	1,161	1.96	1.60	1.28
Shower Heads	1,064	2.46	2.50	2.00
Bathroom Faucets	2,040	2.24	2.20	1.50

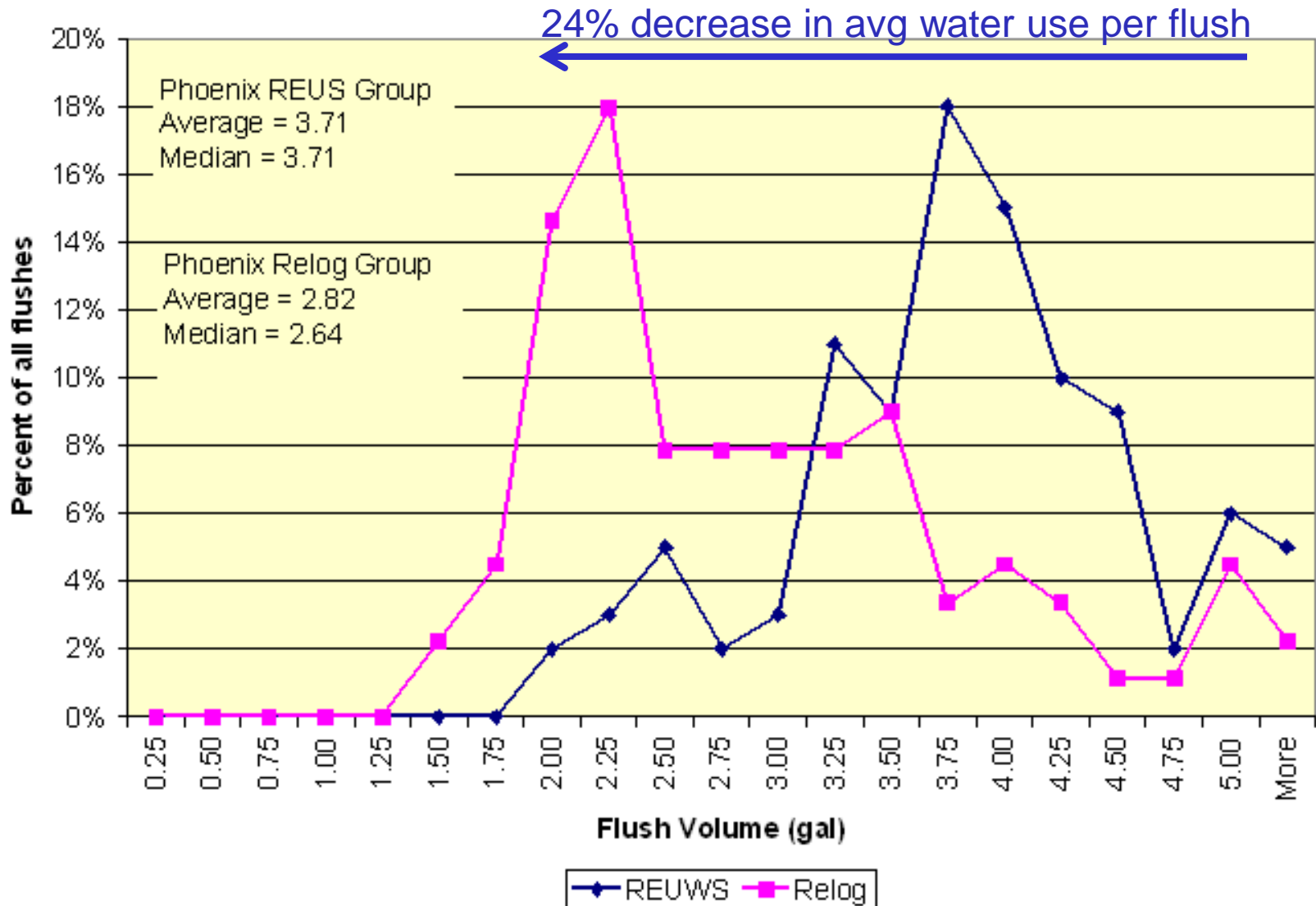
Significant capacity for additional efficiency under existing technology

Considerably more potential with more efficient standards

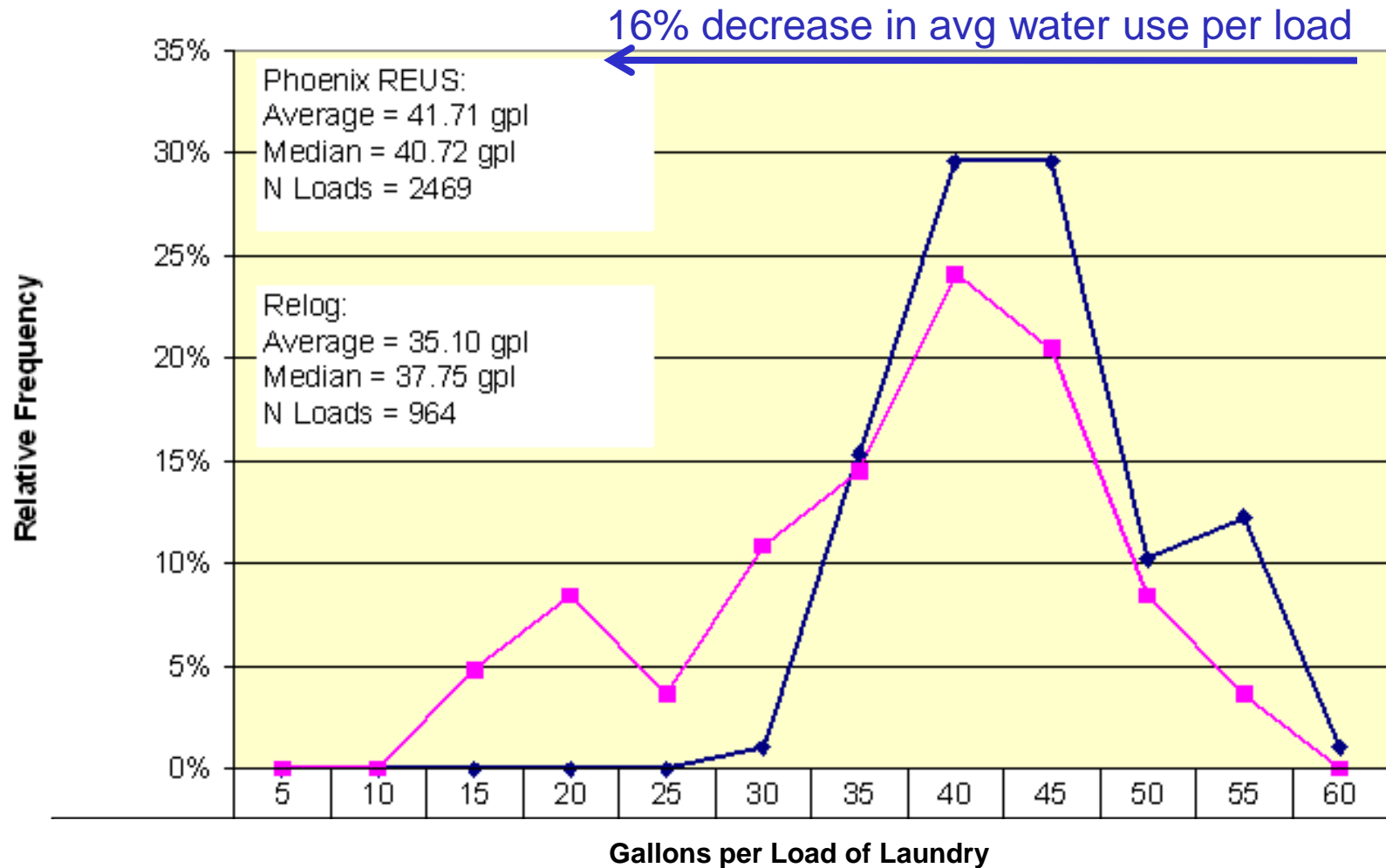
# Data Re-Logging of Homes

- 89 of 99 single-family meters logged in 1997 as part of Residential End Uses of Water Study still active
- Homes re-logged by AquaCraft Inc. for a single 2-week period
- Objective: evaluate trend in indoor efficiency
- Decrease in average household use of about 20 gallons per day from 1997 to 2009
- Evaluation of end uses event characteristics revealing

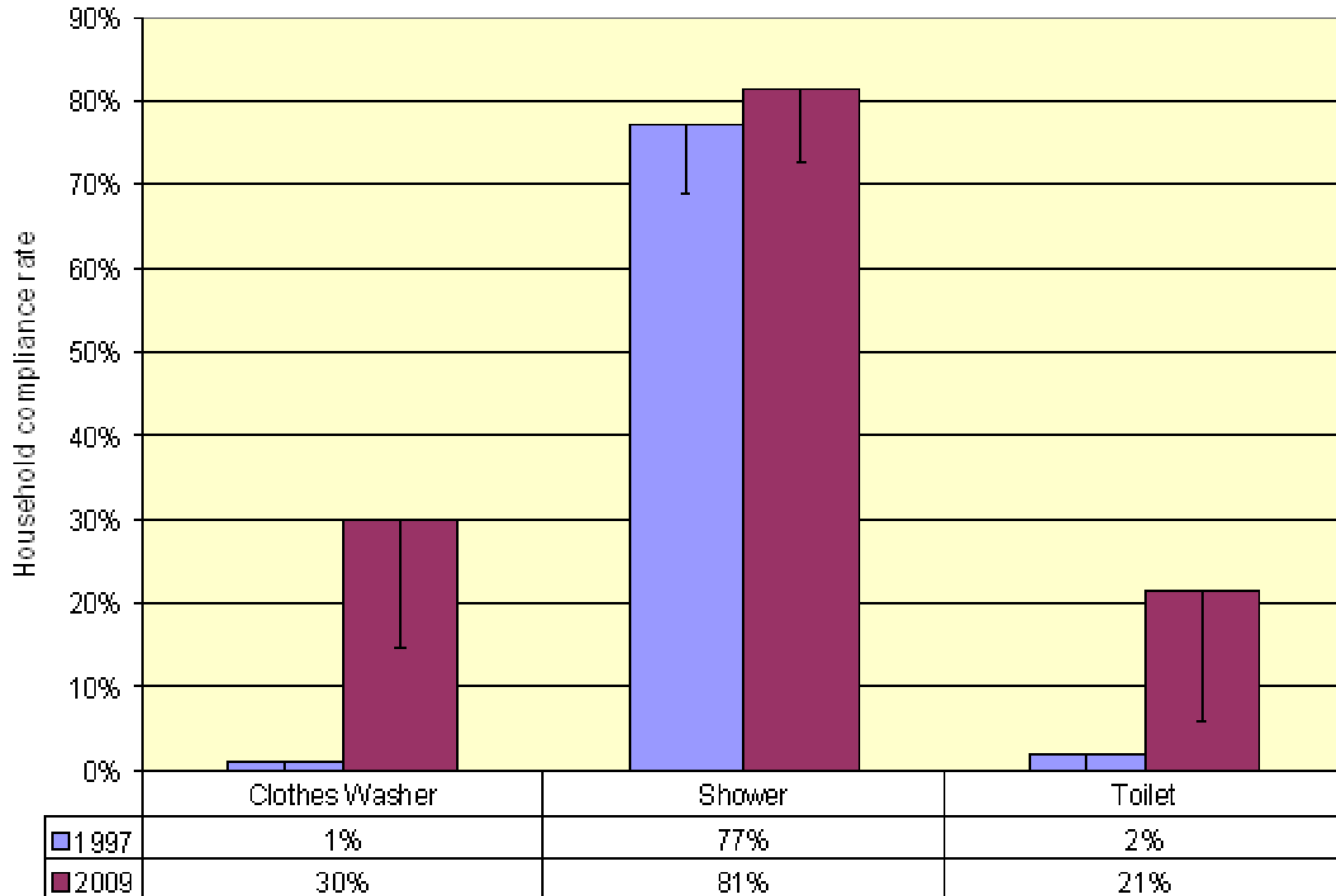
# Decrease in Average Flush Volumes



# Decrease in Gallons per Load of Laundry



# Proportion of Efficient End Uses or Events



# Synopsis

## Previous operating assumption:

- Water demand & wastewater generation would increase steadily with population growth.

## What we are learning:

- Water demand and wastewater generation has been relatively flat despite significant population growth.



# Synopsis

## Previous operating assumption:

- Water demand from existing homes & businesses would be stable without intervention.

## What we are learning:

- Low-flow technology is systematically integrated in older housing stock and commercial properties.

# Prospective Future

- New development will be more efficient than base
- Older housing stock and businesses will improve efficiency for decades
- Rate increases and cultural trends will continue influencing low-water landscaping
- Rate revenue will fall unless rates are increased, and when rates are increased, demand may drop further
- Large distribution (and collection) networks will deliver smaller volumes

# Implications for Planning

- **Continue to monitor and adapt**
- Revise demand forecast and supply acquisition outlook
- Emphasize shortage planning
- Address long-term revenue impacts and pricing strategies
- Revise engineering standards to reflect lower flows
- Evaluate operational consequences of lower flows

# On-Going and Future Demand Analyses

- Multifamily field survey underway
- Expand data-logging for new homes
- Evaluate advanced interval-metering technology
- Conduct nonresidential field surveys
- Examine role of water pricing on rates of adoption for water efficiency
- Perform wastewater flow metering for different types of land-use

# THANK YOU

**Jack C. Kiefer, Ph.D., Hazen and Sawyer, P.C.**

**[jkiefer@hazenandsawyer.com](mailto:jkiefer@hazenandsawyer.com)**

**(618) 889-0498**

**Adam Q. Miller, Phoenix Water Services**

**[adam.miller@phoenix.gov](mailto:adam.miller@phoenix.gov)**

**(602) 262-4575**